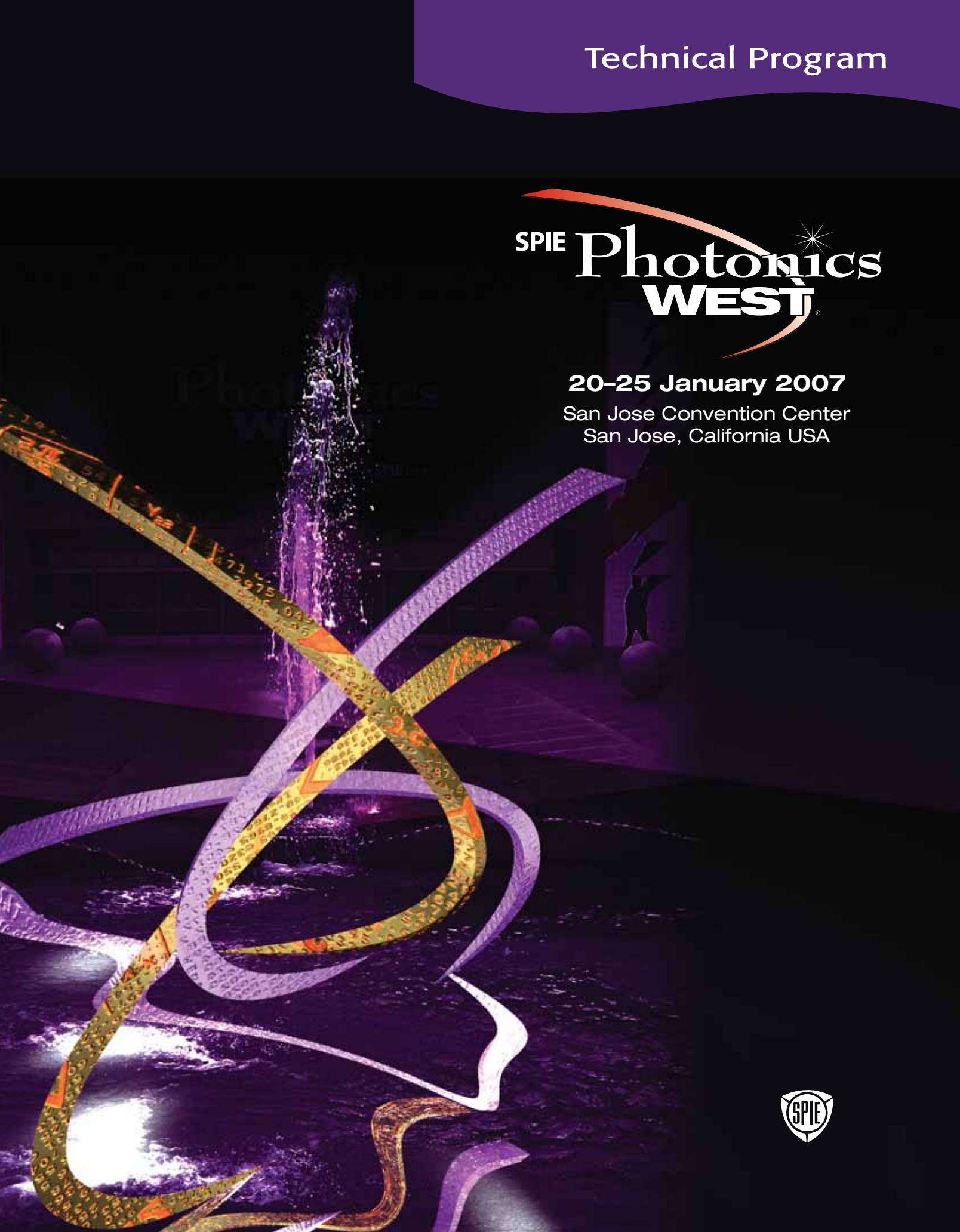
Technical Program

SPIE Photonics WEST

20–25 January 2007

San Jose Convention Center
San Jose, California USA



New from

HAMAMATSU

The next level in TDI-CCD sensors and cameras.

Advanced TDI technology with 50 KHz line rates and 100 times more signal.

Hamamatsu TDI technology is unique in its entirety. Through our complete vertical integration, we enable quality assurance and accountability at every step of product development, creating truly advanced TDI-CCDs and board-level cameras, with low dark current and a wide dynamic range.

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128 TDI Stages for Better Images: Producing huge signal levels, far superior to conventional imaging techniques.

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Industry-Leading Characteristics: Including bidirectional readout capabilities, up to 16 amplifier ports, external triggering capabilities to synchronize TDI clocking with the motion of a moving object, and speeds approaching 500 million pixels per second.

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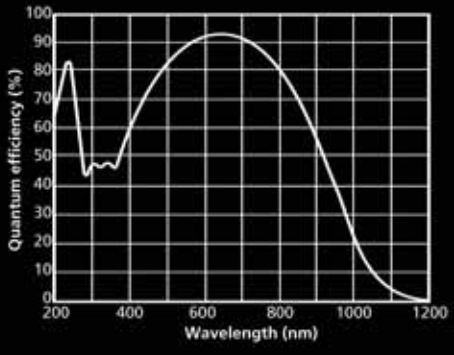
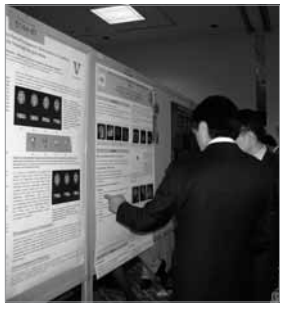
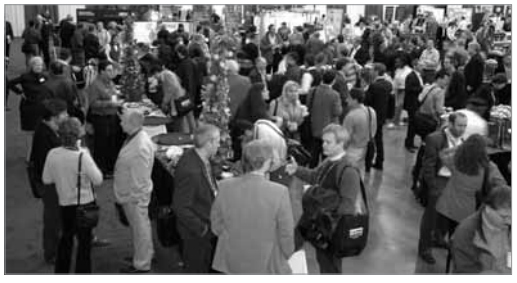
Collaboration between our CCD design team, wafer process group, and electronics and software engineers has resulted in the most advanced TDI-CCD technology available. For all this, plus the highest level of service in the industry, look only to Hamamatsu.



HAMAMATSU *Photonics*

For more information, please visit sales.hamamatsu.com/TDI • USA 800.524.0504 • Europe 00.800.800.800.88





SPIE Photonics WEST

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San Jose Convention Center
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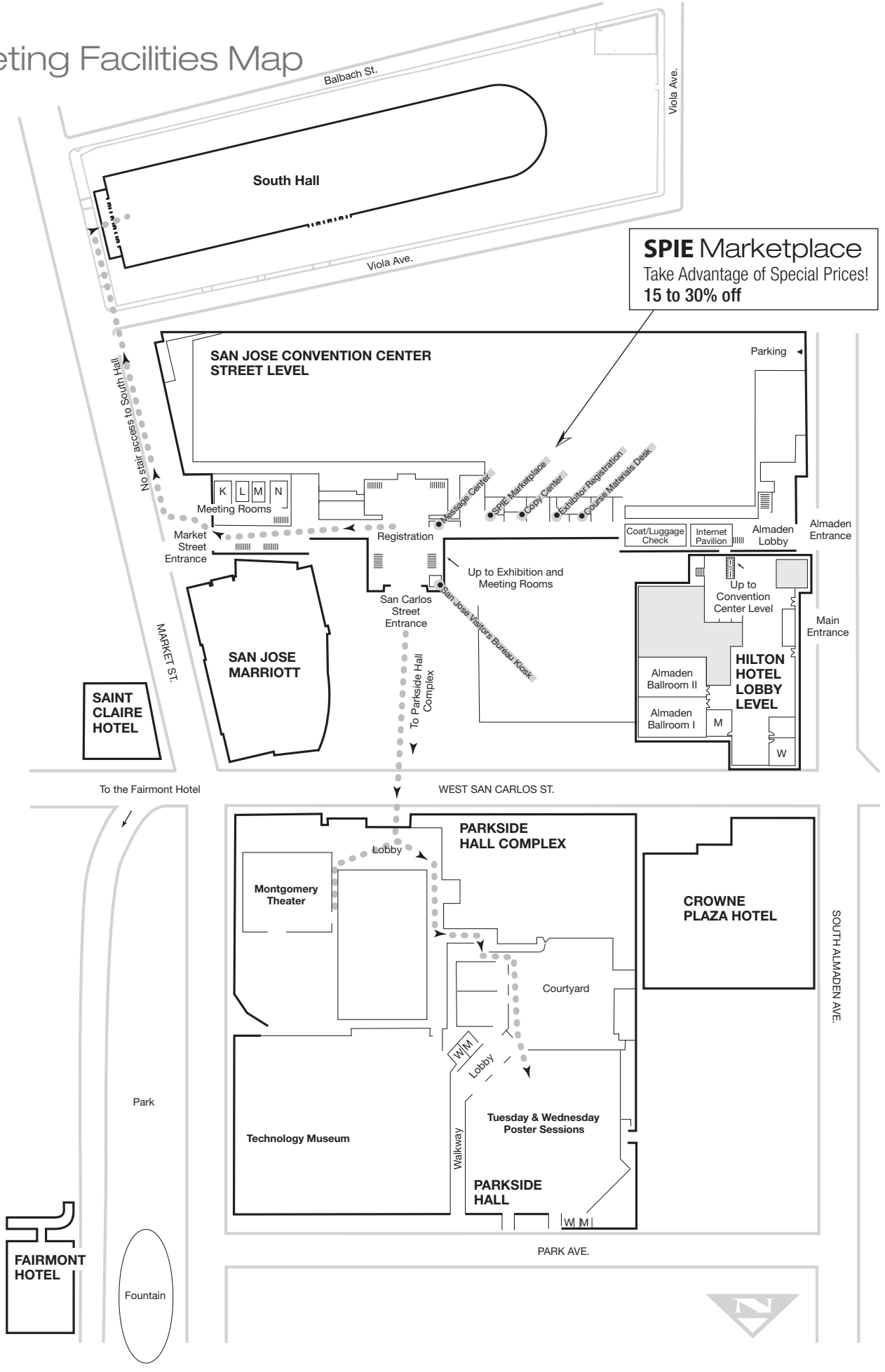
Contents

SPIE would like to express its deepest appreciation to the program chairs, conference chairs, cochairs, program committees, and session chairs who have so generously given of their time and advice to make this symposium possible. The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members.

This program is based on commitments received up to the time of publication and is subject to change without notice.

Meeting Facilities Map



ESDI Engineering Tomorrow's Optical Technology Today

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Thank you for trusting us for 10 years to deliver high-precision metrology solutions.

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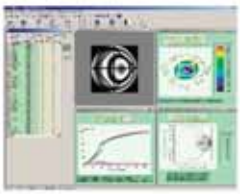
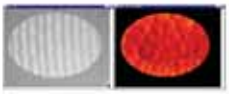


***IntelliWave™* Interferometric Analysis Software**
Works with virtually any interferometer. Our new release, ***IntelliWave™ 2006***, features advanced automatic fringe tracing, new measurement wizards, and ISO standard 10110-5 support. Our ***IntelliWave™ Library***, the ***IntelliWave™*** internal data processing engine, is available as a developer's library that can be called from any programming language. We also provide training courses to help users be more proficient with ***IntelliWave™*** and get an optimum solution for their applications.



***IntelliPhase™* Vibration-Insensitive Smart Solution**
Embedded in every ***IntelliWave™*** license, including ***IntelliWave™ Library***, ***IntelliPhase™*** works with virtually any interferometer. This is a 'no hardware' solution to obtain many of the benefits of vibration insensitive technology.

Interferometer Upgrade Kit
Make use of your existing interferometer. Get the latest hardware and software, and save up to 75% over the cost of a new system, while obtaining the benefits of vibration-insensitive technology embedded in ***IntelliWave™***. The kit consists of a camera, frame grabber, pzt, analog card, and ***IntelliWave™***.

***Intellium™ Z30* Affordable Super Compact 30mm Fizeau Interferometer for Small Spherical and Flat Optical Testing**
Fast and simple operation for production floor QC. The ***Intellium™ Z30*** has a compact footprint of 80mmx180mmx215mm.

***Intellium™ Z40* and *Intellium™ Z100* Ultra Compact 40mm Fizeau Interferometer and World's Most Compact 100mm Fizeau Interferometer for Flat or Spherical Surfaces**
True HeNe 632.8nm laser, 6x continuous zoom, focus control +/- 1500mm for ***Intellium™ Z40*** and +/- 2000mm for ***Intellium™ Z100***. Compatible with all industry standard reference optics and interferometer accessories. Premium-quality measurements at an affordable price for small optics, precision machined parts, polished ceramics, semiconductors, and wafers. The highest value for performance vs. cost interferometers on the market.

***Intellium™ H2000* Simultaneous Phase-Shifting Fizeau Interferometer for Vibration-Prone Environments**
The highest level phase-shifting performance on the market. Superb 100m coherence length and unshakable reliability. Turn your ordinary interferometer into an extraordinary interferometer with the ***HyperPhase™*** Simultaneous Phase-Shifting Module. Available in OEM quantities for existing interferometers or in completely new systems. ***HyperPhase™*** translates previously impossible measurements into mainstream processing capabilities. Particularly suitable where vibration insensitivity is critical.

***Intellium™ SBSI* Shearing Interferometer**
Visualize collimation and wavefront of 0.12 to 8mm diameter beams in real-time. Ideal for small beam wavefront analysis such as laser diodes, fiber optic systems, optical alignment of holographic storage & disk mastering systems, and OEM integration for real-time monitoring of laser collimation. Also capable of measuring small optical surfaces and performing lens diagnostics.

***Intellium™ PDI* Point Diffraction Interferometer**
The only compact Point DIffraction Interferometer on the market with phase-shifting capability at an affordable price. Incorporating state-of-the-art technology, the interferometer generates its own reference spherical wavefront using a pinhole in a waveplate. The result is a highly stable interferogram that can be phase-shifted using polarization methods. Test beams from 3-25mm diameter can be analyzed.

***HASO* Shack-Hartmann Wavefront Sensors**
Four times the dynamic range of competing systems, up to 1500 waves. Analyze coherent or incoherent light sources in real-time, with instantaneous data refresh rates. The instrument obtains a map of the local slopes of a wavefront using a micro lens array. From slope information, the intensity, phase, aberrations, PSF, MTF, convergence, divergence, beam-waist size/position, M^2, and Strehl ratio can be measured in real-time. These wavefront sensors can be used to analyze lasers, laser diodes, and other coherent or incoherent light sources. Other applications: adaptive optics mea surements, aspheric optics with large wavefront departure, and ophthalmic measurements.

***MiniScatR™* 2D/3D Scatterometer**
For 2D/3D Scattered Light Measurements. A compact motorized optical system for scattering characterization of any kind of material, such as specular, diffuse, etched surfaces, diffraction gratings, powders, liquids, and multilayer films. The instrument allows fast and easy measurement of luminous energy distribution, scattered-light spectral composition, and BRDF/BTDF, in the 3D hemisphere.

***Quantum 5™* 3D Spherical Scatterometer**
Performs hemispherical & spherical light scatter/radiometric measurements in real-time. The highest level of light scatter/radiometric measurement performance on the market. The radiometer measures 3D scattered or radiated light in real-time at 0.2 degrees resolution over the entire hemisphere (or sphere) with a dynamic range of 16000:1. Ideally suited for production and research environments, this instrument offers excellent measurement versatility for biomedical, semiconductor, nanotechnology, and optical applications.

Accessories
We provide a wide range of accessories for interferometers and wavefront sensors.

Measurement Services
We offer measurement services utilizing our product lline.

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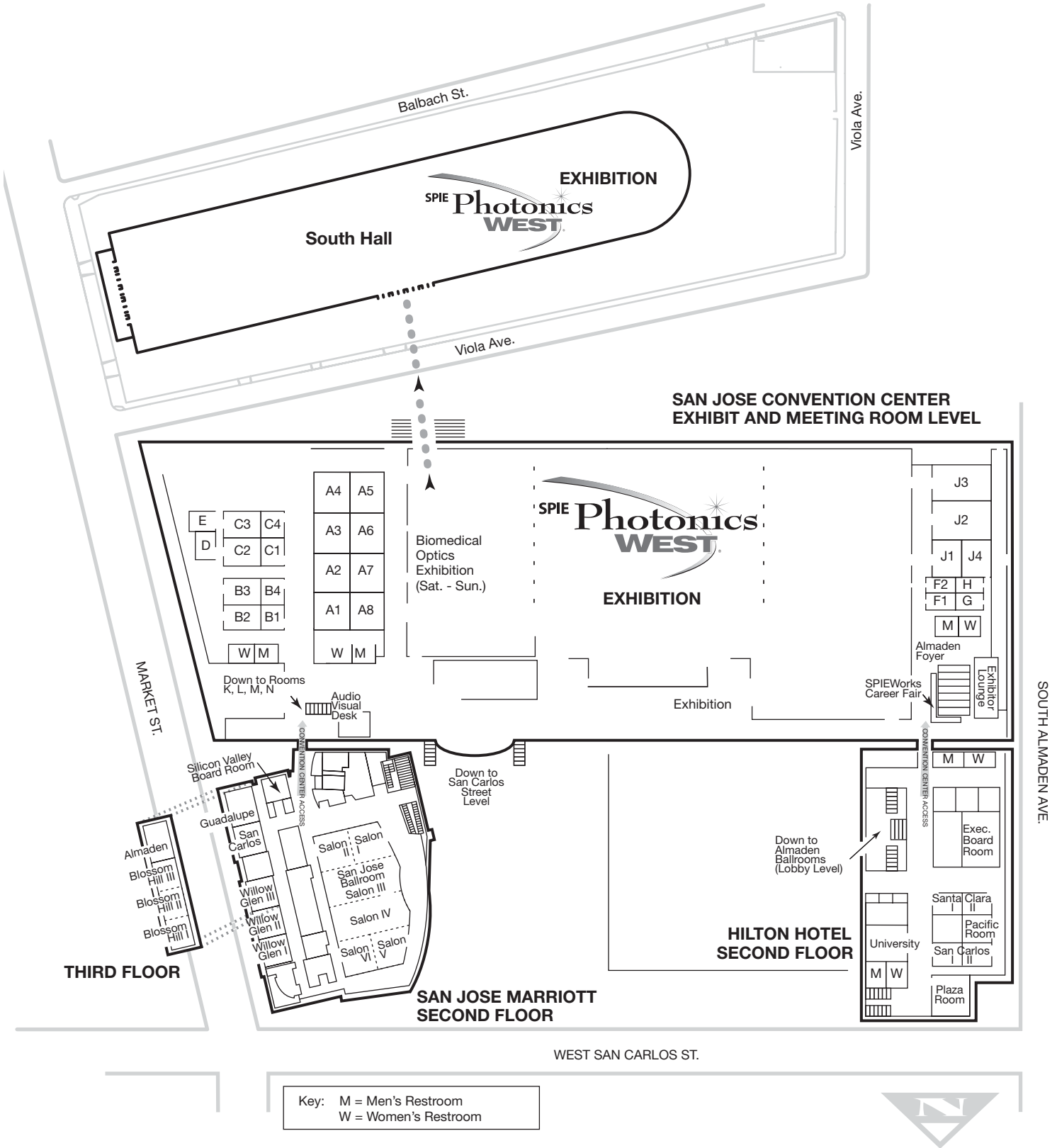
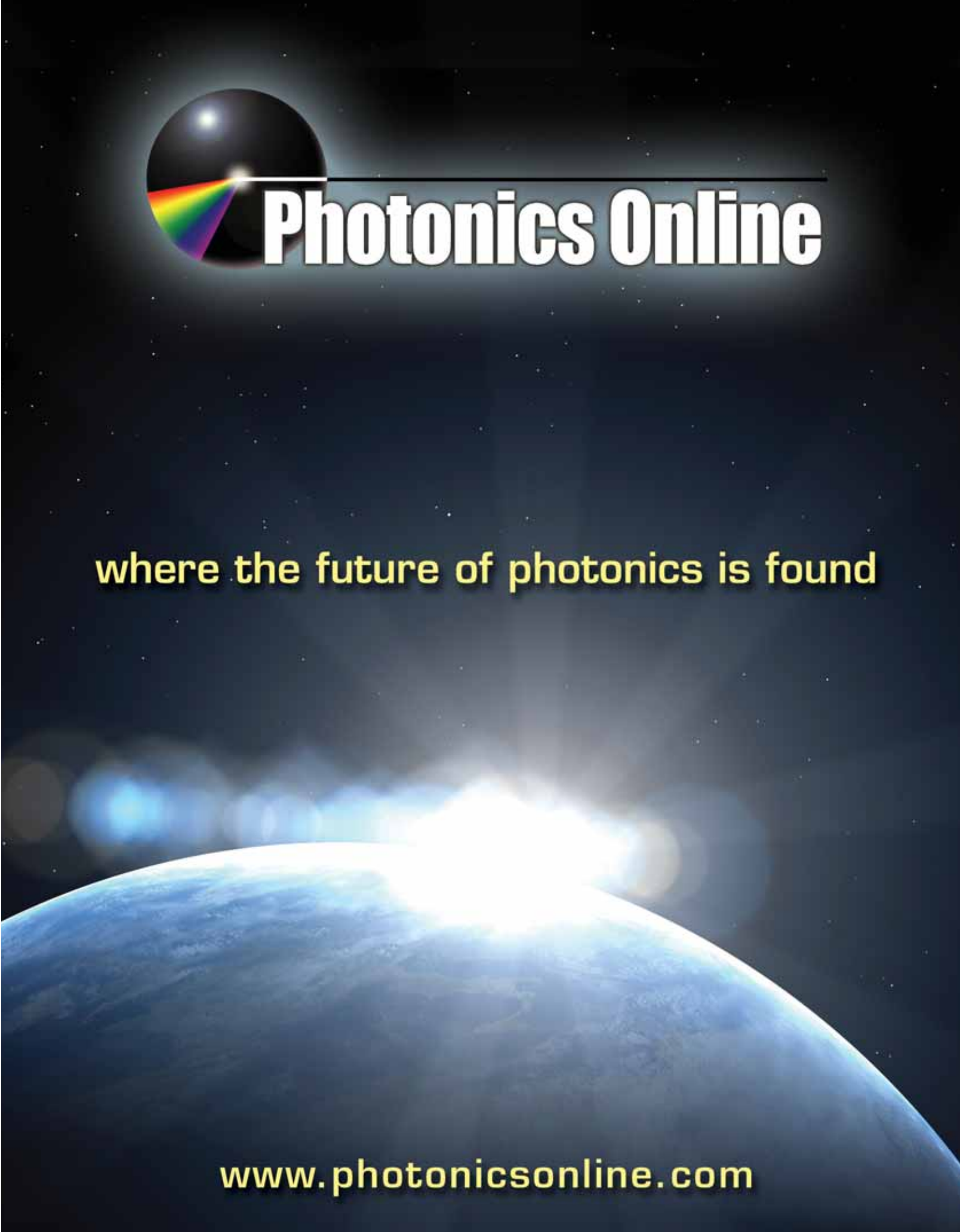
Meeting Facilities Map

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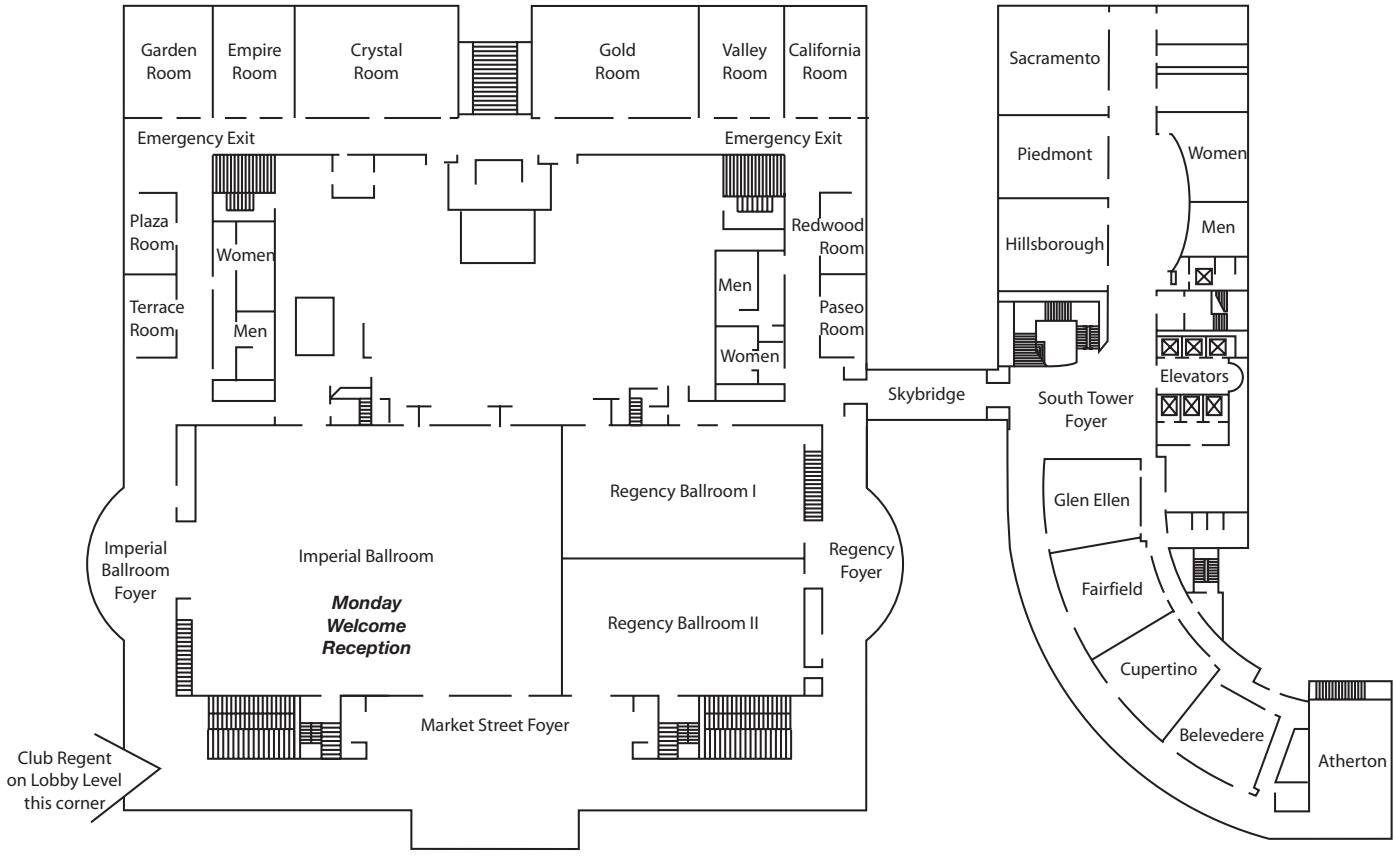
Fairmont Hotel

Ballroom Level (2nd Floor)



Technical Conference Room Lists

BiOS 2007

Biomedical Optics

James Fujimoto,
Massachusetts Institute of Technology

R. Rox Anderson, M.D.,
Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine

Photonic Therapeutics and Diagnostics

Program Chairs: **Reza Malek, M.D.,** Mayo Clinic; **Keith Black, M.D.,** Cedars-Sinai Medical Ctr.

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ.; **Anita Mahadevan-Jansen,** Vanderbilt Univ.

Conference of related interest:

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven Jacques,** Oregon Health and Science Univ.; **William P. Roach,** Air Force Research Lab.

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia; **Daniel Farkas,** Cedars-Sinai Medical Ctr.

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo; **Dan Nicolau,** The Univ. of Liverpool (United Kingdom)

Conference of related interest:

Key

CC = Convention Center
M = Marriott
H = Hilton
F = Fiarmont
SC = St. Claire

LASE 2007

Lasers and Applications in Science and Engineering

Symposium Chairs:

Friedrich G. Bachmann, ROFIN-SINAR Laser GmbH (Germany)

Henry Helvajian, The Aerospace Corp. (USA)

Symposium Cochairs

Jan J. Dubowski, Université de Sherbrooke (Canada)

L. N. Durvasula, DARPA (USA)

Laser Source Engineering

Program Chair: **Gregory Quarles**, VLOC

Nonlinear Optics

Program Chair: **Peter Powers**, Univ. of Dayton

Semiconductor Lasers and LEDs

Program Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

LASE 2007 *Continued*

Laser Communication and Propagation

Program Chair: **G. Stephen Mecherle**, Innocept Inc.

Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp.; **James S. Horwitz**, U.S. Department of Energy

MOEMS-MEMS 2007

Micro & Nanofabrication

Symposium Chair:

Rajeshuni Ramesham, Jet Propulsion Lab.

Symposium Co-Chair:

Albert K. Henning, Aquarian Microsystems

Micro/Nanofabrication

Devices/Applications/Reliability

Optoelectronics 2007

Integrated Optoelectronic Devices

Symposium Chair:

Yakov Sidorin, Photineer Technology Group

Symposium Co-Chair:

Ali Adibi, Georgia Institute of Technology

Optoelectronic Materials and Devices

Program Chair: **James G. Grote,** Air Force Research Lab

Photonic Integration

Program Chair: **Yakov Sidorin,** Photineer Technology Group

Nanotechnologies in Photonics

Program Chair: **Ali Adibi,** Georgia Institute of Technology

Advanced Optoelectronic Applications

Program Chair: **Zameer U. Hasan,** Temple Univ.

Semiconductor Lasers and LEDs

Program Chair: **Daniel K. Johnstone,** Virginia Commonwealth Univ.

Displays and Holography

Program Chairs: **Liang-Chy Chien,** Kent State Univ.; **Ming H. Wu,** Hamamatsu Corp.

Key

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Special Events

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Optics Exhibition

San Jose Convention Center, Exhibition Hall 1

1:00 to 5:00 pm (Saturday) · 10:00 am to 4:00 pm (Sunday)

BiOS Hot Topics, 7:00 to 9:30 pm, p. 14

Workshop: **Prospects of Molecular Imaging from Bench to Bedside** *(Gandjbakhche/ Tromberg)*, 6:00 to 8:00 pm, p. 14

Annual Meeting of the Photonics Society of Chinese American (PSC): **Solid State Lighting Technologies,** 1:00 to 5:30 pm, p. 21

Workshop: **Intellectual Property Issues in High-Tech Business (WS412),** 8:30 am to 12:30 pm, p. 24

MOEMS-MEMS Plenary Session 9:00 am to 12:00 pm, p. 18

Student Workshop: **Optimizing Your Resume (WS777),** 1:30 to 3:30 pm, p. 12

Workshop: **Basic Optics for Non-Optics Personnel (WS209),** 1:30 to 3:30 pm, p. 24

Workshop: **Intellectual Property: Prior Art Searching (WS758),** 1:30 to 5:30 pm, p. 25

Workshop: **Strategies and Tactics for High-Tech Sales Success (WS826),** 1:30 to 5:30 pm, p. 25

Welcome Reception, Fairmont Hotel, Imperial Ballroom, 6:00 to 7:30 pm, p. 10

Panel Discussion: **Progress and Prospects in Microfluidics,** 7:30 to 9:30 pm, p. 19

Photonics West Exhibition

San Jose Convention Center, Exhibition Hall 1–3, Exhibit Foyer and South Hall

10:00 am to 5:00 pm (Tuesday) · 10:00 am to 5:00 pm (Wednesday) · 10:00 am to 4:00 pm (Thursday)

SPIE WORKS

Attend the SPIEWorks Career Fair!

Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance

11:00 am to 3:00 pm (Tuesday) · 11:00 am to 3:00 pm (Wednesday)

Workshop: **Off the Beaten Path: Career Opportunities for Engineers in the Patent Boom (WS827),** 8:30 to 12:30 pm, p. 25

Optoelectronics Plenary Session, 8:30 to 10:00 am, p. 20

Student Lunch with the Experts, 12:30 to 1:30 pm, p. 12

Industry Perspective: **Executive Panel: Market Direction and Implications for the World of Photonics,** 2:00 to 3:00 pm, p. 22

Become an SPIE Committee Volunteer, 6:00 to 7:30 pm, p. 12

BiOS Poster Session, Parkside Hall, Civic Auditorium Complex, 6:00 to 7:30 pm

Round Table Discussion: **Optical Microsystems for Biomedical Applications**, 7:30 to 9:00 pm, p. 19

Technical Group Meeting: **IBOS—International Biomedical Optics Society,** 7:30 to 9:00 pm, p. 14

Technical Group Meeting: **Illumination,** 7:30 to 9:00 pm, p. 20

Technical Group Meeting: **Global Homeland Security,** 7:30 to 9:00 pm, p. 21

Technical Group Meeting: **Holography,** 7:30 to 9:00 pm, p. 20

Workshop: **Understanding Laser Beam Performance Specifications (WS828),** 8:30 to 12:30 pm, p. 26

Workshop: **The Craft of Scientific Presentations: A Workshop on Technical Presentations (WS667),** 8:30 am 12:30 pm, p. 26

LASE Plenary Session, 10:30 am to 12:30 pm, p. 16

Workshop: **The Craft of Scientific Presentations: A Workshop on Technical Writing (WS668),** 1:30 to 3:30 pm, p. 12

Workshop: **How to Start a Small High Tech Business Almost Anywhere (WS756),** 1:30 to 5:30 pm, p. 24

Industry Perspective: **The Impact of Solid State Devices — Inorganic and Organic, Diodes and Lasers — On the Display Business,** 2:00 to 3:00 pm, p. 23

OPTO, LASE, MOEMS-MEMS Poster Session, Parkside Hall, Civic Auditorium Complex, 6:00 to 7:30 pm

Become an SPIE Committee Volunteer, 6:00 to 7:30 pm, p. 12

Women in Optics Sponsored: **Presentation and Reception,** 7:00 to 8:30 pm, p. 13

Technical Group Meeting: **Laser Communications,** 7:30 to 9:00 pm, p. 17

Workshop on Building a Nanophotonics Roadmap, 8:30 am to 12:30 pm, Fairmont Hotel, Hillsborough Room, p. 21

Industry Perspective: **Trends and Opportunities in Biophotonics,** 9:15 to 9:45 am, p. 23

Best Student Presentation Award: **Solid State Laser Technology XVI: Technology and Devices,** 9:50 am, p. 17

Best Student Presentation Award: **Fiber Lasers IV: Technology, Systems, and Applications,** 5:30 pm, p. 17

Welcome Reception

Fairmont Hotel, Imperial Ballroom

Monday 22 January · 6:00 to 7:30 pm

All attendees are invited to relax, socialize, and enjoy refreshments while establishing and renewing connections with colleagues. Please wear your conference badge. Dress is casual.

Conference Poster Sessions

Parkside Hall, Civic Auditorium Complex, 180 W. San Carlos St.

DISPLAY HOURS

Posters will be on display from 6:00 to 7:30 pm.

Tuesday 23 January for BiOS conferences

Wednesday 24 January for OPTO, LASE, and MOEMS-MEMS conferences

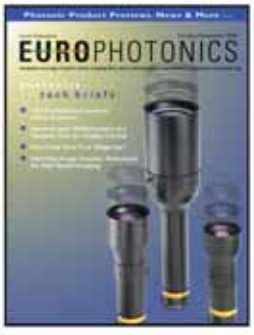
All symposium attendees are invited to attend the poster sessions and enjoy refreshments while reviewing poster papers. Attendees are requested to wear their conference registration badges to the poster sessions.

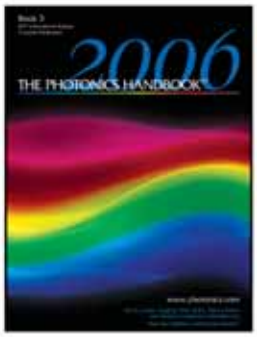
Poster sessions are technical events and part of the conference program; it is not appropriate for spouses and families to attend these events.

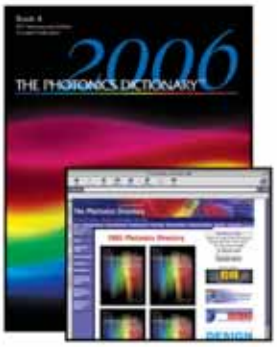
Poster Setup

Poster presenters: see p. 271 for instructions on setting up your posters.

The Most Powerful Sources for Photonics Information







Photonics Spectra is today's leading source of technological solutions and of news and information about photonics. It is the magazine referred to worldwide by the largest audience of photonics engineers, scientists and end users. Integrating all segments of photonics, **Photonics Spectra** is unique in that it provides both technical and practical information for every aspect of the global industry. For a free subscription, please go to www.PhotonicsSpectra.com.

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Biophotonics International is designed to present the latest global developments and techniques from the photonics industry to those involved in the medical and biotechnological disciplines. **Biophotonics International**'s buying audience is made up of people who use photonics technology in biotechnological or medical products and procedures, plus key researchers looking for new photonic techniques and products to improve methodology and to solve problems.

EUROPHOTONICS

EuroPhotonics is a product-oriented publication dedicated to covering the growing market for photonics with a European focus. It is published bimonthly with a guaranteed distribution of 30,000 to important buyers and users of photonics products and services in Europe. Featured sections include Product Spotlights, Product Previews and News.

THE PHOTONICS DIRECTORY™

THE PHOTONICS CORPORATE GUIDE TO PROFILES & ADDRESSES®

Book 1, **The Photonics Corporate Guide**, provides complete company profiles of more than 4300 international manufacturers — addresses, telecommunications numbers, company sizes, personnel and products.

THE PHOTONICS BUYERS' GUIDE TO PRODUCTS & MANUFACTURERS®

Book 2, **The Photonics Buyers' Guide**, has more than 2000 product categories listed by manufacturer or distributor, and identifies them as custom or stock items.

THE PHOTONICS DESIGN & APPLICATIONS HANDBOOK®

Book 3, **The Photonics Handbook**, contains 500 pages of practical information, with new developments and technological know-how for today's design and applications engineers. It is completely revised each year.

THE PHOTONICS DICTIONARY™

Book 4, updated and expanded each year, is the only **Photonics Dictionary** in the industry, and it contains more than 5800 technical terms and definitions.

Photonics on the Internet at Photonics.com

You will find a world of information about photonics on the premier photonics Web site. **Photonics.com** combines information from **Photonics Spectra** and the largest photonics database of **The Photonics Directory**, providing an invaluable reference source.

For more information or a free subscription, visit us at www.photonics.com

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Student Lunch with the Experts A Networking Event

Tuesday • 12:30 to 1:30 pm

Advance sign-up in the Marketplace by 5:00 pm Monday is required. Seating is limited.

Enjoy a casual meal with colleagues at this engaging networking event. Hosted by SPIE Student Services, this event features Nobel Laurate Charles Townes and other distinguished experts willing to share their experience and wisdom on career paths in optics and photonics. Lunch is complimentary to all students.

Become an
SPIE Committee Volunteer!

Tuesday & Wednesday • 6:00 to 7:30 pm

Parkside Hall, Civic Auditorium Complex

Are you new to your Optics/Photonics career or interested in conference involvement? Learn more about SPIE volunteer opportunities; talk with conference staff, and other dedicated volunteers working in SPIE conferences and governance. Committeee applications will be available on-site. **Bring your resume or CV.**

The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667

Course level: Introductory
CEU 0.35
$125 SPIE Members/$175 nonmembers;
FREE to SPIE Student Members
Wednesday, 8:30 am to 12:30 pm

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

See p. 26 for full workshop description.

The Craft of Scientific Writing: A Workshop on Technical Writing

WS668

Course level: Introductory
CEU 0.35
$125 SPIE Members/$175 nonmembers;
FREE to SPIE Student Members
Wednesday, 1:30 to 3:30 pm

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

See p. 26 for full workshop description.

Optimizing Your Resume

WS777

Course level: Introductory
CEU 0.2
FREE to SPIE Student Members and Early Career Professionals
Monday, 1:30 to 3:30 pm

NOTE: This workshop is free to students and early career professionals, but **you must register to attend.**

Today's job market pits you against hundreds, if not thousands, of candidates who have approximately the same credentials as you do. How do you stand out in the crowd? This workshop, which concentrates on students and recent graduates, will review a number of strategies, tips, and tools that you can use to increase the impact of your resume and cover letter. We'll examine ways to translate your educational experience into a format that is attractive to potential employers, and how to create tailored versions of your job search materials for multiple targets. The process of creating your resume will be discussed, with a focus on both layout/formatting and writing style. We'll also look at cover letters, lists of references, and other materials used in your job search.

LEARNING OUTCOMES

This course will enable you to:

- translate your educational and work experience into a focused and effective resume
- avoid common mistakes and misconceptions
- learn how HR and hiring managers typically review resumes
- tailor your resume and cover letter for multiple job targets
- choose an effective layout and format to ensure maximum impact

INTENDED AUDIENCE

This material is intended primarily for students, recent graduates, and early-career professionals who want to improve the quality and effectiveness of their job search materials.

INSTRUCTOR

John Cain is a former professional resume writer, and has written more than 500 resumes and cover letters for multiple industries and professions, focusing primarily on technical fields. He currently develops technical education programs for SPIE.

Presentation and Reception

Wednesday 24 January • 7:00 to 8:30

Open to all conference attendees.

Sponsored by SPIE Women in Optics

All attendees are welcome to attend this presentation and reception.

Zohra Ben Lakhdar
Professor, University of Tunisia

How Active Learning in Optics and Photonics (ALOP) fosters rational thinking in developing nations

Professor Zohra Ben Lakhdar has greatly furthered the development of optics and photonics as a scientific discipline in Tunisia and all of Africa, making a number of valuable contributions to optical science and its applications in many different areas, from the environment to biotechnology. After her studies at the University of Tunis, she earned a PhD in Atomic Spectroscopy from the University of Paris VI.

Zohra has authored numerous papers and textbook chapters, she has advised and mentored many students, and was a founding member of the Tunisian Optical Society. In 1994, she was elected to the Islamic Academy of Sciences and since 2001 has been an associate member of the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy. She has organized and chaired international conferences and workshops in laser physics and related fields. In 2005 she was honored by being named a winner of the 2005 L'OREAL-UNESCO award for Women in Science.

Pr. Zohra Ben Lakhdar with her physics students, University of Tunis El Manar.

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SPIE Women in Optics 2007 Planner

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The SPIE Women in Optics monthly planner is a valuable resource for young women interested in entering the field of optics. This piece features stories and pictures from SPIE Members making a difference through their work and contributing to the field of optics.

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Attend the SPIEWorks Career Fair!

Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance

Tuesday 23 January . . . . . 11:00 am to 3:00 pm
Wednesday 24 January . . . . . 11:00 am to 3:00 pm

Top employers are coming together to interview and hire talented engineers and scientists like you! The SPIEWorks Career Fair at Photonics West is a great way to:

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- Learn more about the jobs available in our industry
- Network!

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Free Services for Employers

- Stop by the SPIEWorks booth in the Career Fair and gain access to our proprietary resume database at no charge.
- Post jobs for free. That's right, there's no charge to post jobs to the Photonics West Career Fair. Go to spieworks.com, create an account and sign-in to post jobs online. Your free job(s) will be live 22 – 28 January.

For information on future recruiting events contact Robert Dentel or Dave Baggenstos at +1 360 715 3705 or email sales@spieworks.com

BiOS 2007
Special Events

BiOS Hot Topics

Saturday 20 January · 7:00 to 9:30 pm · Convention Center, J2-J3

Welcome and Introduction:

James Fujimoto,
Massachusetts Institute of Technology, *BiOS 2007 Symposium Chair*

Presentation of Lifetime Achievement Award to

Ashley J. Welch,
Univ. of Texas/Austin

Presented by:
R. Rox Anderson, Wellman Ctr. For Photomedicine, Massachusetts General Hospital and Harvard School of Medicine,
BiOS 2007 Symposium Chair

Hot Topics Moderator:
Sergio Fantini,
Tufts Univ.

Taking Control
Ashley J. Welch,
Univ. of Texas/Austin

Photonic Tools for Cancer Screening and Diagnosis
Thomas M. Baer,
Stanford Photonics Research Ctr.

Modalities for Molecular Imaging
Eva-Marie Sevick-Muraca,
Baylor College of Medicine

Use of In-vivo Optical Measures to Accelerate Drug Development and Optimize Drug Delivery
Christopher H. Contag,
Stanford Univ.

New Developments in OCT
Joseph A. Izatt,
Duke Univ.

CARS Microscopy
Xiaoliang Sunney Xie,
Harvard Univ.

Three-dimensional Multi-photon Endoscopic Systems
Min Gu,
Swinburne Univ. of Technology

Optical Microscopy in Tissue Engineering
Irene Georgakoudis,
Tufts Univ.

Workshop

Prospects of Molecular Imaging from Bench to Bedside

Marriott Hotel, San Jose Ballroom, Salon III

Sunday 21 January . . . . . 6:00 to 8:00 pm

Chairs: **Amir Gandjbakhche,** National Institutes of Health;
Bruce Tromberg, Univ. of California/Irvine

The emerging field of molecular imaging, which allows specific targeting of cells to study the molecular origin of diseases, and generally includes the integration of exogenous molecular probes as contrast agents, will be discussed by renowned experts in this area.

This workshop is sponsored by the National Institutes of Health.

Speakers will include:

PET imaging from mouse to man
Michael Welch, Professor, Radiology, Washington University, St Louis

Identifying molecular targets: lessons from PET for optics
Samuel Achilefu, Professor, Radiology, Washington Univ., St. Louis

Multicolor, activatable, targeted fluorescence probes
Hisataka Kobayashi, NIH, Molecular Imaging Program, National Cancer Institute

Don't miss the weekend
BiOS Exhibition
The World's Largest Biomedical Exhibition
Saturday 20 January 2007 · 1:00 to 5:00 pm
Sunday 21 January 2007 · 10:00 am to 4:00 pm

Technical Group Meeting

IBOS—International Biomedical Optics Society

Fairmont Hotel, Sacramento

Tuesday 23 January . . . . . 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

Biomedical optics is a major growth area in modern medicine. The International Biomedical Optics Society is a nonprofit interdisciplinary group that provides a unique channel for communications among physicians and clinicians employing optics in medicine and the scientists and engineers who provide foundations for advancements in this field. The BiOS symposium, where IBOS meets, is the premier annual international forum for discussions and announcements of technical/clinical and educational/ pedagogical developments in the use of lasers, optical fibers, spectroscopic diagnostic techniques, and related areas of optical medicine.

The 2007 IBOS meeting will feature tutorials by two renowned experts in biomedical optics.

Tutorial: **Laser-Tissue Interactions**
Steven L. Jacques, Oregon Health & Science Univ.

Tutorial: **Optical Coherence Tomography**
Wolfgang Drexler, Univ. of Cardiff (United Kingdom)

All registered participants are encouraged to attend this evening session. Attendees are requested to wear their conference badges.

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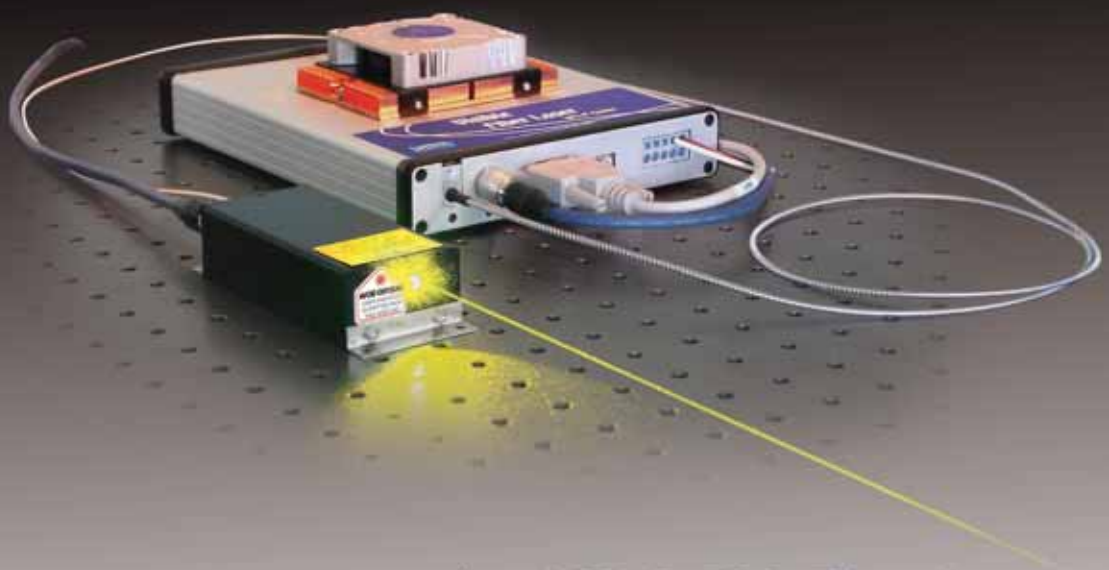

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LASE 2007
Special Events

LASE Plenary Session

Montgomery Theater
(across the street in the Civic Auditorium Complex)

Wednesday 24 January 2007 . . . . . 10:30 am to 12:30 pm

10:30 am to 11:10 am

The Laser - Its Origin, Development, and Possible Future

Professor Charles Townes,
Univ. of California/Berkley

Abstract: A broad discussion of science and technology of the laser, including its origin and problems, development, its scientific and technical applications and performance, along with possible future developments. Laser history is a strong example of the importance of interaction between science and technology.

Charles Townes was born on July 28, 1915, in Greenville, South Carolina. Dr. Townes graduated from Furman University in 1935, earning a Bachelor of Science in physics and a Bachelor of Arts in modern languages. He completed a master's degree in physics at Duke University in 1936 and in 1939 received the Ph.D. degree in physics at the California Institute of Technology. He was a staff member of Bell Laboratories from 1939-1947, then successively Associate Professor of Physics, Professor, and Chairman of the Physics Department at Columbia University between 1948 and 1961. In 1959-1961, he was in Washington as Vice-President and Director of Research of the Institute for Defense Analysis. He was Provost and Institute Professor at the Massachusetts Institute of Technology 1961-65, and University Professor at the University of California from 1967 to the present. In 1994, he became Professor in the Graduate School.

Dr. Townes principal scientific work is in microwave spectroscopy, nuclear and molecular structure, quantum electronics, radio astronomy and infrared astronomy. He holds the original patent for the maser and with Arthur Schawlow, the original laser patent. He received the Nobel Prize in 1964 for fundamental work in quantum electronics which has led to the construction of oscillators and amplifiers based on the maser-laser principle.

At the University of California, Townes returned to full-time research and teaching, and pursued new interests in astrophysics. His work there in radio astronomy resulted in the first detection of polyatomic molecules in interstellar clouds and the use of molecular spectra to characterize these dark clouds, now an important astronomical field. In the infrared region, he has worked primarily on high spectral and spatial resolution for astronomical observations. Much of this work has been directed towards understanding the galactic center. Townes has recently been using three moveable telescopes for obtaining very high angular resolution of astronomical objects at infrared wavelengths by spatial interferometry.

During much of his career, Townes has been active as a government advisor. He was a member of the President's Science Advisory Committee from 1965 to 1969, and vice chairman of that group during the second half of his term. He was chairman of the technical advisory committee for the Apollo Program until shortly after the first successful lunar landing. More recently, he has chaired committees on Strategic Weapons and the MX missile. He has been active in the National Academy of Science's contacts with China, its work on Arms Control, and its meetings with representatives of the Soviet Academy; he has also had an active role in helping to formulate advice given by the Papal Academy to the Pope on issues of peace and the control of nuclear weapons.

In addition to the Nobel Prize, Dr. Townes received the 1982 National Medal of Science. Townes is a member of the National Academy of Sciences, the National Academy of Engineering, the Royal Society of London, the Max Planck Society, the National Inventors Hall of Fame, and the Engineering and Science Hall of Fame. He has received the National Academy of Sciences Comstock Prize and the John J. Carty Medal, the National Academy of Engineers Founders Award, and the Stuart Ballentine Medal of the Franklin Institute (twice). Other awards include the Rumford Premium of the American Academy of Arts and Sciences, the C.E.K. Mees Medal of the Optical Society of America, the Medal of Honor of the Electrical and Electronics Engineers, the Plyler Prize of the American Physical Society, NASA's Distinguished Public Service Medal, and the 2006 Vannevar Bush medal. Among Dr. Townes international awards are the Thomas Young Medal and Prize of the Institute of Physics and the Physical Society (England), the Wilhelm Exner Award (Austria), the 1979 Niels Bohr International Gold Medal, the Lomonosov Medal of the Russian Academy of Sciences, the Rabindranath Tagore Award of India, the Karl Schwarzschild Medal of German-speaking countries, and the 2005 Templeton Prize. He also holds a number of honorary degrees.

11:10 to 11:50 am

Lasers: Astrophysics to Particle Physics

Professor Robert L. Byer,
Stanford Univ.

Einstein formulated the general theory of relativity nearly 100 years ago and showed that gravity is curvature in space-time and further that waves in space-time, gravitational waves, travel at the speed of light. The Laser Interferometer Gravitational wave Observatory, LIGO, is now in its fifth science run the quest to detect gravitational waves. The Laser Interferometer Space Antenna, LISA, is the first great observatory in the NASA Beyond Einstein Program. LISA is a space based interferometer with 5 million kilometer arms that will detect gravitational waves from massive Black Hole binary systems when in orbit a decade from now. The detection of gravitational waves requires the ultimate in precision measurement where the ruler is the constant; the speed of light.

At the other end of the scale lies the TeV frontier of particle physics. Advances in laser acceleration of electrons open the door to a new approach to particle acceleration with the prospect of achieving TeV scale energies using a laser accelerator that would fit on the SLAC site. On the way to this nearly impossible goal, laser accelerators will open the door to making coherent X-rays at attosecond pulse duration; a new era of coherent light sources.

Robert L. Byer has conducted research and taught classes in lasers and nonlinear optics at Stanford University since 1969. He has made numerous contributions to laser science and technology including the demonstration of the first tunable visible parametric oscillator, the development of the Q-switched unstable resonator Nd:YAG laser, remote sensing using tunable infrared sources and precision spectroscopy using Coherent Anti Stokes Raman Scattering (CARS). Current research includes the development of nonlinear optical materials and laser diode pumped solid state laser sources for applications to gravitational wave detection and to laser particle acceleration.

Professor Byer is a Fellow of the Optical Society of America, the Institute of Electrical and Electronics Engineers (IEEE), the American Physical Society and the American Association for the Advancement of Science and the Laser Institute of America. In 1985 Professor Byer served as president of the IEEE Lasers and Electro-optics Society. He was elected President of the Optical Society of America and served in 1994. He is a founding member of the California Council on Science and Technology and is served as chair from 1995 - 1999. He was Chair of the Applied Physics Department from 1981 to 1984 and again from 1999 - 2002; Associate Dean of Humanities and Sciences from 1985 to 1987, and served as Vice Provost and Dean of Research at Stanford University from 1987 through 1992. He is currently the co-director of the Stanford Photonics Research Center and the Director of the Edward L. Ginzton Laboratory at Stanford.

In 1996 Professor Byer received the Quantum Electronics Award from the Lasers and Electro-optics Society of the IEEE. In 1998 he received the R. W. Wood prize of the Optical Society of America and the A. L. Schawlow Award from the Laser Institute of America. In 2000 he was the recipient of the IEEE Third Millennium Medal.

Professor Byer has published more than 400 scientific papers and holds 50 patents in the fields of lasers and nonlinear optics. Professor Byer was elected to the National Academy of Engineering in 1987 and to the National Academy of Science in 2000.

11:50 am to 12:30 pm

Optical Technologies: Engine for Innovations in Industrial Applications of Lasers

Dr. Hans-Juergen Kahlert,
JENOPTIK Laser, Optik,
Systeme GmbH (Germany)

Optical technologies, such as lasers, optics and sensor systems are the product focus of the JENOPTIK company. Market and technology driven trends will be presented and discussed related to a network of European technology leaders. The continued approach of efficient technology funding to stimulate industry and applied science cooperation will be reported.

Hans-Juergen Kahlert born 1955 in Dortmund, studied physics at University of Bochum, Germany, industrial positions since 1984 at VDI-Technologiezentrum Düsseldorf, Lambda Physik GmbH, MicroLas Lasersystem GmbH and Innovavent GmbH, Göttingen. Current position president at JENOPTIK Laser, Optik, Systeme GmbH, Jena, Germany, responsible for laser technology.

Technical Group Meeting

Laser Communications

Fairmont Hotel, Glen Ellen

Wednesday January 24 2007 . . . . . 7:30 to 9:00 pm

Chair: **Steve Mecherle,** Innocept Inc.

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The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XIX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

Best Student Presentation Award

Solid State Laser Technology XVI: Technology and Devices

Thursday, 25 January 2007 · 9:50 am · Convention Center, J1

Prizes donated by:

COHERENT.

Best Student Presentation Award

We are pleased to announce that prizes in the amount of $1,500 US and $500 US will be awarded to the best student oral presentation and the best student poster presentation, respectively, in the conference on Solid State Laser Technology XVI: Technology and Devices, at SPIE's Photonics West Symposium taking place next January in San Jose, California. The prize money has been donated by Coherent, Inc. and the awards will be presented by Norman Hodgson, Vice President of Engineering.

Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee headed by **Louis McDonagh,** University of Kaiserslautern (Germany). To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral or poster presentation. The prizes will be awarded based on the quality of the presentation and not on the content of the submitted abstract. The winners of the Best Student Presentation Awards will be announced during the Student Award Session scheduled to take place on Thursday morning.

Best Student Presentation Award

Fiber Lasers IV: Technology, Systems, and Applications

Thursday 25 January 2007 · 5:20 pm · Convention Center, J2

Prize donated by:

IPG PHOTONICS
The leader in active fiber devices.

Best Student Presentation Award

We are pleased to announce that a prize in the amount of $1,000 US will be awarded to the best student oral presentation in the conference on Fiber Lasers III: Technology, Systems, and Applications at SPIE's Photonics West Symposium taking place next January in San Jose, California. This year's prize money has been donated by IPG Photonics Corp and the award will be presented by an IPG Photonics representative.

Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee headed by last year's student prize winner, **Fabian Röser**, Friedrich-Schiller-Univ. Jena (Germany). To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation. The prize will be awarded based on the quality of the presentation and not on the content of the submitted abstract. Any student papers presented in the Late Breaking Developments session will also be eligible for this award. The winner of the Best Student Presentation Award will be announced during the Student Award Session scheduled to take place on Thursday afternoon.

MOEMS-MEMS 2007
Special Events

MOEMS-MEMS Plenary Session

Convention Center A7-A8

Monday January 22, 2007 . . . . . 9:00 am to 12:00 pm

9:00 to 9:10 am

Welcome and opening remarks

9:10 to 10:00 am

MEMS for Medical Technology Applications

Göran Stemme,
Royal Institute of Technology (Sweden)

Applications for medical technology is an important and growing field for the use of MEMS technology. The possibilities offered by MEMS to create components and systems with small external size for minimal invasive devices as well as components with small "internal size" for handling of minute liquid volumes for Lab-on-Chip and diagnostics applications are very attractive driving forces in current development of medical technology applications.

This talk will describe different projects at the Royal Institute of Technology (KTH) which utilize MEMS and microsystem technology for realization of components intended for specific applications in medical technology and diagnostic instrumentation. It will describe minimal invasive components including blood pressure measurements, sensors for ventilators and respirators and spiked EEG-electrodes. A special focus will be given to a transdermal drug delivery system based on a micro-needle chip and an miniaturized "electronic nose" system for detection of narcotics.

By novel use of the DRIE fabrication technology we have developed the side-opened out of plane silicon microneedles intended for use in transdermal drug delivery applications. The side opening reduces clogging probability during penetration into the skin and increases the uptake area of the liquid in the tissue.

Finally, I will describe a recently designed, fabricated and successfully tested integrated miniaturized Quartz Crystal Microbalance (QCM) based electronic nose microsystem. The work integrates a novel environment-to-chip sample interface with the sensor element.

Göran Stemme was born in 1958 in Stockholm, Sweden. He received a M.Sc. in electrical engineering in 1981 and a Ph.D. in solid state electronics in 1987, both from the Chalmers University of Technology, Gothenburg, Sweden. In 1991, Dr. Stemme was appointed professor at The Royal Institute of Technology, Stockholm, Sweden, where he heads the Microsystem Technology group at the School of Electrical Engineering. His research is devoted to microsystem technology based on micromachining of silicon. The works spans over a broad range of technological and application fields such as medical technology, biochemistry, biotechnology, microfluidics, optical applications, wafer-level packaging and device integration. Between 1995 and 2001 he was a member of the International Steering Committee of the Conference series IEEE MEMS and General Co-Chair in 1998. Dr. Stemme is a member of the Editorial Board of the IEEE/ASME "Journal of Microelectromechnical Systems" since 1997 and was a member of the the Editorial Board of the Royal Society of Chemistry journal "Lab On A Chip" between 2000 and 2005. In 2001 he won, together with two colleagues, the final of Innovation Cup in Sweden. Dr. Stemme has published more than 150 research journal and conference papers and has more than 12 patents proposals or granted patents. Dr. Stemme is a member of the Royal Swedish Academy of Sciences (KVA) and he is an IEEE Fellow.

10:20 to 11:10 am

MEMS & OPTICS: A Happy Marriage

Richard S. Payne,
Pixtronix, Inc.

MEMS took a while to realize the promise foreseen by Feynman in his 1959 visionary talk: "There's Plenty of Room at the Bottom". However, 30 years since the first MEMS devices were realized by Nathanson and 20 years since the term MEMS was coined is not a long time for a technology as diverse as MEMS to develop into a multi-billion dollar reality. We now find several major markets served in high volume by important MEMS products. There are pressure and acceleration sensors, Microdisplays and Ink Jet printers, Bio-Chips and Chem-Chips, with microphones and Direct View displays now emerging in large numbers.

Photonic devices held out great promise in the 1995-2000 time period, boosted largely by the Telecomm bubble and depressed thereafter by the same. However, there remains a fundamentally good match between MEMS and photons that is real. Hence, the near IR MEMS device technology developed originally for Telecomm is now finding applications in re-emerging Telecomm applications as well as areas as diverse as spectrometers, test systems and important new displays.

In the display space, MEMS-based light modulators are used in high volume projection micro-display applications such as the DLP and are now enabling exciting new direct view displays. Utilizing breakthrough design and manufacturing of MEMS-based light modulators, the latest direct view displays are demonstrating extremely attractive combinations of image quality and very low power consumption, unique characteristics in high demand to manufacturers of portable consumer electronics products such as cell phone handsets, portable media players and mobile PCs.

This talk will review the past and look into the future of MEMS in optics.

Richard S. Payne, PhD has spent the last 9 years in what he terms MEMS enabled start-ups. He is VP of MicoFabrication at Pixtronix, a pioneering MEMS display company. Previously he was VP of Engineering and Manufacturing at Polychromix, the wavelength management company, developing products for communications and more. Prior to that, he was Chief Scientist and GM of East Coast Operations for OMM, Inc., an optical switch company. Before OMM he was Executive VP of Cyrano Sciences, an e-nose company. During his 27 year large-company period, Dr. Payne held several executive positions at Analog Devices, where he founded what grew to become the Micromachined Products Division in Cambridge, MA, building the ADXL AirBag accelerometer family of products. He began his career at Bell Laboratories developing early applications of Ion Implantation in Bipolar and CMOS Technologies. He received an AB (1964) from Dartmouth and a Ph.D. in Physics (1970) from Yale. He is a fellow of the IEEE and recipient of the 1992 J.J. Ebers Award for his pioneering work on Twin-Tub CMOS.

11:10 am to 12:00 pm

Diffractive Optical Modulators based on MEMS Technology

Olav Solgaard, Stanford Univ.

The unique strengths of MEMS technology are miniaturization, parallel processing, and integration of mechanical structures and electronics. The combination of these features enable large array of optical devices that can be accurately positioned by electronically-controlled microactuators to create a desired spatial variation on an incident optical field. In this talk we will describe a class of optical MEMS devices that use arrays of microactuated reflectors to manipulate the phase of the optical field. Phase modulation in combination with diffraction allows the creation of amplitude modulators for a variety of applications, including projection displays, fiber-optic attenuators, Wavelength-division-Multiplexers, tunable optical filters, spectrometers, and mask-less lithography. The basic operational principles as well as the MEMS fabrication processes and practical implementations of diffractive optical MEMS modulators for these applications will be described and opportunities for future developments will be discussed.

Olav Solgaard received the BS degree in electrical engineering from the Norwegian Institute of Technology and his MS and Ph.D. degrees in electrical engineering from Stanford University, California. He was a post doctoral researcher at the University of California at Berkeley, before joining the University of California at Davis as an Assistant Professor in 1995. In 1999 he joined Stanford University where he is now an Associate Professor of Electrical Engineering.

His research interests are micro-optical and nano-optical devices that combine MEMS, photonic crystals, integrated optics, and free-space optics. He has authored more than 180 technical publications and holds 25 patents. He is a co-founder of Silicon Light Machines, Sunnyvale, CA, and an active consultant in the MEMS industry.

Panel Discussion on:

Progress and Prospects in Microfluidics

Fairmont Hotel, Gold

Monday 22 January 2007 . . . . . 7:30 to 9:30 pm

Moderators: **Albert K. Henning,** Redwood Microsystems, Inc.;
Ian Papautsky, Univ. of Cincinnati

In the past decade, microfluidics has rapidly emerged and become main stream. Microfabrication techniques related to microfluidics have matured and are commercially available. Most microfluidic devices today are made of glass and polymer materials. In large measure, this rapid emergence of microfluidics has been driven by compelling applications in analytical chemistry and biomedical sciences, with enormous potential in developing new technologies and reducing costs. Recent years have seen a number of microfluidic chips brought to market, including those by Agilent and Fluidigm. One little-addressed aspect of microfluidics, however, is on-chip synthesis of microfluidics with optical detection techniques. This panel discussion will provide an overview of microfluidics over the past decade, with particular emphasis on progress related to the integration of optical detection in microfluidic systems.

Round Table Discussion

Optical Microsystems for Biomedical Applications

Fairmont Hotel, Atherton

Tuesday 23 January 2007 . . . . . 7:30 to 9:00 pm

Chair: **Scot S. Olivier**,
Lawrence Livermore National Lab.

We will discuss plans for bringing together the disciplines of medical and biological research with optical microsystems engineering in a National Science Foundation Engineering Research Center to enable the development and transfer to industry of optical microsystems that provide new capabilities for biomedical applications while reducing the costs of optical components, packages and systems to catalyze proliferation of these technologies for biomedical research and clinical use. Opportunities for industrial participation in the planning for this Center will be emphasized.

Optoelectronics 2007
Special Events

Opto 2007 Plenary Session
Convention Center, A7-A8

Tuesday January 23, 2007 . . . . . 8:30 to 10:00 am

8:30 am

Introduction and Opening Remarks

8:40 am

Transformative Advances in Electro-Optic and All-Optical Materials and Devices

Larry R. Dalton,
Univ. of Washington

A tour of development of new nanostructured materials that exhibit EO-properies orders of magnitude higher over current materials, and the integration of these materials with silicon photonic circuitry characterized by nanoscopic dimensions.

Larry R. Dalton received his B.S. and M.S. degrees from the Honors College of Michigan State University and A.M. and Ph.D. degrees from Harvard University in 1965, 1996, 1971 respectively.

He is currently the George B. Kauffman Professor (appointments in Chemistry and EE) at the University of Washington (98-present) where he directs the National Science Foundation Science and Technology Center on Materials and Devices for Information Technology Research and the Department of Defense MURI Center on Polymeric Smart Skin Materials. Previously, he was the Harold and Lillian Moulton Professor (appointments in Chemistry and MS&E) at the University of Southern California (81-98) where he served as Scientific Co-Director of the Loker Research Institute and Director of the DoD MURI Center of Materials and Processing at the Nanometer Scale. Recent awards include the American Chemical Society Award in the Chemistry of Materials and the Richard C. Tolman Medal. He is a Fellow of the American Association for the Advancement of Science. Current Federal and civilian advisory panel service includes the Advisory Committee for the Government Performance Act (ACGPA, NSF), the Advisory Committee for the Mathematical and Physical Sciences Directorate (MPSAC, NSF), the Advisory Group for Electron Devices (AGED, DoD); the Peer Review Panel for the Energy Science and Technology Directorate of Pacific Northwest National Laboratory, the Engineering and Physical Sciences Research Council (EPSRC, England), the Arizona Biomedical Research Commission/Disease Control Research Commission Review Panel for Biomedical Engineering, Imaging, and Sensing, the External Advisory Committee of the Center for Research and Education on Advanced Materials (Norfolk State University), the External Advisory Committee for the NSF RISE Center at Alabama A&M University, and the Editorial Board of Materials Today. He is a member of the American Chemical Society, the Optical Society of America, SPIE, and IEEE.

His current research interests include organic and hybrid photonic and opto-electronic materials with a particular focus on electro-optic materials and nonlinear optical materials integrated with silicon photonics. He also actively pursues research on sensor materials and embedded network sensing. He is the author or co-author of over 500 scientific articles, texts, and patents.

9:20 am

Optofluidics

Demetri Psaltis,
California Institute of Technology

Optofluidics refers to a class of adaptive optical circuits that integrate optical and fluidic devices. Familiar examples include liquid crystals and dye lasers. The introduction of liquids in the optical structure enables flexible fine-tuning and reconfiguration of circuits so they can perform tasks optimally in a changing environment. Dr. Demetri Psaltis will discuss how the emergence of fluidic transport technologies at the micron and nanometer levels opens possibilities for novel adaptive optical devices.

The integration of microfluidic circuits with photonic structures that contain voids into which fluids are injected and the use of colloidal solutions of nanoparticles are some of the approaches being pursued. Electrical fields or light beams redistribute the nanoparticles and modify the optical properties of the structure. Liquid dyes injected into microfluidic chips provide the optical gain necessary for building a dye laser on a chip.

Demetri Psaltis has been the Thomas G. Myers professor of electrical engineering at the California Institute of Technology in Pasadena and the director of the Center on Optofluidics Integration. He was recently appointed professor of electrical engineering and applied optics at EPFL in Switzerland. He received his education at Carnegie Mellon University. His research group works on optical information systems including memories, computers, sensors and communications. In addition to optofluidics, their current research projects are on the use of holograms as wavelength filtering elements and nonlinear propagation of femtosecond pulses in fibers and three-dimensional media. Professor Psaltis has received the ICO prize, the Humboldt award, and the Gabor award.

Technical Group Meeting

Illumination
Fairmont Hotel, Piedmont

Tuesday 23 January . . . . . 7:30 to 9:00 pm

Chair: **R. John Koshel,** Lambda Research Corp.

The focus of the meeting will be displays. Illumination comprises a major part of the design of successful displays, especially for backlit, projection, and LED-based displays. Display technologies of importance at this time are LED-based, OLED-based, thinned projection displays, plasma, and backlit displays. These and potentially other topics will be the focus of the first Illumination Technical Group meeting at Photonics West. If you would like to speak or have a suggestion for topics and/or speakers, please contact John Koshel (**jkoshel@lambdares.com**). The Illumination Technical Group welcomes all suggestions! At the end of the planned events for the meeting, the floor will be opened to the audience to present other illumination results, trends, or questions. By attending the Illumination Technical Group you will hear state of the art technology and concerns from the illumination community, especially for the display sector.

Technical Group Meeting

Holography
Fairmont Hotel, Hillsborough

Tuesday 23 January . . . . . 7:30 to 9:00 pm

Chair: **Hans I. Bjelkhagen,** Optic Technium Ctr. for Modern Optics

In 1948 Dennis Gabor realized that the wavefront emanating from each point of a scene could be recorded by causing it to interfere with a background wave, converting phase difference into an intensity difference. The wavefront could be reconstructed by illuminating the recorded information with coherent light. Gabor termed this process holography, or whole record.

The Holography Technical Group is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues.

Technical Group Meeting

Global Homeland Security

Fairmont Hotel, Glen Ellen

Tuesday 23 January . . . . . 7:30 to 9:00 pm

Chair: **Ted Saito,** Lawrence Livermore National Lab.

Everyone is invited to attend SPIE's Global Homeland Security Technical Group Meeting. In pursuing our mission is "To stimulate and focus the optics and photonics community's contribution to enhance safety, improve the sense of well being, and to counter terrorist threats" we will give updates on our two major initiatives:

- Port & Harbor Security
- Drinking Water Safety

Also Dr. Sarka Southern's progress on developing efforts in Health Security will be discussed. This will be your opportunity to voice ideas for future directions as well as give feedback on the past. We shall also preview the upcoming "Optics & Photonics in Global Homeland Security III" at SPIE's Defense and Security Symposium 9-13 April 2007 in Orlando, FL)

Annual Meeting of the Photonics Society of Chinese Americans: (PSC) Highlights Solid State Lighting Technologies

Fairmont Hotel, Atherton

Sunday 21 January . . . . . 1:00 to 5:30 pm

A nominal registration fee is paid at the door.

Solid state lighting (SSL) technologies are increasingly drawing attention worldwide as the performances of LED keep on breaking records and applications keep widening to LCD backlight, automobile, medicine, and general lighting. The potential impacts of SSL on energy savings and reduction of green house gases further gain support from governmental policy makers to install national SSL programs in USA, China, Taiwan, Korea and Japan.

Among these countries, China announced in 2006 the national program with a budget of RMB350 million (US$44 million). In 2008, the Olympic Game will be a show case for LED lighting in Beijing. In the meantime, Taiwan has quickly become a world leading supplier of LED chips and high power devices. It is expected, Asia will play an important role both as suppliers as well as consumers as the SSL industry grows.

This year's PSC 2007 annual meeting will assess the SSL technology and industry trends by inviting several prominent speakers including:

- **Wu Ling,** Director, China's National Solid State Lighting Program
- **Dr. Robert Walker,** CEO of BridgeLux
- **Dr. Robert Steele,** Director, Optoelectronics, Strategies Unlimited

PSC is the largest professional society in optics and photonics for Chinese-American and friends in USA. The Annual Meeting is open to public. For further information, please visit the website at **www.eoa-psc.org**.

Workshop on

Building a Nanophotonics Roadmap

Thursday 25 January · 8:30 am to 12:30 pm
Room: Fairmont Hotel, Hillsborough Room

MONA (Merging Optics and Nanotechnologies, www.ist-mona.org) is a two-year action of the European Commission. The principal outcome of the MONA project will be a Roadmap for Nanophotonic Technologies. In this workshop you are invited to participate in the construction of this roadmap. There will first be presentations of nanophotonics roadmap progress from around the world. From these efforts some key areas for debate have been identified. You will be able to contribute by joining a work group to develop a response to one of these issues. The results of all working groups will be presented in the concluding part of the workshop.

8:30 am: **Welcome and Introductions**

8:40 am: **The OITDA Roadmap for Nanophotonics,** Yasuhiko Arakawa, The Univ. of Tokyo (Japan)

9:00 am: **Nanophotonics in the MIT Photonics Rodmap Project,** Lionel Kimerling, Massachusetts Institute of Technology

9:20 am: **Planning for Nanophotonics Development in Taiwan,** Wei-Xin Ni, National Nano Device Laboratory (Taiwan)

9:40 am: **Nanophotonics Program Development in Korea,** Jung Il Lee, Korea Institute of Science and Technology -KIST (South Korea)

10:00 am: **MONA, the Nanophotonics Roadmap Project in Europe,** Thomas P. Pearsall, European Photonics Industry Consortium (France)

10:20 am: **Coffee Break**

10:30 am: **Breakout Sessions**

11:30 am: **Reports from Breakout Sessions**

MONA
Merging Optics & Nanotechnologies

Industry Perspectives

Market analysis, technology review and ideas for business

Location: Convention Center, A8

Don't miss this **FREE SESSION** open to all exhibition visitors, exhibitors and technical conference attendees. Hear industry experts share their views on the opportunities, innovations and applications that impact strategy, planning and implementation.

Tuesday, January 23 · 2:00 to 3:00 pm

• Executive Panel: Market Direction and Implications for the World of Photonics

In this lively discussion, visionary leaders representing different aspects of the marketplace will share their insight regarding trends and opportunities in optics & photonics. With the extraordinary experience and resources these executives bring to the table in technology development, global sales, marketing, manufacturing and innovation, you are sure to learn new things about the direction of the industry and priorities for your business.

Moderator:
Steve Eglash, Principal,
Worldview Technology Partners

Panelists:

Bookham	**Giorgio Anania,** President and CEO
MellesGriot	**Lynn Strickland,** VP Marketing and Strategic Development
Edmund Optics	**Robert Edmund,** CEO and Chairman of the Board
Newport	**Gary Spiegel,** Vice President Sales and Service
Hamamatsu	**Ken Kaufmann,** New Technology Development
Coherent	**Paul Meissner,** Executive Vice President, Global Business Operations

Location: Convention Center, A8

Wednesday, January 24 · 2:00 to 3:00 pm

• The impact of Solid State Devices—Inorganic and Organic, Diodes and Lasers—on the Display Business

Presenter: **Paul Semenza,** Vice President, Display Research for iSuppli

Despite surging sales, rapidly declining prices mean that revenue growth and profitability is challenging in the display business. The most lucrative opportunity for innovation in displays will arise in providing components and materials that make LCDs better. LEDs, OLEDs, lasers and other emerging technologies can provide a superior alternative to conventional Cold-Cathode Fluorescent Lamps (CCFLs) now used for LCD backlighting. Other innovations, such as new films and filters, emissive materials—or any technology that improves efficiency or cuts costs—will find strong market acceptance.

With ruthless competition and constant pricing pressure, interest in new technologies that cut cost and improve performance remains high—meaning opportunity as established brands and emerging suppliers look for components and processes that deliver a technology advantage.

In this presentation, you will hear detailed analysis and market forecasts, so you can learn which segments are growing fastest and the components for which new markets are developing. Come learn about this fast-changing industry so that you are better prepared to tap into lucrative R&D and component supplier opportunities.

Paul Semenza manages market research and strategic analysis activities in electronic displays and consumer electronics at iSuppli. From 1997 to 2000, Paul took on a variety of display research and management roles at Stanford Resources, and since the acquisition by iSuppli in 2000 has played a key role in integrating Stanford Resources into iSuppli.

Prior to joining Stanford Resources, Paul was a Program Officer at the Computer Science and Telecommunications Board of the National Research Council, where he directed studies on software engineering, wireless communication technologies, and the economic and social impacts of computing and communications technologies. Previously, Paul contributed to business development and technology assessment activities at Mogee Research and Analysis Associates, a patent trend analysis firm. He was an analyst at the U.S. Congress Office of Technology Assessment (OTA), from 1993 to 1995, where he wrote the study Flat Panel Displays in Perspective and contributed to a study on innovation and commercialization of emerging technologies.

Paul received a Bachelor of Science in electrical engineering and Master of Science in electro-optics from Tufts University. In 1994, he was awarded a Master in Public Policy degree from the John F. Kennedy School of Government at Harvard University.

Thursday, January 25 · 9:15 to 9:45 am

• Trends and Opportunities in Biophotonics

Presenter: **David Krohn,** Managing Partner, Lightwave Venture

The field of biomedical photonics is rapidly expanding, driven by development of breakthrough technologies for medical diagnostics, therapy, environmental sensing, threat detection, food safety, and other lucrative applications. In this session, David Krohn summarizes key developments, trends and opportunities for new business. Whether you are in a large corporation, start-up, scientific research institute or government agency—if you want to understand the future of biophotonics—don't miss this Industry Perspectives session.

Dr. David A. Krohn has over 39 years experience in the photonics industry. He is the Managing Partner of Light Wave Venture Consulting LLC, which is focused on developing photonics business opportunities in telecommunications, sensors and biophotonics. He has assisted over 75 companies with activities in funding, planning and management functions. David Krohn has also been directly involved with founding four companies since 1999. In 2004, he founded the Fiber Optic Sensor Consortium which is assisting over 50 companies and organizations to develop the fiber optic sensor industry. David Krohn attended Rutgers University as an undergraduate. He obtained his MS from Case Western Reserve University in 1967 and his Ph.D. from Lehigh University in 1973. He has written 3 books, 51 papers and holds 27 patents relating to fiber optics and optical sensors.

FREE Sessions

Open to all interested in new market opportunities, growth trends and business strategy!

Basic Optics for Non-Optics Personnel

WS609

Course level: Introductory
CEU .20 $100 / $150 USD
Monday 1:30 to 3:30 pm

This course will provide the technical manager, sales engineering, marketing staff, or other non-optics personnel with a basic understanding of the terms, specifications, and measurements used in optical technology to facilitate effective communication with optics professionals on a functional level. Topics to be covered include basic concepts such as interference, diffraction, polarization and aberrations, definitions relating to color and optical quality, and an overview of the basic measures of optical performance such as MTF and wavefront error. The material will be presented with a minimal amount of math, rather emphasising working concepts, definitions, rules of thumb, and visual interpretation of specifications. Specific applications will include defining basic imaging needs such as magnification and depth-of-field, understanding MTF curves and interferograms, and interpreting radiometric terms.

LEARNING OUTCOMES
This course will enable you to:
- read and understand optical system descriptions and papers
- ask the right questions about optical component performance
- understand basic optical specifications for lenses, filters, and other components
- select the right off-the-shelf lenses, filters, and beam directing optics
- interpret optical data such as interferogram, MTF and aberration reports

INTENDED AUDIENCE
This course is intended for the non-optical professional who needs to understand basic optics and interface with optics professionals.

INSTRUCTOR
Kevin Harding has been active in the optics industry for over 25 years, and has taught machine vision and optical inspection methods for over 20 years, including engineering workshops on machine vision, metrology, NDT, and interferometry used by vendors and system houses to train their own engineers.

Key:
Price = SPIE Member / Nonmember
FC = Foundation Course

Intellectual Property Issues in High-Tech Business

WS412

Course level: Introductory
CEU .35 $280 / $325 USD
Monday 8:30 am to 12:30 pm

Intellectual property (IP), in the form of copyrights, trademarks, trade secrets, ideas and patents, is of critical importance in high-tech business. In today's economy, IP is an asset that high-tech companies seek to leverage to add to their bottom line, whether through licensing or lawsuits. For many high-tech companies, IP represents their most valuable asset. Not surprisingly, the typical high-tech company's level of technical sophistication far outweighs its level of IP sophistication; yet both are needed to ultimately be successful in the high-tech marketplace. It is therefore imperative that employees of a high-tech company know the fundamentals of IP and understand their role in the IP-related aspects of a high-tech business. The aim of this course is to provide the audience with an overview of the numerous IP issues related to high-tech business. Topics covered include: the basic forms of IP, developing an IP strategy, IP licensing, litigation issues, IP insurance, IP management, directed development and generation of IP, and patent mapping.

LEARNING OUTCOMES
This course will enable you to:
- understand the basic forms of IP
- understand the role of IP in a company
- intelligently manage IP in a company
- develop an IP strategy that suits your business
- work intelligently with attorneys
- optimize the value of your company's IP
- properly generate, develop and leverage IP
- properly identify and document existing and future IP
- understand your role in your company's IP process.

INTENDED AUDIENCE
This course is designed for technicians, engineers, scientists, managers and executives involved in high-tech business.

INSTRUCTOR
Joseph Gortych is a registered patent attorney and is president of his own IP law and consulting firm based in Sarasota, Florida. He specializes in the strategic development, management and protection of intellectual property for optics, photonics and semiconductor technologies.

How to Start a Small High Tech Business Almost Anywhere

WS756

Course level: Introductory
CEU .35 $280 / $325 USD
Wednesday 1:30 to 5:30 pm

This course focuses on the elements that can minimize investment capital and the time needed to set up a viable and vibrant small business with growth potential. For individuals contemplating or engaged in starting a small business, understanding the process can literally be the difference between success and failure.

It is possible to set up such an entity within a large company, where one or a handful of individuals can grow new ideas and technology into high tech products that can have a significant impact on the competitiveness of the company. The course provides an overview of the skills necessary to do so and points out how these skills can form the basis for developing small high tech businesses as spin-offs or standalone entities. It also addresses the steps needed to start a small high tech business, even under less-than-ideal conditions.

Elements to be considered include: motivation; start up planning; types of organizations that can be operated; and the set up of structures that will greatly aid success. Crucial topics such as consulting, small business contracts, subcontracts, intellectual property, licensing, product development, long term planning, and mergers/acquisitions will be reviewed.

LEARNING OUTCOMES
This course will enable you to:
- identify specific skills that can have high payoff for individuals establishing high tech operations, and discuss ways to hone these skills
- describe the advantages and pitfalls associated with operating a small high tech business
- list the series of steps necessary for starting a small high tech business (i.e., decision to leave a job, vision for the new company, funding, the type of organization to be formed, a strategic and tactical plan, an operational plan, marketing)
- discuss intellectual property and how to minimize the cost of acquiring and developing an effective patent base, as well as how to offset some costs by licensing/joint ventures
- study examples of small companies that establish leverage to develop relationships with other organizations
- outline some of the issues that a small business may face during a merger or acquisition

INTENDED AUDIENCE
Engineers, scientists, technicians and managers in both large and small organizations can benefit from this course. People from large organizations will benefit from developing skills that can make their own organizations more cost effective and efficient, as well as understanding the advantages and disadvantages of having small businesses as partners.

INSTRUCTOR
Eric Udd worked at McDonnell Douglas from 1977 to 1993 building a fiber optic sensor program that grew to a large organization-wide effort. In 1993 he left McDonnell Douglas to found Blue Road Research, where he now serves as Vice President of Technology. He founded Columbia Gorge Research, LLC in 2004 as his second company and plans to "retire into it".

SPIE Foundation Courses

What are SPIE Foundation Courses?

Foundation courses provide an introduction to and overview of the technical area they address. They are an ideal entry point for understanding core concepts and tools if you're new to a field, looking to brush up your knowledge in a specific area, or want to take a closer look at a specialization you're considering pursuing. Courses are taught by instructors with deep knowledge and years of in-the-field experience, and offer the unique opportunity to learn from some of the most accomplished optics professionals in their respective industries.

Look for the icon above to identify SPIE Foundation Courses on pages 53–63.

Intellectual Property: Prior Art Searching

WS758

Course level: Intermediate
CEU .35 $280 / $325 USD
Monday 1:30 to 5:30 pm

This course provides attendees with the basic skills needed to search for prior art when developing a patent application and/or taking your technology from R&D to production stage. The course includes a detailed presentation of the methods and tools for information retrieval, current sources of information, and modern trends in intellectual property search and analysis. The scope of this course encompasses searches of U.S. patents and published applications, foreign patents and published applications and non-patent literature. Case studies will be presented showing detailed examples of each type of search.

LEARNING OUTCOMES
This course will enable you to:
- protect your innovations by focusing on features uncovered in the prior art
- accelerate prosecution of your patent applications
- determine who your competitors are
- avoid patent infringement lawsuits
- identify material for licensing/cross-licensing
- use reliable and systematic methods to identify the building blocks of your invention, determine scope of the prior art search, and perform the search

INTENDED AUDIENCE
This material is intended for anyone who needs to learn how to perform a prior art search. Inventors who want to protect their innovations will find this course valuable, because it teaches how to avoid infringements and to accelerate prosecution of your patent. Business development managers will learn how to uncover trends in product development based on patent analysis. Scientists, engineers, and technicians may learn how to quickly access existing solutions for their tasks.

INSTRUCTOR
Nadya Reingand is a Senior Patent Analyst, a Head of Electrical Engineering and Photonics Group at Landon IP, Inc. She has a Ph.D. in Photonics, is the author of more than 70 scientific papers, and has been involved in patent search and analysis for over 10 years.

Strategies and Tactics for High-Tech Sales Success *NEW*

WS826

Course level: Introductory
CEU .35 $280 / $325 USD
Monday 1:30 to 5:30 pm

This course introduces proven strategies and tactics for high-tech sales success. Participants will gain a strong understanding and appreciation of the purchase process as seen through the eyes of their customers. Attendees will learn how to align their sales process with how their customers wish to make purchase decisions. The workshop is hands-on, with interactive exercises and worksheets that attendees will complete using their own products and services as a guide.

LEARNING OUTCOMES
This course will enable you to:
- use "Active Listening Skills" to develop rapport with your customers
- demonstrate your technical competence and understanding of the customer's needs
- gain access to key technical and financial decision makers
- maintain positive sales momentum throughout the sales cycle
- identify and delineate between qualified and unqualified prospects

INTENDED AUDIENCE
Anyone who is involved with the sales, marketing and support of highly technical products and services will benefit from this course. (This includes pre and post-sales engineers and customer support representatives.)

INSTRUCTOR
Greg Johnson is the founder of Honorable Selling Inc., a high-tech sales training and consulting business. He holds a BS in Physics and an MS in Geophysics and has over 19 years experience in sales, sales management and sales training within the high-tech and software industries.

COURSE PRICE INCLUDES a workbook containing worksheets, templates and sections from the instructor's upcoming sales-training book. While several exercises will be completed during the course, these additional resources will help attendees effectively utilize the techniques and tactics introduced during the course.

Off the Beaten Path: Career Opportunities for Engineers in the Patent Boom

(Law Degree Not Required) *NEW*

WS827

Course level: Introductory
CEU .35 $280 / $325 USD
Tuesday 8:30 am to 12:30 pm

Looking for a position where you are exposed to cutting edge technology, while at the same time not becoming pigeon-holed into a specific technological field, never to return? A position in the ever-growing field of intellectual property (IP) support might be for you. Law firms, businesses, and government entities are hiring engineers as never before due to the explosion in the number of patent filings over the last decade.

This course will skim over the patent basics only to the extent necessary to indoctrinate those having no background in the area. Next, you will be guided to the places of opportunity (law firms, in-house corporate, and the United States Patent and Trademark Office) and provided with job descriptions for each. Finally, and most importantly, you will learn how to get the job you want from actual practitioners in the field. These insiders will provide you with the tips you need to get around the "outside-looking-in" barrier that keeps most people out.

LEARNING OUTCOMES
This course will enable you to:
- gain an understanding of the basics of the patent and IP field
- learn about the different types of jobs and the specific opportunities available
- avoid common obstacles and barriers to entry
- develop a winning strategy to secure a career in this rapidly growing industry
- get direct advice from current professionals in the patent and IP support field

INTENDED AUDIENCE
Anyone who has interest in employment in the field of patents. This course intends to expose engineers, scientists, and others to opportunities outside the realm of the typical science / technology career track. Practicing engineers, students and early-career professionals, corporate executives, and others may have interest.

INSTRUCTOR
Marshall Honeyman is a patent attorney in Kansas City, Missouri where he is Of Counsel to the law firm of Lathrop and Gage, L.C. Earlier, he worked in the U.S. Patent and Trademark Office (USPTO) as an Associate Solicitor and Patent Examiner.

Registration is required.
See SPIE Cashier to Register.

Understanding Laser Beam Performance Specifications *NEW*

WS828

Course level: Introductory
CEU .35 $280 / $325 USD
Wednesday, 8:30 am to 12:30 pm

This workshop will provide attendees with a basic understanding of laser beam performance specifications. Topics to be covered include Beam Pointing Stability, Polarization Ratio, RMS Noise, Peak-to-Peak Noise, Pulse Duration and Duty Cycle, Peak Power, Average Power, Pulse Repetition Rate, and M2. These specifications constitute the critical parameters that determine whether or not a laser, or laser system, will do the intended job.

LEARNING OUTCOMES
This course will enable you to:
- understand laser performance parameters/ specifications for any type of laser/laser system
- select the right laser/laser system for any application with certainty
- intelligently engage your clients or customers using proper laser terminology
- build stronger relationships with clients/ customers
- obtain the technical knowledge and confidence to enhance your job performance and rise above the competition, inside and outside your company

INTENDED AUDIENCE
Sales/marketing personnel will find the course quite beneficial to precisely grasp clients' requirements and specifications. Engineers, technicians and other support staff may also find this course useful as they strive to meet client needs as directed by sales/marketing.

INSTRUCTOR
Sydney Sukuta is currently a Laser Technology professor at San Jose City College and has industry experience working for the some the world's leading laser manufacturers in Silicon Valley.

COURSE PRICE INCLUDES two weeks of follow-up email and phone consultations.

The Craft of Scientific Presentations: A Workshop on Technical Presentations

WS667

Course level: Introductory
CEU .35 $125 / $175 USD
Wednesday 8:30 am to 12:30 pm

This course provides attendees with an overview of what distinguishes the best scientific presentations. The course introduces a new design for presentation slides that is both more memorable and persuasive from what is typically shown at conferences.

LEARNING OUTCOMES
This course will enable you to:
- account for the audience, purpose, and occasion in a presentation,
- logically structure the introduction, middle, and ending of a scientific presentation,
- create a memorable and persuasive set of presentation slides, and
- deliver a presentation with more confidence.

INTENDED AUDIENCE
This material is intended for anyone who needs to present scientific research. Those who either have not yet presented or have made several presentations will find this course valuable.

INSTRUCTOR
Michael Alley teaches writing and speaking to engineering students at Penn State. Alley has taught this workshop to researchers at the Army Research Laboratory, Lawrence Livermore National Laboratory, United Technologies, the University of Illinois, the University of Oslo, and Virginia Tech.

COURSE PRICE INCLUDES the text *The Craft of Scientific Presentations* by the instructor.

The Craft of Scientific Writing: A Workshop on Technical Writing

WS668

Course level: Introductory
CEU .35 $125 / $175 USD
Wednesday 1:30 to 5:30 pm

This course provides an overview on writing a scientific paper. The course focuses on the structure, language, and illustration of scientific papers.

LEARNING OUTCOMES
This course will enable you to:
- account for the audience, purpose, and occasion in a scientific paper,
- logically structure the introduction, middle, and ending of a scientific paper,
- understand how to make your language clear, energetic, and fluid, and
- avoid the most common mechanical errors in scientific writing.

INTENDED AUDIENCE
This material is intended for anyone who needs to write about scientific research. Those who either have not yet written a paper or have written several papers will find this course valuable.

INSTRUCTOR
Michael Alley teaches writing and speaking to engineering students at Penn State.

COURSE PRICE INCLUDES the text *The Craft of Scientific Writing* by the instructor.

Registration is required.
See SPIE Cashier to Register.

Don't miss
Industry Perspectives:
analysis, insight, and ideas
FREE business strategy sessions open for all attendees..
See page 22–23 for details.

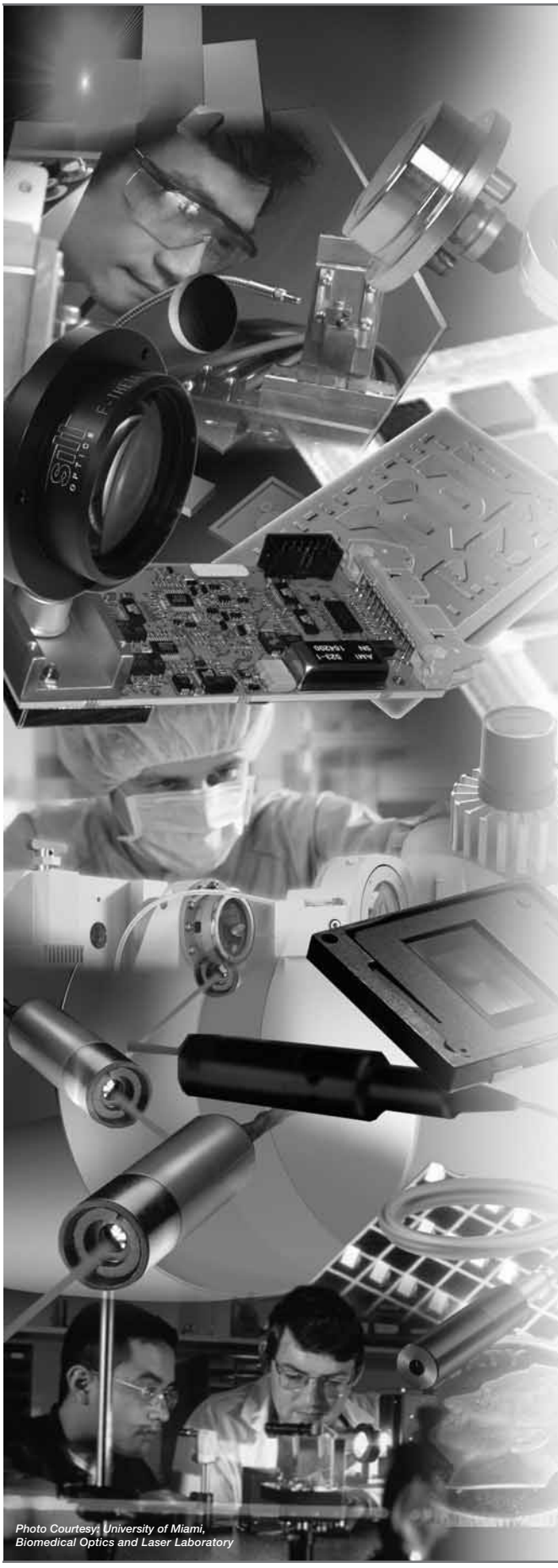

Photo Courtesy, University of Miami, Biomedical Optics and Laser Laboratory

Make time for the Exhibitions!

BiOS Exhibition

The World's Largest Biomedical Symposium and Exhibition

Saturday 20 January 2007 . . . . . 1:00 to 5:00 pm
Sunday 21 January 2007 . . . . . 10:00 am to 4:00 pm

See the applications and technologies driving the diagnostic, treatment, and instrumentation of the future at the BiOS exhibition. Meet the vendors behind the leading-edge clinical diagnostics and therapeutics. Trade ideas with other medical and optical physicists, bioengineers, and pharmacologists, cancer therapists, cell physiologists, and others sharing your interests.

Photonics West Exhibition

Make Business Connections at the Global Shopping Center for Light-Driven Technologies

Tuesday 23 January 2007 . . . . . 10:00 am to 5:00 pm
Wednesday 24 January 2007 . . . . . 10:00 am to 5:00 pm
Thursday 25 January 2007 . . . . . 10:00 am to 4:00 pm

Come see the entire spectrum of photon-based technologies! From optical engineering to optoelectronics manufacturing; from the latest microphotonics to the most cutting edge nanotechnology applications; Photonics West provides fast, easy access to this multibillion-dollar global marketplace for today's busy buyers. See for yourself why Photonics West has become the show to launch new products and how it has helped fuel the explosive growth in the many areas of optical technology.

See new applications in action at the Product Spotlights.

Exhibitor Product Spotlights – Opto Town Square

DEMO AREA I • San Jose Convention Center Hall 1

TIME	Tuesday 23 January	Wednesday 24 January	Thursday 25 January
10:30 am	**New TDI-CCD's for Industrial & BioMedical Imaging** **John Gilmore,** Hamamatsu Corp.	**High Speed Shortwave Infrared (SWIR) Imaging Cameras** **Doug Malchow,** SUI, part of Goodrich Corp. *(Sensors Unlimited, Inc.)*	**Power Over Fiber - Photonic Power Applications** **Mort Cohen,** JDSU
11:30 am	**New Optoelectronics Design Automation Software for Nanophotonics, Fiber Lasers and Interconnects** **Dan Herrmann,** RSoft Design Group	**What's New in ZEMAX** **Dr. Mark Nicholson,** ZEMAX Development Corp.	**TracePro 4.0, Optical Raytracing Software for Modeling & Analyzing Light in Opto-Mechanical Systems** **Patrick le Houillier,** Lambda Research Corporation
12:30 pm	**How to Directly Control CCD Cameras from IDL Using SIDX** **Paul Sommer,** ITT Visual Information Solutions	**Detection of fluorescent Cells and Micro-Arrays using a CCD-Detector and LED Illumination** **Dr. Hanswilly Mueller,** Sensovation	**Highly Sensitive Spectrometers for UV-VIS, VIS-NIR, and Raman** **Dr. Jay Jeong,** Newport Corp.
1:30 pm	**World's Smallest Linear Motor Drives Phone Camera Optics and More** **David Henderson,** New Scale Technologies	**Micro Optics and Diffractive Optical Elements** **Edgar Pawlowski, Helge Vogt,** and **Bernd Woelfing,** SCHOTT North America, Inc.	**Portable & Modular Spectroscopy** **Lane Manoosingh,** Ocean Optics
2:30 pm	**Semrock Sets the Standard in Optical Filters** **Turan Erdogan,** Semrock, Inc.	**Sixth Generation High Speed CMOS Imagers** **Andrew Bridges,** Photron, Inc.	**Short Pulse, High Intensity LEDs** **Randall Wilcox,** Lightspeed Technologies
3:30 pm	**Finding Answers with Scientific Infrared Cameras** **Dave Bursell,** FLIR Systems, Inc.	**Film Thickness and Optical Constant Measurements of Complex Multilayer Stacks** **Eric Teboul,** HORIBA Jobin Yvon	**Spatial and spectral trade-offs in Hyperspectral versus Raman Imaging Spectrometers** **David Bannon,** Headwall Photonics, Inc.
4:30 pm	**Hybrid Opto-electronic Systems on Ceramics** **Dr. Frank Buchmann,** ASKION GmbH	**FDTD Solutions: High Performance Design Tools for Nanophotonic Applications** **Dr. Paul Paddon,** Lumerical Solutions	**EXHIBITION CLOSED**

DEMO AREA II • San Jose Convention Center Hall 3

TIME	Tuesday 23 January	Wednesday 24 January	Thursday 25 January
10:30 am	**New 16 Million Pixel Interline Transfer CCD image sensor for Industrial and Aerial Applications** **Jim Dibella,** Eastman Kodak Company	**TECHSPEC Mechanics by Optical Engineers for Optical Engineers** **Sam Sadoulet,** Edmund Optics	**See the Future of Optical Engineering Software** **Richard Pfisterer,** Photon Engineering, LLC
11:30 am	**Super-Wide Range NIR SpectroRadiometers covering 200-1700nm** **Will Pierce,** StellarNet Inc.	**Cylindrical Optics for Challenging Applications** **Volker Schmidt,** Berliner Glas KGaA	**Metrology of UV-Vis through FT-IR Spectroscopy Systems, How to Improve Your Results** **Jim Steensrud,** Varian, Inc.
12:30 pm	**High Power Turn-Key Green Modelocked Picosecond Laser Source** **Robert Braunschweig,** High Q Laser (US), Inc.	**Combining AFM/SPM Systems with Micro Raman** **Prof. Aaron Lewis,** Nanonics Imaging Ltd.	**New Ultrafast Fiber Laser Product Offerings from IMRA** **Michelle Stock,** IMRA America, Inc.
1:30 pm	**New Developments in High Performance Infrared Imaging for Demanding R&D Applications** **Chris Alicandro,** Electrophysics Corp.	**IntelliWave 2007** **Dr. Mary Turner,** Engineering Synthesis Design, Inc.	**The Theory and Application of Infrared and UV Viewers** **Barry Durr,** FJW Optical Systems, Inc.
2:30 pm	**QPC Introduces On-Chip Internal Grating Technologies** **Dr. Paul Rudy,** QPC Lasers, Inc. *(formerly Quintessence Photonic Corporation)*	**Advanced Control Interfaces for High-Energy Custom Laser Systems** **Michael LaHa,** Continuum	**Small Structures in High Density – A New Generation of Structured Wafers for Innovative Applications** **Fred Doss,** Berliner Glas US
3:30 pm	**ASAP Optical Software Overview** **Dr. Jon Herlocker,** Breault Research Organization	**A Turnkey Laser System in the Wavelength Range of 630nm to 1064nm** **Steve Klunk,** High Power Devices	**Fast Steering Mirror for Laser Scanning** **Geroge Murray,** Axsys Technologies
4:30 pm	**Coherent's New Line of High-Power High-Performance Real-World Solutions** **Al Yuen,** Coherent, Inc.	**Introducing New Interferometer to Measure Flatness of Ultra-Thin Wafers** **Gunars Indars,** Valley Design Corp.	**EXHIBITION CLOSED**

DEMO AREA III • South Hall

TIME	Tuesday 23 January	Wednesday 24 January	Thursday 25 January
10:30 am	**New Near-Infrared Photon Counting Sensors and Cameras** **Dr. Bruce True,** Intevac, Inc.	**MEMS Adaptive Optics Demonstration System for Optical Imaging Enhancement** **Andreas Gehner,** Fraunhofer IPMS	**New Advancements in Trigger and Pulse Generator Equipment** **Alex Palm,** Quantum Composers, Inc.
11:30 am	**Synopsys Sentaurus Device: Optoelectronic Capabilities** **Dr. Wei-Choon Ng,** Synopsys	**Spectrally Selective Metal: Revolutionary Dichroic Hybrid Optical Coatings for Metal** **Robert Crase** or **Dr. Mark George,** Deposition Sciences, Inc.	**Femtosecond Ultra Broadband Sources** **Andrey Zamyatin,** Del Mar Photonics
12:30 pm	**Intense Laser Diodes** **Prof. John Marsh,** Intense Ltd.	**Microlenses and Optical Cavities in Glass Wafers for Optical MEMS, Data Storage and Photonics** **Thomas Hoeftmann,** Plan Optik AG	**High Resolution Photon Timing Module** **Dr. Carl Jackson,** SensL Technologies Ltd.
1:30 pm	**LED Test Demo** **Vikrant Mahajan,** Labsphere, Inc.	**Miniature Motion Controllers** **David Goodin,** AllMotion	**High Performance, Non-Scanning CCD Spectrometers for Biomedical Applications** **Olga Pawluczyk,** P&P Optica
2:30 pm	**Reference Laser for Fiber Optic Photonic Millimeter-Wave Local Oscillator Distribution** **Dr. Michel Têtu,** Teraxion	**Software: When Optics and Light Merge with Mechanics** **Maroun Massabki,** OPTIS	**The Novawave Iris™1000 DFG-based laser system.** **James Scherer,** NovaWave Technologies
3:30 pm	**Sony's New XP-Based Smart Cameras** **Ilias Levis,** Sony Visual Imaging Products	**AG-1 Laser for Interferometric Sensing Applications** **Martin Czasnojc,** Sabeus, Inc.	
4:30 pm	**Ultra-stable, Coherent Laser Oscillators** **Dr. Yaakov Shevy,** Orbits Lightwave Inc.	**Laser Marking Dual Head System for Wide Range Application** **Peter Grollmann,** TRUMPF Inc.	**EXHIBITION CLOSED**

SPIE would like to thank the following sponsors for their generous support of Photonics West 2007

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<td>Internet Pavilion
 

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<td>Welcome Evening Reception
 

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<td>Exhibition/City Map Back Cover
 

Booth #6005</td>
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<tr>
<td colspan="3">Exhibitor Lounge and Exhibitor Reception
 

 

 

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<td>Laser Communications Technical Group Refreshments
 

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<td>OPTO, LASE & MOEMS-MEMS Evening Poster Reception
 

Booth #6367</td>
<td>Tuesday Morning Coffee Break
 

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This is the top show in the world for us – it has the right combination of commercial and research/academic attendees . . . Because the shoppers and sellers are in one place, business discussions not only are initiated, but advance to the next level.

*–**Rick Waltonsmith,** Director, Sales & Marketing, Novalux*

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Attend the SPIEWorks Career Fair!

Tuesday 23 January, 11:00 am – 3:00 pm
Wednesday 24 January, 11:00 am – 3:00 pm

Exhibition Level, Convention Center
Almaden Concourse near the Hilton Hotel Entrance

Top employers are coming together to interview and hire talented engineers and scientists like you! The SPIEWorks Career Fair at Photonics West is a great way to:

- **Get "face to face" time with employers and interview on the spot**
- **Learn more about the jobs available in our industry**
- **Network!**

TWO DAYS ONLY

FREE ADMISSION

NO REGISTRATION REQUIRED

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SPIE is an authorized provider of Continuing Education Units (CEUs) though ICAET—The International Association of Continuing Education and Training. SPIE awards CEUs to participants who successfully attend courses, and complete and return the evaluation form within 30 days of the course presentation. SPIE maintains a record of all CEUs earned for each participant for seven years.

Professional Development from SPIE

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SPIE Foundation Courses

Look for this symbol to identify SPIE Foundation Courses FC

What are SPIE Foundation Courses?

Foundation courses provide an introduction to and overview of the technical area they address. They are an ideal entry point for understanding core concepts and tools if you're new to a field, looking to brush up your knowledge in a specific area, or want to take a closer look at a specialization you're considering pursuing. Courses are taught by instructors with deep knowledge and years of in-the-field experience, and offer the unique opportunity to learn from some of the most accomplished optics professionals in their respective industries.

SPIE Foundation Courses are ideal for:

- Technical sales professionals looking to increase their knowledge to better work with customers
- Early career professionals who need an in-depth background in their specialization
- Mid-career professionals interested in changing focus to a new field
- Companies looking for training for their entry-level engineers
- Professionals seeking to broaden their skills with interdisciplinary training
- Anyone looking to gain a fundamental understanding of the subject

Daily Course Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Basic Optics and Photonics

Sunday	Monday	Tuesday	Wednesday	Thursday
SC156 **Basic Optics for Engineers** FC *(Ducharme)* 8:30 am to 5:30 pm, $495 / $580	SC017 **Principles of Fourier Optics and Diffraction** FC *(Gaskill)* 8:30 am to 5:30 pm, $585 / $660	SC040 **Gratings, Monochromators, and Spectrometers** FC *(Fisher)* 8:30 am to 12:30 pm, $280 / $325	SC448 **Diode Lasers: How to Select the Best Laser for Your Application** *(Linden)* 8:30 am to 12:30 pm, $280 / $325	SC825 ***NEW*** **Imaging Performance Evaluation for Digital Cameras, Cell-phone Cameras and Scanners** *(Burns, Williams)* 8:30 am to 5:30 pm, $460 / $545
SC402 **Understanding Lasers, Fiber Optics, and Photonics Components** FC *(Ezekiel)* 8:30 am to 5:30 pm, $460 / $545		SC747 **Semiconductor Optoelectronic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $460 / $545	SC206 **Polarized Light: A Practical Hands-on Introduction** FC *(Fisher)* 8:30 am to 5:30 pm, $460 / $545	
SC212 **Modern Optical Testing** FC *(Wyant)* 1:30 to 5:30 pm, $280 / $325		SC800 ***NEW*** **Instruments for Light Spectroscopy** *(Saptari)* 1:30 to 5:30 pm, $280 / $325	WS828 ***NEW*** **Understanding Laser Beam Performance Specifications** *(Sukuta)* 8:30 am to 12:30 pm, $280 / $325	

Ultrafast Optics

Sunday	Monday	Tuesday	Wednesday	Thursday
SC746 **Introduction to Ultrafast Technology** FC *(Trebino)* 1:30 to 5:30 pm, $280 / $325	SC744 **Ultrafast Fiber Lasers** FC *(Fermann)* 8:30 am to 12:30 pm, $280 / $325		SC541 **An Introduction to Femtosecond Laser Techniques** *(Mazur)* 1:30 to 5:30 pm, $280 / $325	
	SC743 **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $280 / $325			

Price Key

SPIE Member/Non-Member

FC = SPIE Foundation Course

Daily Course Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Spectroscopy and Imaging

SC819 ***NEW*** **Multiphoton Microscopy (MM)-Basics, Technology Development, and Applications** *(Periasamy, So)* 8:30 am to 5:30 pm, $460 / $545

SC312 FC **Principles and Applications of Optical Coherence Tomography** *(Fujimoto)* 1:30 to 5:30 pm, $280 / $325

SC040 FC **Gratings, Monochromators, and Spectrometers** *(Fisher)* 8:30 am to 12:30 pm, $280 / $325

SC768 **Optoacoustic Systems for Medical Imaging: From Principles to Clinical Applications** *(Oraevsky)* 1:30 to 5:30 pm, $280 / $325

SC823 ***NEW*** **Diagnostic Endoscopy** *(Zeng)* 1:30 to 5:30 pm, $280 / $325

SC800 ***NEW*** **Instruments for Light Spectroscopy** *(Saptari)* 1:30 to 5:30 pm, $280 / $325

SC825 ***NEW*** **Imaging Performance Evaluation for Digital Cameras, Cell-phone Cameras and Scanners** *(Burns, Williams)* 8:30 am to 5:30 pm, $460 / $545

Nanophotonics and Photonic Crystals

SC742 **Nano-Photonics: Physics and Techniques** *(Scherer)* 8:30 am to 12:30 pm, $280 / $325

SC727 **Nanoplasmonics** *(Stockman)* 8:30 am to 5:30 pm, $460 / $545

SC608 **Photonic Crystals: A Crash Course, from Bandgaps to Fibers** *(Johnson)* 8:30 am to 12:30 pm, $280 / $325

Illumination Engineering & Displays

SC657 **Accurate Measurement of LED Optical Properties** *(Tirpak)* 1:30 to 5:30 pm, $280 / $325

SC052 **Light-Emitting Diodes** *(Schubert)* 8:30 am to 12:30 pm, $320 / $375

SC011 **Design of Efficient Illumination Systems** *(Cassarly)* 1:30 to 5:30 pm, $280 / $325

Registration is required.
See SPIE Cashier to Register.

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
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Biophotonics and Biochips

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
	SC259 **Biochips: Fundamentals, Fabrication, and Applications** *(Nicolau)* 1:30 to 5:30 pm, $280 / $325	SC463 **Biophotonics** *(Prasad)* 8:30 am to 5:30 pm, $510 / $595		SC532 **Micro- and Nanofluidics—Technology and Applications** *(Gaertner)* 8:30 am to 12:30 pm, $280 / $325	SC727 **Nanoplasmonics** *(Stockman)* 8:30 am to 5:30 pm, $460 / $545
		SC437 **Microfabrication Techniques for MicroFluidics & BioMEMS** *(Madou)* 8:30 am to 12:30 pm, $280 / $325		SC742 **Nano-Photonics: Physics and Techniques** *(Scherer)* 8:30 am to 12:30 pm, $280 / $325	

Semiconductor Lasers and LEDs

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
	SC698 **Quantum Dot LEDs and Laser Diodes** *(Blood)* 1:30 to 5:30 pm, $280 / $325	SC817 ***NEW*** **Silicon Photonics** *(Michel, Saini)* 8:30 am to 12:30 pm, $280 / $325	SC052 **Light-Emitting Diodes** *(Schubert)* 8:30 am to 12:30 pm, $330 / $375	SC448 (FC) **Diode Lasers: How to Select the Best Laser for Your Application** *(Linden)* 8:30 am to 12:30 pm, $280 / $325	
		SC657 **Accurate Measurement of LED Optical Properties** *(Tirpak)* 1:30 to 5:30 pm, $280 / $325	SC053 **Testing and Reliability of Semiconductor Lasers** *(Wang)* 1:30 to 5:30 pm, $280 / $325	SC822 ***NEW*** **Principles of GaN-based Devices** *(Piprek)* 1:30 to 5:30 pm, $280 / $325	
		SC818 ***NEW*** **Laser Beam Quality** *(Paschotta)* 1:30 to 5:30 pm, $280 / $325	SC747 (FC) **Semiconductor Optoelectronic Device Fundamentals** *(Linden)* 8:30 am to 5:30 pm, $460 / $545		

Photonic and Laser Applications

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
		SC817 ***NEW*** **Silicon Photonics** *(Michel, Saini)* 8:30 am to 12:30 pm, $280 / $325	SC820 ***NEW*** **Fundamentals and Applications of Slow Light** *(Khurgin)* 8:30 am to 5:30 pm, $465 / $550		
		SC547 (FC) **Terahertz Wave Technology and Applications** *(Zhang)* 1:30 to 5:30 pm, $280 / $325	SC188 **Laser Beam Propagation for Applications in Laser Communications, Laser Radar, and Active Imaging** *(Phillips, Andrews)* 8:30 am to 5:30 pm, $580 / $665		

Price Key

SPIE Member/Non-Member

(FC) = SPIE Foundation Course

Courses

Daily Course Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
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Micromachining and Microfabrication

SC437 **Microfabrication Techniques for MicroFluidics & BioMEMS** *(Madou)* 8:30 am to 12:30 pm, $280 / $325

SC743 **Micromachining with Femtosecond Lasers** *(Nolte, Schaffer)* 1:30 to 5:30 pm, $280 / $325

SC689 FC **Introduction to MicroMachining Using Lasers** *(Schaeffer)* 8:30 am to 12:30 pm, $280 / $325

SC699 **Polymer Microfabrication** *(Becker)* 8:30 am to 5:30 pm, $460 / $545

Laser Sources and Nonlinear Optics

SC047 FC **Introduction to Nonlinear Optics** *(Fisher)* 8:30 am to 5:30 pm, $460 / $545

SC752 FC **Solid State Laser Technology** *(Hodgson)* 8:30 am to 5:30 pm, $570 / $665

SC748 **High-Power Fiber Sources** *(Nilsson)* 1:30 to 5:30 pm, $280 / $325

SC744 FC **Ultrafast Fiber Lasers** *(Fermann)* 8:30 am to 12:30 pm, $280 / $325

SC818 ***NEW*** **Laser Beam Quality** *(Paschotta)* 1:30 to 5:30 pm, $280 / $325

SC228 **Fiber Laser Sources and Amplifiers for Lightwave System Applications** *(Digonnet)* 8:30 am to 5:30 pm, $460 / $545

Laser Safety and Product Classification

SC603 **Laser Product Certification to National and International Regulations** *(Stoev)* 8:30 am to 5:30 pm, $460 / $545

Holography

SC821 ***NEW*** **Holographic Techniques for Advanced Photonic Systems** *(Kostuk)* 8:30 am to 12:30 pm, $280 / $325

Price Key

SPIE Member/Non-Member

FC = SPIE Foundation Course

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Fluorescent Sensing and Diagnostics

SC309 **Fluorescent Markers: Usage and Optical System Optimization** *(Levi)* 8:30 am to 12:30 pm, $280 / $325

SC461 **Bio-Optical Detection Systems** *(Levi)* 1:30 to 5:30 pm, $280 / $325

SC695 **Optical in Biosensing Based on Color Fluorescent Proteins** *(Savitsky)* 8:30 am to 12:30 pm, $280 / $325

Tissue Optics

SC824 *NEW* **Diffuse Light Transport in Tissue and Diffuse Tomography Reconstruction using MATLAB** *(Dehghani, Pogue)* 8:30 am to 5:30 pm, $460 / $545

SC750 **Optical Clearing of Tissue and Blood** *(Tuchin)* 8:30 am to 12:30 pm, $340 / $385

SC029 **Tissue Optics** FC *(Jacques)* 1:30 to 5:30 pm, $280 / $325

SC768 **Optoacoustic Systems for Medical Imaging: From Principles to Clinical Applications** *(Oraevsky)* 1:30 to 5:30 pm, $280 / $325

Ophthalmic Applications

SC702 FC **Optics and Optical Quality of the Human Eye** *(Roorda)* 8:30 am to 12:30 pm, $280 / $325

Optomechanics

SC015 **Structural Adhesives for Optical Bonding** *(Daly)* 8:30 am to 12:30 pm, $280 / $325

Registration is required.
See SPIE Cashier to Register.

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
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Optical Components and Systems Design

SC552 **Aspheric Optics: Design, Fabrication, and Test** *(Fischer)* 8:30 am to 12:30 pm, $355 / $400

SC157 **MTF in Optical and Electro-Optical Systems** *(Ducharme)* 8:30 am to 5:30 pm, $495 / $580

SC010 **Introduction to Optical Alignment Techniques** *(Ruda)* 8:30 am to 5:30 pm, $830 / $1035

SC690 **Geometrical Optics** (FC) *(Greivenkamp)* 8:30 am to 5:30 pm, $490 / $575

SC001 **Optical System Design: Layout Principles and Practice** *(Smith)* (FC) 8:30 am to 5:30 pm, $530 / $615

SC720 **Cost-Conscious Tolerancing of Optical Systems** *(Youngworth)* 8:30 am to 12:30 pm, $280 / $325

SC725 **Optical & Laser Scanning Technology: Devices, Systems & Applications** *(Marshall)* 8:30 am to 5:30 pm, $630 / $715

SC825 ***NEW*** **Imaging Performance Evaluation for Digital Cameras, Cell-phone Cameras and Scanners** *(Burns, Williams)* 8:30 am to 5:30 pm, $460 / $545

SC384 **The Design of Plastic Optical Systems** *(Schaub)* 8:30 am to 12:30 pm, $280 / $325

SC700 **Understanding Scratch and Dig Specifications** (FC) *(Aikens)* 8:30 am to 12:30 pm, $315 / $360

SC321 **Thin Film Optical Coatings** *(Macleod)* 8:30 am to 5:30 pm, $460 / $545

SC003 ***NEW*** **Practical Optical System Design - *EXPANDED 2-Day Format*** (FC) *(Fischer)* 8:30 am to 5:30 pm, $905 / $1210

Industry Workshops

Basic Optics

WS609 **Basic Optics for Non-Optics Personnel** (FC) *(Harding)* 1:30 to 3:30 pm, $100 / $150

Business, Patents and IP

Registration is required.
See SPIE Cashier to Register.

WS412 **Intellectual Property Issues in High-Tech Business** *(Gortych)* 8:30 am to 12:30 pm, $280 / $325

WS827 ***NEW*** **Off the Beaten Path: Career Opportunities for Engineers in the Patent Boom (Law Degree Not Required)** *(Honeyman)* 8:30 am to 12:30 pm, $280 / $325

WS828 ***NEW*** **Understanding Laser Beam Performance Specifications** *(Sukuta)* 8:30 am to 12:30 pm, $280 / $325

WS758 **Intellectual Property: Prior Art Searching** *(Reingand)* 1:30 to 5:30 pm, $280 / $325

WS756 **How to Start a Small High Tech Business Almost Anywhere** *(Udd)* 1:30 to 5:30 pm, $280 / $325

WS826 ***NEW*** **Strategies and Tactics for High-Tech Sales Success** *(Johnson)* 1:30 to 5:30 pm, $280 / $325

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
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Industry Workshops

Professional Development

Don't miss
Industry Perspectives:
analysis, insight, and ideas
FREE business strategy sessions open for all attendees..
See page 22–23 for details.

WS667	**The Craft of Scientific Presentations: A Workshop on Technical Presentations** *(Alley)* 8:30 am to 12:30 pm, $125 / $175
WS668	**The Craft of Scientific Writing: A Workshop on Technical Writing** *(Alley)* 1:30 to 5:30 pm, $125 / $175

Executive Organizing Committee:

Samuel Achilefu, Washington Univ. in St. Louis
Robert Alfano, City College/CUNY
Juanita Anders, USUHS
Fred Azar, Siemens Corporate Research
Vadim Backman, Northwestern Univ.
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Robert Leif, Newport Instruments
Steen Madsen, Univ. of Nevada/Las Vegas
Reza Malek, M.D., Mayo Clinic
Fabrice Manns, Univ. of Miami
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Alexander Oraevsky, Fairway Medical Technologies
Marek Osiński, The Univ. of New Mexico
Ammasi Periasamy, Univ. of Virginia
Paras Prasad, SUNY/Buffalo
Alexander Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia)
Ramesh Raghavachari, U.S. Food and Drug Administration
Peter Rechmann, D.D.S., Univ. of California/San Francisco
William Roach, Air Force Research Lab.
Thomas Ryan, Microsulis Americas Inc.
Alexander Savitsky, A.N. Bach Institute of Biochemistry (Russia)
Eva Sevick-Muraca, Baylor College of Medicine
Peter So, Massachusetts Institute of Technology
Per Söderberg, St Erik's Eye Hospital (Sweden)
Bruce Stuck, U.S. Army Medical Research Detachment
Mamoru Tamura, Hokkaido Univ. (Japan)
Guillermo Tearney, M.D., Massachusetts General Hospital
Bruce Tromberg, Univ. of California/Irvine
Valery Tuchin, Saratov State Univ. (Russia)
Tuan Vo-Dinh, Duke Univ.
Ruikang Wang, Oregon Health and Science Univ.
Lihong Wang, Washington Univ. in St. Louis
Thomas Wang, Stanford Univ.
Adam Wax, Duke Univ.
Ronald Waynant, U.S. Food and Drug Administration
Tony Wilson, Univ. of Oxford (United Kingdom)
Brian Wong, M.D., Univ. of California/Irvine
Kenji Yamamoto, M.D., Research Institute of the International Medical Ctr. of Japan
Haishan Zeng, British Columbia Cancer Agency (Canada)

SPIE Photonics WEST

BiOS 2007

Biomedical Optics

20–25 January 2007

San Jose Convention Center • San Jose, California USA

Symposium Chairs:

James Fujimoto,
Massachusetts Institute of Technology

R. Rox Anderson, M.D.,
Wellman Ctr. for Photomedicine, Massachusetts General Hospital and Harvard School of Medicine

Photonic Therapeutics and Diagnostics

Program Chairs: **Reza Malek, M.D.,** Mayo Clinic;
Keith Black, M.D., Cedars-Sinai Medical Ctr.

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ.;
Anita Mahadevan-Jansen, Vanderbilt Univ.

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven Jacques,** Oregon Health and Science Univ.;
William P. Roach, Air Force Research Lab.

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia;
Daniel Farkas, Cedars-Sinai Medical Ctr.

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo;
Dan Nicolau, The Univ. of Liverpool (United Kingdom)

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Photonic Therapeutics and Diagnostics

Program Chairs: **Reza Malek, M.D.,** Mayo Clinic; **Keith Black, M.D.,** Cedars-Sinai Medical Ctr.

6424A **Photonics in Dermatology and Plastic Surgery** *(Kollias, Choi, Zeng)* p. 49

6424B **Urology: Diagnostics, Therapeutics, Robotics, and Minimally Invasive** *(Malek)* p. 51

6426B **Laser and Noncoherent Light Ocular Effects** *(Stuck, Belkin)* p. 61

6424C **Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology** *(Wong, Ilgner)* p. 52

6425 **Lasers in Dentistry XIII** *(Rechmann, Fried)* p. 55

6424D **Diagnostic and Therapeutic Applications of Light in Cardiology** *(Gregory, Tearney)* p. 53

6428 **Mechanisms for Low-Light Therapy** *(Hamblin, Waynant, Anders)* p. 35

6424E **Optical Techniques in Neurosurgery and Brain Imaging** *(Hirschberg, Madsen)* p. 54

6426A **Ophthalmic Technologies XVII** *(Manns, Söderberg, Ho)* p. 57

6427 **Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XVI** *(Kessel)* p. 62

Conference Poster Sessions

Parkside Hall, Civic Auditorium Complex, 180 W. San Carlos St.

DISPLAY HOURS

Posters will be on display from 6:00 to 7:30 pm.

Tuesday 23 January for BiOS conferences

All symposium attendees are invited to attend the poster sessions and enjoy refreshments while reviewing poster papers. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster sessions are technical events and part of the conference program; it is not appropriate for spouses and families to attend these events.

Poster Setup

Poster presenters: see p. 271 for instructions on setting up your posters.

Special Events

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Optics Exhibition

San Jose Convention Center, Exhibition Hall 1

1:00 to 5:00 pm | 10:00 am to 4:00 pm

BiOS Hot Topics
7:00 to 9:30 pm, p.14

Workshop: **Prospects of Molecular Imaging from Bench to Bedside** *(Gandjbakhche/ Tromberg)*, 6:00 to 8:00 pm, p. 14

Welcome Reception, Fairmont Hotel, Imperial Ballroom, 6:00 to 7:30 pm, p. 10

Photonics West Exhibition

San Jose Convention Center, Exhibition Hall 1–3, Exhibit Foyer and South Hall

10:00 am to 5:00 pm | 10:00 am to 5:00 pm | 10:00 am to 4:00 pm

Attend the SPIEWorks Career Fair!

Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance

11:00 am to 3:00 pm | 11:00 am to 3:00 pm

Round Table Discussion: **Optical Microsystems for Biomedical Applications**, 7:30 to 9:00 pm, p. 19

Technical Group Meeting: **IBOS—International Biomedical Optics Society,** 7:30 to 9:00 pm, p. 14

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Clinical Technologies and Systems

Program Chairs: **Tuan Vo-Dinh,** Duke Univ.; **Anita Mahadevan-Jansen,** Vanderbilt Univ.

6431 **Multimodal Biomedical Imaging** *(Azar)* p. 76

6432 **Endoscopic Microscopy** *(Tearney, Wang)* p. 78

6429 **Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XI** *(Fujimoto, Izatt, Tuchin)* p. 67

6433 **Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VII** *(Gannot)* p. 80

6430B **Quality and Reliability of Technologies for Medicine and Biomedical Devices** *(Raghavachari)* p. 74

6430A **Advanced Biomedical and Clinical Diagnostic Systems V** *(Vo-Dinh, Grundfest, Benaron, Cohn)* p. 71

6434 **Optical Tomography and Spectroscopy of Tissue** *(Chance, Alfano, Tromberg, Tamura, Sevick-Muraca)* p. 82

Conference of Related Interest

6472 **Terahertz and Gigahertz Electronics and Photonics VI** *(Linden, Sadwick)* p. 189

Tissue Optics, Laser-Tissue Interaction, and Tissue Engineering

Program Chairs: **Steven Jacques,** Oregon Health and Science Univ.; **William P. Roach,** Air Force Research Lab.

6436 **Complex Dynamics and Fluctuations in Biomedical Photonics IV** *(Tuchin)* p. 89

6439 **Optics in Tissue Engineering & Regenerative Medicine** *(Kirkpatrick, Wang)* p. 97

6435 **Optical Interactions with Tissue and Cells XVIII** *(Jacques, Roach)* p. 86

6437 **Photons Plus Ultrasound Imaging and Sensing 2007: The Eighth Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics** *(Oraevsky, Wang)* p. 91

6440 **Thermal Treatment of Tissue: Energy Delivery and Assessment** *(Ryan)* p. 99

6438 **Biophotonics and Immune Responses II** *(Chen)* p. 95

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Spectroscopy, Microscopy, and Imaging

Program Chairs: **Ammasi Periasamy,** Univ. of Virginia; **Daniel Farkas,** Cedars-Sinai Medical Ctr.

6441 **Imaging, Manipulation and Analysis of Biomolecules, Cells, and Tissues V** *(Farkas, Leif, Nicolau)* p. 101

6442 **Multiphoton Microscopy in the Biomedical Sciences VII** *(Periasamy, So)* p. 104

6443 **Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIV** *(Conchello, Cogswell, Wilson)* p. 108

6444 **Ultrasensitive and Single-Molecule Detection Technologies IIs** *(Enderlein, Gryczynski)* p. 110

6445 **Optical Diagnostics and Sensing VI** *(Coté, Priezzhev)* p. 112

6446 **Biomedical Applications of Light Scattering** *(Wax, Backman)* p. 114

BiOS Hot Topics
7:00 to 9:30 pm

Nano/Biophotonics

Program Chairs: **Paras Prasad,** SUNY/Buffalo; **Dan Nicolau,** The Univ. of Liverpool (United Kingdom)

6448 **Colloidal Quantum Dots for Biomedical Applications** *(Osiński, Jovin, Yamamoto)* p. 118

6447 **Nanoscale Imaging, Spectroscopy, Sensing and Actuation for Biomedical Applications IV** *(Cartwright, Nicolau)* p. 116

6449B **Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes** *(Savitsky, Wachter)* p. 123

6449A **Molecular Probes for Biomedical Applications** *(Achilefu, Bornhop, Raghavachari)* p. 121

6450 **Plasmonics in Biology and Medicine** *(Vo-Dinh, Lakowicz)* p. 125

Conference of Related Interest

6465 **Microfluidics, BioMEMS, and Medical Microsystems V** *(Papautsky, Wang)* p. 000

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Photonics in Dermatology and Plastic Surgery

Conference Chairs: **Nikiforos Kollias**, Johnson & Johnson CPPW; **Bernard Choi**, Univ. of California/Irvine; **Haishan Zeng**, British Columbia Cancer Agency (Canada)

Saturday 20 January

SESSION 1

Room: Conv. Ctr. A5 . . . . . Sat. 8:30 to 10:10 am

Skin Imaging 1: Multiphoton Imaging

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

8:30 am: **Two-color excited state absorption imaging of melanins,** D. Fu, Princeton Univ.; T. Ye, W. S. Warren, Duke Univ. . . . . [6424A-01]

8:50 am: **Noninvasive intravital cellular diagnosis of atopic dermatitis by using harmonic optical virtual biopsy,** S. Chen, J. Lee, B. Chiang, C. Sun, National Taiwan Univ. (Taiwan) . . . . . [6424A-02]

9:10 am: **Quantitative multiphoton imaging for guiding basal-cell carcinoma removal,** S. Lin, National Taiwan Univ. Hospital (Taiwan); R. Wu, C. Kuo, National Taiwan Univ. (Taiwan); J. Chen, W. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6424A-03]

9:30 am: **Multiphoton tomography of skin tumors after ALA application,** I. Riemann, A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); D. Dill-Müller, Univ. des Saarlandes (Germany); S. Martin, JenLab GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6424A-04]

9:50 am: **Clinical in-vivo two-photon micro-endoscopy for intradermal high-resolution imaging with grin optics,** K. König, A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); B. Messerschmidt, GrinTech GmbH (Germany); S. Schenkl, I. Riemann, Fraunhofer-Institut für Biomedizinische Technik (Germany); M. Kaatz, Friedrich-Schiller-Univ. Jena (Germany); S. Martin, A. V. Tchernook, JenLab GmbH (Germany) . . . . . [6424A-05]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Room: Conv. Ctr. A5 . . . . . Sat. 10:40 am to 12:20 pm

Skin Imaging 2: Spectral Imaging

Chair: **Bernard Choi**, Beckman Laser Institute and Medical Clinic

10:40 am: **Seasonal variation in the concentrations of cutaneous chromophores documented in vivo using spectral imaging,** G. N. Stamatas, Johnson & Johnson Consumer France S.A.S. (France); N. Kollias, Johnson & Johnson CPPW . . . . . [6424A-06]

11:00 am: **In-vivo hyperspectral imaging of traumatic skin injuries in a porcine model,** L. L. Randeberg, A. M. Winnem, E. L. P. Larsen, M. B. Lilledahl, Norwegian Univ. of Science and Technology (Norway); R. Haaverstad, Univ. Hospital of Trondheim (Norway) and Norwegian Univ. of Science and Technology (Norway); O. A. Haugen, Norwegian Univ. of Science and Technology (Norway) and Univ. Hospital of Trondheim (Norway); L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6424A-07]

11:20 am: **Characterization of soft tissue injuries,** A. M. Winnem, L. L. Randeberg, E. L. P. Larsen, M. B. Lilledahl, B. Skallerud, Norwegian Univ. of Science and Technology (Norway); R. Haaverstad, Univ. Hospital of Trondheim (Norway); O. A. Haugen, Trondheim Univ. Hospital (Norway); L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6424A-08]

11:40 am: **Near-infrared spectroscopy to quantitatively assess tissue vasculature: application to Kaposi_s Sarcoma skin lesions,** A. J. Vogel, V. V. Chernomordik, M. Hassan, F. Amyot, B. Dasgeb, National Institutes of Health; Y. Tao, Univ. of Maryland/College Park; S. G. Demos, Lawrence Livermore National Lab.; K. Wyvill, K. Aleman, R. Little, R. Yarchoan, A. H. Gandjbakhche, National Institutes of Health . . . . . [6424A-09]

12:00 pm: **Feasibility of multispectral imaging system to provide enhanced demarcation for skin tumor resection,** R. de Roode, H. J. Noordmans, R. M. Verdaasdonk, M. Canninga-van Dijk, V. Sigurdsson, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6424A-10]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 3

Room: Conv. Ctr. A5 . . . . . Sat. 1:30 to 2:50 pm

Skin Imaging 3: OCT, Photoacoustic, and Confocal Imaging

Chair: **Haishan Zeng**, British Columbia Cancer Agency (Canada)

1:30 pm: **Three-dimensional evaluation of in-vivo human skin by fiber-based polarization sensitive spectral domain optical coherence tomography using B-scan oriented polarization modulation,** S. Sakai, M. Matsumoto, Kanebo Cosmetics Inc. (Japan); M. Yamanari, A. Miyazawa, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6424A-11]

1:50 pm: **Photo-acoustic imaging of port wine stains,** R. G. Kolkman, M. J. Mulder, Univ. Twente (Netherlands); C. P. Glade, Medisch Spectrum Twente; T. G. van Leeuwen, W. Steenbergen, Univ. Twente (Netherlands) . . . . . [6424A-12]

2:10 pm: **Three-dimensional skin imaging using the combination of reflected confocal and multiphoton microscopy,** M. Lin, W. Chen, W. Lo, National Taiwan Univ. (Taiwan); H. Tan, Chang Gung Memorial Hospital (Taiwan); S. Jee, S. Lin, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6424A-13]

2:30 pm: **Toward optical pathology of nonmelanoma skin cancers,** A. N. Yaroslavsky, V. Neel, E. V. Salomatina, J. Novak, Massachusetts General Hospital; R. R. Anderson, Wellman Ctr. for Photomedicine; T. J. Flotte, Massachusetts General Hospital . . . . . [6424A-14]

Coffee Break . . . . . 2:50 to 3:30 pm

SESSION 4

Room: Conv. Ctr. A5 . . . . . Sat. 3:30 to 4:50 pm

Skin Imaging and Spectroscopy: NIR and Fluorescence

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

3:30 pm: **Digital fluorescent imaging system for quantitative analysis of facial sebum production,** B. Han, B. Jung, Yonsei Univ. (South Korea); J. S. Nelson, Beckman Laser Institute and Medical Clinic . . . . . [6424A-15]

3:50 pm: **In-vivo quantitative mapping of blood volume and oxygen saturation using modulated imaging: experimental results in a rat dorsal pedicle skin flap model,** D. J. Cuccia, Univ. of California/Irvine; J. G. Kim, J. S. You, A. J. Durkin, Beckman Laser Institute and Medical Clinic . [6424A-16]

4:10 pm: **Oxygen saturation in arterial and venous occlusions for an animal flap model,** J. Mao, ViOptix, Inc.; G. Bello, A. Ahad, Providence Hospital . . . . . [6424A-17]

4:30 pm: **In-vivo NIR fluorescence imaging of skin and cutaneous melanin with potential applications for melanoma detection,** X. Han, The BC Cancer Research Ctr. (Canada); H. Lui, D. I. McLean, The Univ. of British Columbia (Canada); H. Zeng, The BC Cancer Research Ctr. (Canada) . . . . . [6424A-19]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 5

Room: Conv. Ctr. A5 . . . . . Sun. 8:50 to 10:10 am

Skin Therapy

Chair: **Bernard Choi**, Beckman Laser Institute and Medical Clinic

8:50 am: **Treatment of inflammatory facial acne vulgaris in Chinese patients with the 1450-nm diode laser: a pilot study,** H. Liu, Q. Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6424A-20]

9:10 am: **Treatment optimalization of localized psoriasis with the 308-nm excimer laser and treatment effectiveness using multispectral imaging,** A. I. Rem, H. van Weelden, R. de Roode, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6424A-21]

9:30 am: **Ex-vivo investigations on endoluminal vein treatment procedures,** R. Sroka, C. Schmedt, B. Christine, W. Beyer, T. Beck, B. Steckmeier, Ludwig-Maximilians-Univ. München (Germany) . . . . . [6424A-22]

9:50 am: **The influence of blood concentration and vein diameter on heat generation during endovenous laser treatment for various laser wavelengths,** A. I. Rem, Univ. Medisch Ctr. Utrecht (Netherlands); B. C. Disselhoff, Mesos Medical Ctr. (Netherlands); R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands); D. J. der Kinderen, Mesos Medical Ctr. (Netherlands) . . . . . [6424A-23]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Room: Conv. Ctr. A5 . . . . . Sun. 10:40 am to 12:20 pm

Skin Therapy and Skin Diagnosis

Chair: **Haishan Zeng**, British Columbia Cancer Agency (Canada)

10:40 am: **Diode near-infrared lasers in treatment of complicated hemangiomas in children,** I. A. Abushkin, V. A. Privalov, A. V. Lappa, E. L. Besshtanko, M. Nekhoroshkova, Chelyabinsk State Univ. (Russia) . . . . . [6424A-25]

11:00 am: **Variable depth skin heating with lasers,** D. Y. Paithankar, Candela Corp.; E. V. Ross, Naval Medical Ctr. San Diego . . . . . [6424A-26]

11:20 am: **Comparison of Lorentzian and Gaussian-based equations for laser speckle imaging,** J. C. Ramírez-San-Juan, G. C. Martínez-Niconoff, R. Ramos-García, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); B. Choi, Univ. of California/Irvine . . . . . [6424A-27]

11:40 am: **In-vivo magneto-motive laser speckle imaging,** J. Kim, J. Lofti, Beckman Laser Institute and Medical Clinic; J. G. Kim, Beckman Laser Institute; J. Oh, The Univ. of Texas at Austin; T. E. Milner, The Univ. of Texas/Austin; B. Choi, Beckman Laser Institute and Medical Clinic . . . . . [6424A-28]

12:00 pm: **Optimal spectral acquisition band for temperature profiling in human skin,** M. Milanic, Jozef Stefan Institute (Slovenia) . . . . . [6424A-29]

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Comparison of nail thickness measured with optical coherence tomography and 20-MHz ultrasonography,** J. B. Thomsen, Risø National Lab. (Denmark); M. Mogensen, Univ. of Copenhagen (Denmark); T. M. Jørgensen, L. Thrane, P. E. Andersen, Risø National Lab. (Denmark); G. B. E. Jemec, Univ. of Copenhagen (Denmark) . . . . . [6424A-30]

✔ **Skin topographical analysis by means of Talbot effect technique,** J. Méndez-Gamboa, M. Pérez-Cortés, K. Palma-Alejandro, J. J. Muñoz-Criollo, Univ. Autónoma de Yucatán (Mexico) . . . . . [6424A-31]

✔ **Invariant high resolution optical skin imaging,** S. Murali, K. Lee, J. P. Rolland, College of Optics & Photonics/Univ. of Central Florida . . . . . [6424A-92]

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Urology: Diagnostics, Therapeutics, Robotics, and Minimally Invasive

Conference Chair: **Reza S. Malek**, Mayo Clinic

Program Committee: **Nathaniel M. Fried**, Johns Hopkins Univ.; **Matthew T. Gettman**, Mayo Clinic College of Medicine; **Bodo E. Knudsen**, The Ohio State Univ.; **Rainer M. Kuntz**, Auguste-Victoria-Hospital (Germany); **Kester Nahen**, Laserscope; **James C. Ulchaker**, The Cleveland Clinic Foundation

Saturday 20 January

SESSION 7

Room: Conv. Ctr. C4 . . . . . Sat. 8:30 to 10:10 am

Imaging and Miscellaneous Energy Applications

Chairs: **James C. Ulchaker**, The Cleveland Clinic Foundation; **Reza S. Malek**, Mayo Clinic

8:30 am: **Imaging the cavernous nerves in the rat prostate using optical coherence tomography,** N. M. Fried, Univ. of North Carolina at Charlotte; S. Rais-Bahrami, G. A. Lagoda, A. L. Burnett, L. Su, Johns Hopkins Univ. . . . . [6424B-32]

8:50 am: **Advanced imaging technique for automated classification of casts and crystals in urine,** A. S. Paranjape, Univ. of Texas at Austin Chapter; K. R. Castleman, Advanced Digital Imaging Research, LLC; T. E. Milner, H. G. Rylander III, Univ. of Texas at Austin Chapter . . . . . [6424B-33]

9:10 am: **Thermal and histological tissue effects of bipolar versus monopolar electrosurgical resection of the prostate in a canine model,** R. Ko, B. H. Chew, A. H. H. Tan, E. Rowe, H. A. Razvi, The Univ. of Western Ontario (Canada) . . . . . [6424B-34]

9:30 am: **Use of the 2-μm cw laser as addition and/or alternative for the Nd:YAG in urology,** T. de Boorder, M. T. W. Lock, M. C. M. Grimbergen, J. H. G. M. Klaessens, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6424B-35]

9:50 am: **Radio-frequency ablation of small renal tumors: minimum follow up of 1 year,** V. Patel, R. K. Thaly, K. Shah, Ohio State Univ. . . . . [6424B-36]

Coffee Break . . . . . 10:10 to 10:40 am

✔ Posters - Saturday

Poster will be displayed in conference room during morning coffee break.

✔ **Analysis on the dynamics if the fish-like microrobot based on PRBDM and hydrodynamics,** N. Lin, Beijing Univ. of Technology (China) . [6424B-52]

SESSION 8

Room: Conv. Ctr. C4 . . . . . Sat. 10:40 am to 12:20 pm

Robotics

Chair: **Matthew T. Gettman**, Mayo Clinic

10:40 am: **Perioperative comparison between daVinci-assisted radical prostatectomy and open radical prostatectomy in obese patients,** C. Q. Le, K. V. Ho, J. Slezak, M. Blute, M. T. Gettman, Mayo Clinic . . . . . [6424B-37]

11:00 am: **Learning curve for daVinci-assisted laparoscopic radical prostatectomy,** C. Q. Le, K. V. Ho, M. T. Gettman, Mayo Clinic . . . . [6424B-38]

11:20 am: **Is the learning curve endless? one surgeons experience with robotic prostatectomy,** V. Patel, R. K. Thaly, K. Shah, Ohio State Univ. . . . . [6424B-39]

11:40 am: **Robot-assisted radical prostatectomy: histopathologic and one year PSA data,** V. Patel, R. K. Thaly, K. Shah, Ohio State Univ. . . . . [6424B-40]

12:00 pm: **Robotic-assisted laparoscopic pyeloplasty: minimum 1 year follow up,** V. Patel, R. K. Thaly, K. Shah, Ohio State Univ. . . . . [6424B-41]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 9

Room: Conv. Ctr. C4 . . . . . Sat. 1:20 to 3:00 pm

Fibers and Prosthetics

Chair: **Bodo E. Knudsen**, The Ohio State Univ.

1:20 pm: **Transmission of Erbium:YAG laser radiation through hybrid germanium oxide fibers with sapphire and silica tips at high-pulse energies,** N. M. Fried, Univ. of North Carolina at Charlotte; T. J. Polletto, A. K. Ngo, Johns Hopkins Univ.; A. Tchapyjnikov, K. H. Levin, D. C. Tran, Infrared Fiber Systems, Inc. . . . . [6424B-42]

1:40 pm: **Evaluation of 24 Holmium:YAG laser optical fibers for flexible ureteroscopy,** B. E. Knudsen, A. Mues, Ohio State Univ.; R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; J. M. H. Teichman, The Univ. of British Columbia (Canada) . . . . . [6424B-43]

2:00 pm: **Are laser optical fibers interchangeable with different Holmium:YAG lasers?,** B. E. Knudsen, A. Mues, The Ohio State Univ.; R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; J. M. H. Teichman, The Univ. of British Columbia (Canada) . . . . . [6424B-44]

2:20 pm: **Influence of fiber tip shape on the effectiveness and durability during Holmium laser lithotripsy using high-speed imaging and a ray-trace model,** J. H. G. M. Klaessens, R. M. Verdaasdonk, T. de Boorder, R. de Roode, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6424B-45]

2:40 pm: **Prosthetics in urology: advances, limitations, and the future,** A. Nehra, Mayo Clinic . . . . . [6424B-46]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 10

Room: Conv. Ctr. C4 . . . . . Sat. 3:30 to 5:10 pm

Applications of Light Energy

Chairs: **Nathaniel M. Fried**, Univ. of North Carolina/Charlotte; **Kester Nahen**, Laserscope

3:30 pm: **The ablation mechanism of the high-power KTP laser for BPH treatment compared to other lasers,** J. H. G. M. Klaessens, T. de Boorder, R. de Roode, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6424B-47]

3:50 pm: **The Greenlight Laser: new and improved?,** J. C. Ulchaker, The Cleveland Clinic Foundation . . . . . [6424B-48]

4:10 pm: **Therapeutic efficacy and safety of photo-selective vaporization of prostate under local anaesthesia with light sedation,** C. Arum, St. Olavs Hospital (Norway); P. Romundstad, Norwegian Univ. of Science and Technology (Norway); J. Mjones, St. Olavs Hospital (Norway) . . . . . [6424B-49]

4:30 pm: **Vascular-targeted phototherapy (VTP) using Tookad (WST09) for recurrent prostate cancer after failure of radiation therapy: a phase I/II dose-escalating study,** B. C. Wilson, R. A. Weersink, S. R. H. Davidson, M. Haider, A. Bogaards, M. Gertner, Princess Margaret Hospital (Canada); J. Chin, The Univ. of Western Ontario (Canada); M. M. Elhilali, McGill Univ. (Canada); J. Trachtenberg, Princess Margaret Hospital (Canada) . . . [6424B-50]

4:50 pm: **Erbium:YAG laser incision of urethral strictures: early clinical results,** J. A. Munoz, Manchester Urology Associates PA; J. D. Riemer, Davison Medical Laser Ctr; G. B. Hayes, Laser Components IG, Inc.; D. K. Negus, Sciton; N. M. Fried, Johns Hopkins Univ. . . . . [6424B-51]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Saturday 20 January 2007 • Proceedings of SPIE Vol. 6424C

Advanced Technology and Instrumentation in Otolaryngology: Lasers, Optics, Radio Frequency, and Related Technology

Conference Chairs: **Brian J. Wong**, Univ. of California/Irvine; **Justus F. R. Ilgner**, Univ. Hospital Aachen (Germany)

Program Committee: **Arnold Gillner**, Fraunhofer-Institut für Lasertechnik (Germany)

Saturday 20 January

SESSION 12

Room: Conv. Center C1 . . . . . Sat. 9:00 am to 12:30 pm

Chair: **Brian J. Wong**, Univ. of California/Irvine

9:00 am: **Coblation for tonsillectomy: an evidence-based update,** U. K. Shah, Children's Hospital of Philadelphia . . . . . [6424C-53]

9:20 am: **Effect of low level laser (LLL) and FM1-43 on prevention of ototoxicity in postnatal organotypic culture of rat utricles,** C. Rhee, Y. Chung, Y. Kim, J. Jung, P. Chung, Dankook Univ. (South Korea) . . [6424C-55]

9:40 am: **Effect of cigarette smoke condensate on fibroblast cell viability and induced apoptosis in organotypic skin models,** B. Dao, A. Yamazaki, C. Sun, B. J. Wong, Univ. of California/Irvine . . . . . [6424C-57]

10:00 am: **Voltage and time dependence of electromechanical cartilage reshaping using graphite electrodes,,** A. A. Salibian, D. E. Protsenko, M. Mahalingam, B. J. Wong, Univ. of California/Irvine . . . . . [6424C-58]

Coffee Break . . . . . 10:20 to 10:50 am

10:50 am: **Clinical microscopy techniques for the study of the pediatric vocal fold development.,** C. Boudoux, W. Oh, A. Desjardins, B. J. Vakoc, B. E. Bouma, C. J. Hartnick, G. J. Tearney, Harvard Medical School [6424C-59]

11:10 am: **Evaluation of time-dependent elastic modulus, mechanical properties and temperature distribution profiles of porcine septal cartilage following laser irradiation with Nd:YAG laser and RF generator,** A. J. Zemek, D. E. Protsenko, B. J. Wong, Univ. of California/Irvine . . . . . [6424C-61]

11:30 am: **OCT of the head and neck- instrumentation and technology,** S. Guo, J. M. Ridgway, J. Su, J. Perez, W. B. Armstrong, Z. Chen, B. J. Wong, Univ. of California/Irvine . . . . . [6424C-60]

11:50 am: **Optical characterization of vocal folds by OCT-based laryngoscopy,** K. Lueerssen, H. Wisweh, M. Ptok, Hanover Medical School (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6424C-54]

12:10 pm: **Virtual Spectroscopy Instrument for Diagnosis of Nasopharyngeal Carcinoma,** J. Cai, Fujina Normal Univ. (China); Y. Wu, Z. Liao, H. Li, S. Xie, Fujian Normal Univ. (China) . . . . . [6424C-56]

Diagnostic and Therapeutic Applications of Light in Cardiology

Conference Chairs: **Kenton W. Gregory**, Oregon Medical Laser Ctr.; **Guillermo J. Tearney**, Massachusetts General Hospital

Program Committee: **Laura Marcu**, Univ. of California/Davis

Saturday 20 January

SESSION 13

Room: Conv. Center E . . . . . Sat. 8:30 to 9:50 am

Optical Coherence Tomography

Chair: **Guillermo J. Tearney**, Massachusetts General Hospital

8:30 am: **Intracoronary comprehensive volumetric microscopy with optical frequency domain imaging in vivo,** G. J. Tearney, S. Yun, B. J. Vakoc, M. J. Suter, A. Desjardins, R. Motaghian Nezam, M. S. Shishkov, I. Jang, B. E. Bouma, Massachusetts General Hospital . . . . . [6424D-62]

8:50 am: **Forward scanning catheters for 3D optical coherence tomography of chronic total occlusions: technical development and ex-vivo results,** N. R. Munce, Univ. of Toronto (Canada); T. Shoa, The Univ. of British Columbia (Canada); A. Mariampillai, B. A. Standish, Univ. of Toronto (Canada); J. Butany, Univ. Health Network (Canada); A. I. Vitkin, B. H. Strauss, G. A. Wright, Univ. of Toronto (Canada); J. D. W. Madden, The Univ. of British Columbia (Canada); V. X. D. Yang, Univ. of Toronto (Canada) . . . . . [6424D-63]

9:10 am: **Detection of macrophages in atherosclerotic plaque using differential phase: optical coherence tomography,** J. Kim, J. Oh, The Univ. of Texas/Austin; P. Sanghi, J. Mancuso, M. Clingiroglu, M. D. Feldman, The Univ. of Texas Health Science Ctr. at San Antonio; T. E. Milner, The Univ. of Texas/Austin . . . . . [6424D-64]

9:30 am: **Magneto-motive detection of atherosclerotic plaque with differential phase optical coherence tomography,** J. Oh, The Univ. of Texas/Austin; M. D. Feldman, South Texas Audie Murphy Hospital; J. Kim, The Univ. of Texas/Austin; P. Sanghi, South Texas Audie Murphy Hospital; T. E. Milner, The Univ. of Texas/Austin . . . . . [6424D-65]

Coffee Break . . . . . 9:50 to 10:20 am

SESSION 14

Room: Conv. Center E . . . . . Sat. 10:20 am to 12:00 pm

Spectroscopy

Chair: **Laura Marcu**, Univ. of California/Davis

10:20 am: **Study of normal, fibrous, and calcified aortic valve tissue by Raman and reflectance spectroscopy,** K. C. Rodrigues, F. L. Silveira, L. Silveira, Jr., C. J. De Lima, J. C. Lázzaro, Univ. do Vale do Paraíba (Brazil); G. C. De Souza, J. A. B. Piotto, Cirucor (Brazil); M. T. T. Pacheco, R. A. Zângaro, Univ. do Vale do Paraíba (Brazil) . . . . . [6424D-66]

10:40 am: **High-wavenumber Raman spectral evaluation of coronary atherosclerosis,** J. T. Motz, Harvard Medical School and Wellman Ctr. for Photomedicine and Massachusetts General Hospital; A. H. Chau, Massachusetts Institute of Technology and Wellman Ctr. for Photomedicine and Massachusetts General Hospital; J. A. Gardecki, Massachusetts Institute of Technology and Massachusetss General Hospital; B. E. Bouma, G. J. Tearney, Massachusetts General Hospital and Wellman Ctr. for Photomedicine . . . . . [6424D-67]

11:00 am: **Miniaturized Raman catheter for the detection of coronary atherosclerosis,** A. H. Chau, Massachusetts Institute of Technology and Massachusetts General Hospital; J. T. Motz, Massachusetts Institute of Technology and Harvard Medical School and Massachusetts General Hospital; J. A. Gardecki, Wellman Ctr. for Photomedicine and Massachusetts General Hospital; B. E. Bouma, Massachusetts General Hospital and Harvard Medical School; G. J. Tearney, Wellman Ctr. for Photomedicine and Harvard Medical School and Massachusetts General Hospital . . . . . [6424D-68]

11:20 am: **Broadband coherent anti-Stokes Raman scattering (CARS): a potential tool for atherosclerosis diagnostic imaging,** J. Cormier, Institut National d'Optique (Canada); A. C. Ko, L. Choo-Smith, J. Werner, E. Kohlenberg, M. D. Hewko, National Research Council (Canada); J. Fréchette, M. Fortin, I. Noiseux, J. Bouchard, P. Desroches, Institut National d'Optique (Canada); M. G. Sowa, National Research Council (Canada); M. L. Vernon, Institut National d'Optique (Canada) . . . . . [6424D-69]

11:40 am: **Multiphoton microscopy of atheroslcerotic plaque,** M. B. Lilledahl, O. A. Haugen, L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6424D-70]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 15

Room: Conv. Center E . . . . . Sat. 1:00 to 3:00 pm

Myocardium: Diagnosis and Therapy

Chair: **Kenton W. Gregory**, Oregon Medical Laser Ctr.

1:00 pm: **Optical coherence tomography and Raman spectroscopy investigation of damaged arterial tissue by frictional forces during coronary angioplasty,** M. D. Hewko, L. Choo-Smith, A. C. Ko, J. Werner, E. Kohlenberg, S. Delorme, R. El_Ayoubi, M. Lanthier, M. L. Dufour, G. Lamouche, M. G. Sowa, National Research Council (Canada) . . . . . [6424D-71]

1:20 pm: **Ho:YAG laser irradiation in blood vessels as a vasodilator: ex-vivo study,** E. Nakatani, T. Iwasaki, K. Kaneko, N. Shimazaki, T. Arai, Keio Univ. (Japan) . . . . . [6424D-72]

1:40 pm: **Fiber photo-catheters with spatially modulated diffusers for laser treatment of atrial fibrillation,** I. I. Peshko, Univ. of Toronto (Canada); V. Rubtsov, Intelligent Optical Systems, Inc. . . . . [6424D-73]

2:00 pm: **Comparison of epicardial deformation in passive and active isolated rabbit hearts,** A. Ho, Stony Brook Univ.; L. Tang, Cedars-Sinai Medical Ctr.; F. Chiang, Stony Brook Univ.; S. Lin, Cedars-Sinai Medical Ctr. [6424D-74]

2:20 pm: **Multimodality natural-contrast optical imaging of embryonic hearts in small animal model systems,** R. Yelin, B. E. Bouma, D. Yelin, W. Oh, C. Boudoux, B. J. Vakoc, S. Yun, Massachusetts General Hospital; W. Goessling, L. Zon, Harvard Medical School; R. J. Krieser, K. White, G. J. Tearney, Massachusetts General Hospital . . . . . [6424D-75]

2:40 pm: **Development of novel short-term heating angioplasty,** N. Shimazaki, K. Kaneko, E. Nakatani, T. Arai, Keio Univ. (Japan) . . . [6424D-76]

BiOS Hot Topics

7:00 to 9:30 pm

See page 14 for more information.

Saturday 20 January 2007 • Proceedings of SPIE Vol. 6424E

Optical Techniques in Neurosurgery and Brain Imaging

Conference Chairs: **Henry Hirschberg**, Rikshospitalet (Norway); **Steen J. Madsen**, Univ. of Nevada/Las Vegas

Saturday 20 January

SESSION 16

Room: Conv. Center B1 . . . . . Sat. 8:30 to 10:10 am

Neuro Imaging I

Chair: **Henry Hirschberg**, Rikshospitalet (Norway)

8:30 am: **Noninvasive imaging of GFAP-GFP expression in neonatal transgenic mice as a model for studying Parkinsonism and developmental neurotoxicity,** G. Ho, Institute of Bioengineerng & Nanotechnology (Singapore) . . . . . [6424E-77]

8:50 am: **Optical detection of action potential propagation using spectral-domain optical coherence tomography,** B. H. Park, Wellman Ctr for Photomedicine; C. L. Passaglia, Boston Univ.; J. F. DeBoer, Wellman Ctr for Photomedicine . . . . . [6424E-78]

9:10 am: **In-vivo optical characterization of pediatric epileptogenic lesions,** W. Lin, A. Fernandez, Florida International Univ.; J. Ragheb, G. Morrison, D. Sandberg, S. Bhatia, M. Duchowny, P. Jayakar, Miami Children's Hospital . . . . . [6424E-79]

9:30 am: **Characterizing spatiotemporal changes in cerebral blood flow through the intact rat skull using laser speckle temporal contrast analysis,** P. Li, J. Qiu, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6424E-80]

9:50 am: **Optical coherence tomography imaging of spine foraminal neurovascular structures: animal studies,** D. Raphael, Univ. of Southern California; C. Yang, California Institute of Technology; J. Wu, Univ. of Southern California; N. Tresser, Imalux Corp.; L. Rever, Univ. of Southern California . . . . . [6424E-81]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 17

Room: Conv. Center B1 . . . . . Sat. 10:40 am to 12:20 pm

Tumor Diagnosis and Treatment

Chair: **Steen J. Madsen**, Univ. of Nevada/Las Vegas

10:40 am: **Fluorescence of Pc 4 in U87 cells following photodynamic therapy,** D. Varghai, K. Azizuddin, Y. Ahmad, D. K. Feyes, N. L. Oleinick, D. Dean, Case Western Reserve Univ. . . . . [6424E-82]

11:00 am: **Increased brain edema following 5-aminolevulinic acid administration mediated photodynamic in normal and tumor bearing rats.,** H. Hirschberg, M. S. Mathews, Univ. of California/Irvine; E. Angell-Petersen, The Norwegian Radium Hospital (Norway); S. Spetalen, Ullevaal Univ. Hospital (Norway); S. J. Madsen, Univ. of Nevada/Las Vegas . . . . . [6424E-83]

11:20 am: **Photochemical internalization for the treatment of malignant gliomas,** S. J. Madsen, Univ. of Nevada/Las Vegas and Univ. of Nevada/Las Vegas Cancer Research Ctr.; K. Kharkhuu, Univ. of Nevada/Las Vegas; K. Berg, The Norwegian Radium Hospital (Norway); H. Hirschberg, Univ. of California/Irvine and Univ. of Nevada/Las Vegas . . . . . [6424E-84]

11:40 am: **Comparing the effects of repetitive and chronic ALA mediated PDT on human glioma spheroids.,** M. S. Mathews, C. Sun, Univ. of California/Irvine; S. J. Madsen, Univ. of Nevada/Las Vegas; H. Hirschberg, Univ. of California/Irvine . . . . . [6424E-85]

12:00 pm: **Comparison of ALA and Photofrin in two rat glioma models,** S. A. Ziegler, C. Hall, C. Loucks, Univ. of Nevada/Las Vegas; S. J. Madsen, S. W. Carper, Univ. of Nevada/Las Vegas and UNLV Cancer Reserach Ctr. . . . . [6424E-86]

Lunch Break . . . . . 12:20 to 1:30 pm

SESSION 18

Room: Conv. Center B1 . . . . . Sat. 1:30 to 3:10 pm

Neuro Imaging II

Chair: **Henry Hirschberg**, Rikshospitalet (Norway)

1:30 pm: **Analysis of F18-fluorodeoxy-glucose PET imaging data captured before and after Pc 4-mediated photodynamic therapy of U87 tumors in the athymic nude rat,** N. Cross, D. Varghai, C. Spring-Robinson, R. Sharma, . F. Muzic, Jr., N. L. Oleinick, D. Dean, Case Western Reserve Univ. . [6424E-87]

1:50 pm: **Monitoring Pc 4-mediated photodynamic therapy of U87 tumors with F18-fluorodeoxy-glucose PET imaging in the athymic nude rat,** D. Varghai, N. Cross, C. Spring-Robinson, R. Sharma, D. K. Feyes, Y. Ahmad, N. L. Oleinick, R. F. Muzic, Jr., D. Dean, Case Western Reserve Univ. [6424E-88]

2:10 pm: **Obstructive sleep apnea screening using NIRS,** F. Kashefi, The Univ. of Texas/Arlington . . . . . [6424E-89]

2:30 pm: **Applications of femtosecond laser ablation for nanoneurosurgery in C. elegans,** S. H. Chung, D. A. Clark, C. V. Gabel, A. D. T. Samuel, E. D. Mazur, Harvard Univ. . . . . [6424E-90]

2:50 pm: **Mapping tissue chromophore changes in cerebral ischemia: a pilot study,** D. Abookasis, M. S. Mathews, C. Lay, Univ. of California/Irvine; D. J. Cuccia, Beckman Laser Institute and Medical Clinic; R. D. Frostig, M. Linskey, Univ. of California/Irvine; B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6424E-91]

✔ Posters-Saturday

Chair: **Henry Hirschberg**, Rikshospitalet (Norway)

Posters will be available for viewing near the conference room. Poster authors: Please put up your posters before the conference or during the morning coffee break.

✔ **Hardware, software, and scanning issues encountered during small animal imaging of photodynamic therapy in the athymic nude rat,** N. Cross, R. Sharma, D. Varghai, C. Spring-Robinson, N. L. Oleinick, R. F. Muzic, Jr., D. Dean, Case Western Reserve Univ. . . . . [6424E-93]

✔ **Quantitative intracellular calcium sensing with two-photon fluorescence lifetime imaging microscopy,** E. Kuwana, G. Vargas, T. C. Pappas, A. Liopo, M. Motamedi, The Univ. of Texas Medical Branch at Galveston . . [6424E-94]

BiOS Hot Topics

7:00 to 9:30 pm

See page 14 for more information.

Sunday-Monday 21-22 January 2007 • Proceedings of SPIE Vol. 6425

Lasers in Dentistry XIII

Conference Chairs: **Peter Rechmann**, Univ. of California/San Francisco; **Daniel Fried**, Univ. of California/San Francisco

Program Committee: **Aldo Brugnera Jr.**, Univ. do Vale do Paráiba (Brazil); **John D. B. Featherstone**, Univ. of California/San Francisco; **David M. Harris**, Bio-Medical Consultants, Inc.; **Boris B. Majaron**, Jozef Stefan Institut (Slovenia); **G. L. Powell**, The Univ. of Utah; **George K. Stookey**, Indiana Univ.; **Joel M. White**, Univ. of California/San Francisco; **Harvey A. Wigdor**, Advocate Illinois Masonic Medical Ctr.

Sunday 21 January

SESSION 1

Room: Conv. Center C4 . . . . . Sun. 8:30 to 11:40 am

Lasers in Caries Detection: Diagnostic Imaging

Chair: **Daniel Fried**, Univ. of California/San Francisco

8:30 am: **Multimodal imaging system for dental caries detection,** R. Liang, Eastman Kodak Co.; M. A. Marcus, V. C. Wong, Eastman Kodak Co; P. D. Burns, P. O. McLaughlin, Eastman Kodak Co. . . . . [6425-01]

8:50 am: **Three-dimensional tooth imaging using multiphoton and second harmonic generation microscopy,** M. Chen, National Taiwan Univ. Hospital (Taiwan); W. Chen, Y. Sun, P. T. Fwu, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6425-02]

9:10 am: **Laser scanning confocal microscopy and laser tweezers-based experiments to understand uentine-bacteria interactions,** C. P. Sum, National Univ. of Singapore (Singapore); S. K. Mohanty, P. K. Gupta, Ctr. for Advanced Technology (India); A. Kishen, National Univ. of Singapore (Singapore) . . . . . [6425-03]

9:30 am: **Optical imaging of hard and soft dental tissues using discretely swept OFDR-OCT,** H. Kakuma, The Univ. of Tokyo (Japan); K. Ohbayashi, Kitasato Univ. (Japan); Y. Arakawa, The Univ. of Tokyo (Japan) . . . . . [6425-04]

9:50 am: **Digital image assessment of metallic post morphological detection through trans-illumination of composite materials,** E. C. Lins, F. L. E. Florez, A. R. Figueiredo, L. G. Marcassa, V. S. Bagnato, Univ. de São Paulo (Brazil) . . . . . [6425-05]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Excitation-emission fluorescence spectroscopy and time-gated Raman microscopy analysis of dental tissues,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6425-06]

11:00 am: **A new multiwavelength opticalplethysmograph for quantitative determination of pulpal hemoglobin content and oxygen level using green and near-infrared LEDs,** S. Kakino, Z. Miwa, Y. Takagi, A. Kirimoto, K. Ohuchi, S. Takatani, Tokyo Medical and Dental Univ. (Japan) . . . . . [6425-07]

11:20 am: **Use of aluminium phthalocyanine nanoparticles for teeth enamel microdamages diagnostics,** M. L. Sinyaeva, S. Y. Vasilchenko, I.M. Sechenov Moscow Medical Academy (Russia); V. B. Loschenov II, General Physics Institute (Russia); S. D. Korovin, Institute of High Current Electronics (Russia); A. I. Volkova, General Physics Institute (Russia); A. A. Mamedov, I.M. Sechenov Moscow Medical Academy (Russia); S. Y. Kuzmin, G. N. Vorozhtsov, Organic Intermediates and Dyes Institute (Russia) . . . . . [6425-08]

✔ Posters Pops-Sunday

Chair: **Daniel Fried**, Univ. of California/San Francisco

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters in this session will be viewed following this overview session.

Poster authors: please put up your poster before the conference or during the morning coffee break. Posters must be removed from the boards immediately following the conference.

✔ **The sound of dental tissue ablation as a possible parameter for conservative dentistry,** F. R. P. Robles II, A. B. Matos, F. M. Mendes, Univ. de São Paulo (Brazil) . . . . . [6425-25]

✔ **Combined FT-Raman and SEM studies of Er:YAG laser irradiation on dentin,** L. E. S. Soares, A. Brugnera Jr., F. A. A. Zanin, E. B. P. de Souza, W. A. A. Jara, A. A. Martin, Univ. do Vale do Paraíba (Brazil) . . . . . [6425-26]

✔ **Near-IR and PS-OCT imaging of developmental defects in dental enamel,** K. Hirasuna, C. L. Darling, D. Fried, Univ. of California/San Francisco . . . . . [6425-27]

✔ **Selective removal of simulated enamel caries using laser-ablation and near-IR imaging,** C. Tao, K. Fan, C. L. Darling, D. Fried, Univ. of California/San Francisco . . . . . [6425-28]

✔ **Imaging natural occlusal caries with PS-OCT,** P. Ngaotheppitak, C. L. Darling, D. Fried, Univ. of California/San Francisco . . . . . [6425-29]

Poster Viewing

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 2

Room: Conv. Center C4 . . . . . Sun. 2:00 to 3:00 pm

Lasers and Composites

Chair: **Daniel Fried**, Univ. of California/San Francisco

2:00 pm: **Real-time monitoring of dental tissue deformation during dental composite photo-polymerization,** D. V. Pantelic, Institute of Physics (Serbia and Montenegro); L. Blazic, Univ. of Novi Sad (Serbia and Montenegro); S. Savic-Sevic, B. Muric, I. Belic, Institute of Physics (Serbia and Montenegro) . . . . . [6425-09]

2:20 pm: **Fiber-reinforced composite analysis using optical coherence tomography after mechanical and thermal cycling,** B. d. B. C. Kyotoku, A. K. S. Braz, R. Braz, A. S. L. Gomes, Univ. Federal de Pernambuco (Brazil) . . . . . [6425-10]

2:40 pm: **Aged composite resins ablation under different parameters of Er:YAG laser: ablation rate and morphological aspects,** R. F. Z. Lizarelli, E. C. Lins, D. P. Jacomassi, L. T. Moriyama, V. S. Bagnato, Univ. de São Paulo (Brazil) . . . . . [6425-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 3

Room: Conv. Center C4 . . . . . Sun. 3:30 to 4:30 pm

Lasers in Periodontology and Soft Tissue Surgery

Chair: **Peter Rechmann**, Univ. of California/San Francisco

3:30 pm: **Effect of GaAs laser on photosensitized periodontopathic anaerobic organisms: an in-vitro study,** S. V. Kothiwale, K.L.E. Society's Institute of Dental Sciences (India) . . . . . [6425-12]

3:50 pm: **Comparison of violet diode laser with CO_2 laser in surgical performance of soft tissues,** H. Hatayama, A. Inoue, Sumitomo Electric Industries, Ltd. (Japan); J. Kato, G. Akashi, Y. Hirai, Tokyo Dental College (Japan) . . . . . [6425-13]

4:10 pm: **New cw 2-μm laser for soft tissue applications in dentistry compared to usual laser wavelengths,** R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands); J. W. Blanken, Academisch Medisch Ctr. (Netherlands); T. de Boorder, J. H. G. M. Klaessens, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6425-14]

✔ Posters Pops-Sunday

Chair: **Peter Rechmann**, Univ. of California/San Francisco

Authors of the following posters will give a 3-minute overview of their posters using up to 3 vu-graphs. Posters will be on display in the hallway near the meeting room. Posters in this session will be viewed following this overview session.

Poster authors: please put up your poster before the conference or during the morning coffee break. Posters must be removed from the boards immediately following the conference.

✔ **Diagnosis of oral pathology by means of micro-Raman spectroscopy on biopsies and blood serum,** M. Lepore, Seconda Univ. degli Studi di Napoli (Italy); F. Zenone, Univ. degli Studi di Napoli Federico II (Italy); G. Perna, P. Carmone, Univ. di Foggia (Italy); I. Delfino, Univ. della Tuscia (Italy); G. M. Gaeta, Seconda Univ. degli Studi di Napoli (Italy); V. Capozzi, Univ. di Foggia (Italy) . . . . . [6425-30]

✔ **Phototherapy enhanced bone regeneration,** A. Kwong-Hing, The Univ. of Western Ontario (Canada); P. Brawn, Biolux Research Ltd. (Canada) . . . . . [6425-31]

✔ **Influence of gel/LED-laser application on cervical microleakage of two barrier materials used for endodontically treated teeth-whitening,** M. A. Marchesan, F. Barros, S. Porto, S. Zaitter, Univ. de Ribeirao Preto (Brazil); A. Brugnera Jr., Univ. do Vale do Paraíba (Brazil); M. D. Sousa-Neto, Univ. de Ribeirao Preto (Brazil) . . . . . [6425-32]

✔ **Investigation of photo-bleaching mechanisms through transmittance method in pigmented solution,** F. L. E. Florez, E. C. Lins, R. F. Z. Lizarelli, Univ. de São Paulo (Brazil); O. Batista Jr, Univ. Estadual Paulista Júlio de Mesquita Filho (Brazil); V. S. Bagnato, Univ. de São Paulo (Brazil) . [6425-33]

✔ **Colorimetric evaluation of composite materials with different thickness by reflectance spectroscopy,** P. P. Portero, Univ. Estadual Paulista (Brazil); F. L. E. Florez, E. C. Lins, R. F. Z. Lizarelli, V. S. Bagnato, Univ. de São Paulo (Brazil); O. B. Oliveira Jr., Univ. Estadual Paulista "Júlio de Mesquita Filho" (Brazil) . . . . . [6425-34]

✔ **Organic dye penetration quantification into a dental composite cured by LED system using fluorescence spectroscopy,** M. E. Silva, Jr., Univ. Estadual Paulista (Brazil); E. C. Lins, M. M. Costa, Sr., V. S. Bagnato, R. F. Z. Lizarelli, Univ. de São Paulo (Brazil) . . . . . [6425-35]

✔ **Background interference on the color of dental composite materials with different thickness by digital contrast,** E. C. Lins, F. L. E. Florez, Univ. de São Paulo (Brazil); P. P. Portero, Univ. Estadual Paulista (Brazil); R. F. Z. Lizarelli, Univ. de São Paulo (Brazil); O. B. Oliveira Jr., Univ. Estadual Paulista (Brazil); V. S. Bagnato, Univ. de São Paulo (Brazil) . . . . . [6425-36]

Poster Viewing

Monday 22 January

SESSION 4

Room: Conv. Center C4 . . . . . Mon. 8:30 to 11:40 am

Lasers in Dental Hard Tissue

Chair: **Peter Rechmann**, Univ. of California/San Francisco

8:30 am: **Er:YAG micro-preparation of hard dental tissue,** T. Dostalova, Charles Univ. in Prague (Czech Republic); H. Jelínkov, M. Nemec, P. Koranda, Czech Technical Univ. in Prague (Czech Republic); M. Miyagi, K. Iwai, Sendai National College of Technology (Japan); Y. Shi, Fudan Univ. (China); Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6425-15]

8:50 am: **Surface modification of dental tissues by KrF excimer laser radiation,** M. Sivakumar, V. Oliveira, R. M. Vilar, Instituto Superior Técnico (Portugal) . . . . . [6425-16]

9:10 am: **Real-time near-IR imaging of ablation crater formation in dental enamel during laser ablation,** C. L. Darling, D. Fried, Univ. of California/San Francisco . . . . . [6425-17]

9:30 am: **Scanning ablation of root caries with acoustic feedback control,** K. Fan, D. Fried, Univ. of California/San Francisco . . . . . [6425-18]

9:50 am: **Effect of sample storage conditions on Er:YAG laser ablation of enamel, dentin, and bone,** W. J. Selting, Consultant . . . . . [6425-19]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Investigation of ultra-short-pulsed laser ablation on dental hard tissues,** T. Uchizono, K. Awazu, Osaka Univ. (Japan) . . . . . [6425-20]

11:00 am: **Effect of water spray during laser ablation on dental hard tissue,** H. W. Kang, The Univ. of Texas/Austin; I. Rizoiu, BIOLASE Technology, Inc.; A. J. Welch, The Univ. of Texas/Austin . . . . . [6425-21]

11:20 am: **Assessment of root caries removal by Er,Cr:YSGG laser,** V. R. Geraldo-Martins, M. Martins Marques, Univ. de São Paulo (Brazil) [6425-22]

SESSION 5

Room: Conv. Center C4 . . . . . Mon. 12:00 to 12:40 pm

Lasers in Endodontics

Chair: **Peter Rechmann**, Univ. of California/San Francisco

12:00 pm: **Comparison of various laser wavelengths for root canal preparation,** J. W. Blanken, Academisch Medisch Ctr. (Netherlands); R. M. Verdaasdonk, R. de Roode, J. H. G. M. Klaessens, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6425-23]

12:20 pm: **Effect of laser irradiation on root canal microleakage: an in-vitro study,** C. C. Todea, L. M. Filip, C. I. Balabuc, M. Negrutiu, C. Sinescu, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania); G. Draganescu, West Univ. of Timisoara (Romania) . . . . . [6425-24]

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Ophthalmic Technologies XVII

Conference Chairs: **Fabrice Manns**, Univ. of Miami; **Per G. Söderberg**, St Erik's Eye Hospital (Sweden); **Arthur Ho**, Univ. of New South Wales (Australia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Michael Belkin**, Tel Aviv Univ. (Israel); **Ralf Brinkmann**, Univ. zu Lübeck (Germany); **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Pier Giorgio Gobbi**, Univ. degli Studi di Milano (Italy); **Benedikt J. Jean**, Eberhard-Karls-Univ. Tuebingen (Germany); **Karen M. Joos**, Vanderbilt Univ.; **Katsuhiko Kobayashi**, Topcon Corp. (Japan); **Ezra I. Maguen**, Cedars-Sinai Medical Ctr.; **Peter J. Milne**, National Science Foundation; **Michael C. Mrochen**, ETH Zürich (Switzerland); **Daniel V. Palanker**, Stanford Univ. Medical Ctr.; **Jean-Marie A. Parel**, Univ. of Miami; **Luigi L. Rovati**, Univ. degli Studi di Modena (Italy); **Jerry Sebag**, Univ. of Southern California; **Peter Soliz**, ORION International Technologies, Inc.; **William B. Telfair**, IRIDEX Corp.; **Valery V. Tuchin**, Saratov State Univ. (Russia)

SPIE and the organizers gratefully acknowledge the following contributors to the conference on Ophthalmic Technologies XVI:

ALCON Inc. through the Pascal RoI Foundation

Saturday 20 January

SESSION 1

Room: Conv. Center A2 . . . . . Sat. 8:30 to 10:15 am

Optical Coherence Tomography: Technology and Image Processing

Chairs: **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Luigi L. Rovati**, Univ. of Modena (Italy)

8:30 am: **Hybrid LSLO/SDOCT retinal imager,** N. V. Iftimia, D. X. Hammer, C. E. Bigelow, R. D. Ferguson, Physical Sciences Inc.; J. F. DeBoer, Harvard Medical School . . . . . [6426A-01]

8:45 am: **High-speed high-resolution OCT imaging of the retina with frequency swept lasers at 850 nm,** V. J. Srinivasan, R. A. Huber, I. Gorczynska, D. C. Adler, Massachusetts Institute of Technology; J. Jiang, P. Reisen, A. Cable, Thorlabs, Inc.; J. G. Fujimoto, Massachusetts Institute of Technology [6426A-02]

9:00 am: **Novel ultrahigh resolution optical coherence tomography system at 1020nm for morphological and functional retina imaging,** K. K. Bizheva, H. Singh, D. Wang, Univ. of Waterloo (Canada) . . . . . [6426A-03]

9:15 am: **Enhanced transmission through opaque ocular media and deeper penetration into the choroid of high speed optical coherence tomography at 1050nm,** B. Pova_ay, A. Unterhuber, B. M. Hermann, B. Hofer, Cardiff Univ. (United Kingdom); F. Zeiler, Ludwig Boltzmann Institut (Austria); J. E. Morgan, Cardiff Univ. (United Kingdom); A. Chavez-Pirson, NP Photonics, Inc.; C. Glittenberg, S. Binder, Ludwig Boltzmann Institut (Austria); W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6426A-04]

9:30 am: **In-vivo imaging of the human retina using OFDI: comparison between 850 and 1050 nm.,** D. M. de Bruin, S. Yun, C. Kerbage, H. Lim, E. Lee, J. F. DeBoer, Massachusetts General Hospital . . . . . [6426A-05]

9:45 am: **Correction of motion artifacts and scanning beam distortions in 3D Ophthalmic Optical Coherence Tomography imaging,** R. J. Zawadzki, A. R. Fuller, Univ. of California/Davis; S. S. Choi, Univ. of California/Davis Medical Ctr.; D. F. Wiley, B. Hamann, Univ. of California/Davis; J. S. Werner, Univ. of California/Davis Medical Ctr. . . . . [6426A-06]

10:00 am: **Contrast enhancement of retinal OCT images by horizontal and vertical image registration of multiple B-scans,** T. M. Jørgensen, J. Thomadsen, Risø National Lab. (Denmark); B. Sander, Univ. Hospital Herlev (Denmark) . . . . . [6426A-07]

Coffee Break . . . . . 10:15 to 10:30 am

SESSION 2

Room: Conv. Center A2 . . . . . Sat. 10:30 to 11:35 am

Optical Coherence Tomography: Experimental

Chairs: **Katsuhiko Kobayashi**, Topcon Corp. (Japan); **Peter Soliz**, ORION International Technologies, Inc.

10:30 am: **Measurement of retinal physiology using functional Fourier domain OCT concepts,** R. A. Leitgeb, A. H. Bachmann, C. Blatter, T. Lasser, Ecole Polytechnique Fédérale de Lausanne (Switzerland); M. Pircher, Medizinische Univ. Wien (Austria) . . . . . [6426A-08]

10:45 am: **Phase-insensitive optical coherence angiography,** Y. Hong, Univ. of Tsukuba (Japan) and Korea Advanced Institute of Science and Technology (South Korea); S. Makita, M. Yamanari, Univ. of Tsukuba (Japan); S. Kim, Korea Advanced Institute of Science and Technology (South Korea); T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6426A-09]

11:00 am: **Investigation and visualization of scleral channels created with femtosecond laser in enucleated human eyes using 3D optical coherence tomography images,** G. Chaudhary, B. Rao, D. Chai, Z. Chen, T. Juhasz, Univ. of California/Irvine . . . . . [6426A-10]

11:15 am: **High-resolution SD-OCT imaging of mouse retina,** K. H. Kim, G. N. Maguluri, M. Puoris'haag, B. H. Park, Massachusetts General Hospital; Y. Umino, R. B. Barlow, Upstate Medical Univ./SUNY; J. F. DeBoer, Massachusetts General Hospital . . . . . [6426A-11]

11:30 am: **Imaging of eye tumor in the mouse model of retinoblastoma with spectral-domain optical coherence tomography,** S. Jiao, M. Ruggeri, H. M. Wehbe, G. Gregori, M. E. Jockovich, A. S. Hackam, C. A. Puliafito, Univ. of Miami School of Medicine . . . . . [6426A-12]

SESSION 3

Room: Conv. Center A2 . . . . . Sat. 11:35 am to 12:05 pm

Keynote

Chair: **Per G. Söderberg**, St Erik's Eye Hospital (Sweden)

Keynote Presentation

11:35 am: **Technology needs for tomorrow's treatment and diagnosis of cataract,** M. J. Tassignon, Univ. of Anvers (Belgium) . . . . . [6426A-13]

Lunch/Exhibition Break . . . . . 12:05 to 1:15 pm

SESSION 4

Room: Conv. Center A2 . . . . . Sat. 1:15 to 2:10 pm

Ocular Imaging: Polarization Techniques

Chairs: **Daniel V. Palanker**, Stanford Univ. Medical Ctr.; **M. Joos**, Vanderbilt Univ.

1:15 pm: **Relationship between birefringence and neurotubule density of the primate retinal nerve fiber layer,** R. G. Aranibar, S. Byers, M. K. Markey, H. G. Rylander III, T. E. Milner, The Univ. of Texas at Austin . . . . . [6426A-14]

1:30 pm: **Imaging polarimetry in macular disease with scanning laser polarimetry and polarization-sensitive Fourier domain optical coherence tomography,** M. Miura, Tokyo Medical Univ. Kasumigaura Hospital (Japan) and Univ. of Tsukuba (Japan); M. Yamanari, Univ. of Tsukuba (Japan); A. E. Elsner, Indiana Univ.; T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6426A-15]

1:45 pm: **Comparison of scanning laser polarimetry and polarization sensitive spectral domain optical coherence tomography,** E. Götzinger, M. Pircher, B. Baumann, C. Vass, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6426A-16]

2:00 pm: **Polarization-sensitive ophthalmic imaging with adaptive optics spectral-domain optical coherence tomography,** A. Cense, Y. Zhang II, R. S. Jonnal, J. Rha, W. Gao, Indiana Univ.; M. Mujat, B. H. Park, J. F. DeBoer, Massachusetts General Hospital; D. T. Miller, Indiana Univ. . . . . [6426A-17]

2:05 pm: **High isotropic resolution PS-OCT for imaging the human retina and cone mosaic in vivo,** M. Pircher, B. Baumann, E. Götzinger, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6426A-18]

SESSION 5

Room: Conv. Center A2 . . . . . Sat. 2:10 to 4:40 pm

Visual Optics: Modeling Measurement, Correction

Chairs: **Ezra I. Maguen**, Cedars-Sinai Medical Ctr.; **Arthur Ho**, Univ. of New South Wales (Australia)

2:10 pm: **Atomic Force Microscopy (AFM) for measurement of lens elasticity,** N. M. Ziebarth, E. P. Wojcikiewicz, F. Manns, V. Moy, J. A. Parel, Univ. of Miami . . . . . [6426A-19]

2:25 pm: **Ex vivo equivalent refractive index and biometric properties of postmortem primate crystalline lenses,** D. Borja, Univ. of Miami . [6426A-20]

2:40 pm: **Comparison of keratometric and Gaussian optics formula for corneal power calculations after LASIK,** F. Manns, Y. Lee, J. A. Parel, Univ. of Miami . . . . . [6426A-21]

2:55 pm: **Analysis of correlation between corneal topographical data and visual performance,** C. Zhou, L. Yu, Q. Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6426A-22]

Coffee Break . . . . . 3:10 to 3:40 pm

3:40 pm: **Analyzing retinal image degradation by optical aberrations and light scatter in normal and albino chick eyes,** Y. Tian, K. Shieh, C. F. Wildsoet, Univ. of California/Berkeley . . . . . [6426A-23]

3:55 pm: **New phase-retrieval algorithm for reconstructing point-spread function of the human eyes,** K. Kobayashi, Topcon Corp. (Japan); Y. Iida, Komazawa Univ. (Japan); K. Ohnuma, Chiba Univ. (Japan); T. Noda, National Inst. of Sensory Organs (Japan) . . . . . [6426A-24]

4:10 pm: **Wavefront-guided spectacle lenses,** A. Dreher, J. Jethmalani, L. Warden, L. H. Sverdrup, Jr., Ophthonix, Inc. . . . . [6426A-25]

4:25 pm: **Optically-activated high resolution retinal prosthesis,** A. F. A. Butterwick, A. B. Vankov, P. Huie, J. Loudin, K. Vijayraghavan, D. V. Palanker, Stanford Univ. . . . . [6426A-26]

SESSION 6

Room: Conv. Center A2 . . . . . Sat. 4:40 to 6:10 pm

Optical Coherence Tomography: Clinical

Chairs: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Jerry Sebag**, Univ. of Southern California

4:40 pm: **Three-dimensional imaging of eye surface pathologies and contact lens fit with high-resolution spectral optical coherence tomography,** M. Wojtkowski, Nicolaus Copernicus Univ. (Poland); B. J. Kaluzny, Univ. Mikolaja Kopernika (Poland); A. Szkulmowska, T. Bajraszewski, M. Szkulmowski, P. Targowski, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland) . . . . . [6426A-27]

4:55 pm: **Glaucoma characteristics measured with video-rate SDOCT,** M. Mujat, Massachusetts General Hospital; T. C. Chen, Harvard Medical School; G. N. Maguluri, Massachusetts General Hospital; W. Sun, Boston Univ.; B. Cense, Harvard Medical School; B. H. Park, Massachusetts General Hospital; R. D. Ferguson, D. X. Hammer, N. V. Iftimia, Physical Sciences Inc.; J. F. DeBoer, Massachusetts General Hospital . . . . . [6426A-28]

5:10 pm: **Clinical examinations of anterior eye segments by three-dimensional swept-source optical coherence tomography,** Y. Yasuno, Univ. of Tsukuba (Japan); H. Mori, Tokyo Medical Univ. (Japan); K. Kawana, Univ. of Tsukuba (Japan); Y. Watanabe, Tokyo Medical Univ. (Japan); M. Miura, Tokyo Medical Univ. Kasumigaura Hospital (Japan) and Univ. of Tsukuba (Japan); A. Miyazawa, T. Oshika, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6426A-29]

5:25 pm: **Three-dimensional analysis of choroidal neovascularization progression with high-resolution spectral optical coherence tomography,** B. Sikorski, Univ. Mikolaja Kopernika (Poland); M. Szkulmowski, Nicolaus Copernicus Univ. (Poland); J. J. Kaluzny, Univ. Mikolaja Kopernika (Poland); A. Szkulmowska, T. Bajraszewski, A. Kowalczyk, M. Wojtkowski, Nicolaus Copernicus Univ. (Poland) . . . . . [6426A-30]

5:40 pm: **Development of quantitative diagnostic observables for age-related macular degeneration using Spectral Domain OCT,** B. A. Bower, S. J. Chiu, E. Davies, A. M. Davis, Duke Univ.; R. J. Zawadzki, A. R. Fuller, D. F. Wiley, Univ. of California/Davis; J. A. Izatt, C. A. Toth, Duke Univ. . . . . [6426A-31]

5:55 pm: **High-speed ultrahigh resolution OCT imaging of early stages of age related macular degeneration (AMD): new findings and correlation with standard ophthalmic imaging techniques,** I. Gorczynska, Massachusetts Institute of Technology and Tufts Univ.; J. J. Liu, V. J. Srinivasan, Massachusetts Institute of Technology; M. Wojtkowski, Massachusetts Institute of Technology and Tufts Univ.; B. K. Monson, Tufts Univ.; E. Reichel, Tufts Univ. School of Medicine; J. S. Duker, Tufts Univ.; J. S. Schuman, Univ. of Pittsburgh; J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6426A-32]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 7

Room: Conv. Center A2 . . . . . Sun. 8:00 to 9:15 am

Ophthalmic Diagnostics: Microscopy

Chairs: **Per G. Söderberg**, St Erik's Eye Hospital (Sweden); **Fabrice Manns**, Univ. of Miami

8:00 am: **Demonstration of structural alterations in experimental corneal infectious model using multiphoton microscopy,** W. Lo, National Taiwan Univ. (Taiwan); H. Tan, Chang Gung Memorial Hospital (Taiwan) and Chang Gung Univ. (Taiwan); Y. Chang, Y. Sun, National Taiwan Univ. (Taiwan); S. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. College of Medicine (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6426A-33]

8:15 am: **Structured-illumination ocular microscopy,** J. Requejo-Isidro, Instituto de Optica (Spain); C. Martinez-Garcia, Univ. de Valladolid (Spain); S. C. Marcos, Instituto de Optica (Spain) . . . . . [6426A-34]

8:30 am: **Recording the diffraction pattern reflected from corneal endothelium,** C. P. Bucht, Kungliga Tekniska Högskolan (Sweden); P. G. Söderberg, St Erik's Eye Hospital (Sweden); G. Manneberg, Kungliga Tekniska Högskolan (Sweden) . . . . . [6426A-35]

8:45 am: **Self-mixing laser velocimeter to evaluate the retinal blood flow,** L. L. Rovati, S. Cattini, G. Salvatori, Univ. of Modena (Italy) . . . . . [6426A-36]

9:00 am: **A system for functional imaging of the ocular fundus,** L. L. Rovati, M. Bonaiuti, Univ. of Modena (Italy); C. Riva, Univ. degli Studi di Bologna (Italy) . . . . . [6426A-37]

SESSION 8

Room: Conv. Center A2 . . . . . Sun. 9:15 to 11:15 am

Ocular Laser-Tissue Interactions

Chair: **Ralf Brinkmann**, Univ. zu Lübeck (Germany)

9:15 am: **A novel, compact, and tunable Thulium fiber laser for creating variable depth thermal lesions in the rabbit cornea,** N. M. Fried, Univ. of North Carolina at Charlotte; G. Noguera, J. Castro, A. Behrens, Johns Hopkins Univ. . . . . [6426A-38]

9:30 am: **Microscopic analysis of structural changes in diode laser welded corneal stroma,** P. Matteini, F. Rossi, R. Pini, Istituto di Fisica Applicata Nello Carrara (Italy); L. Menabuoni, Azienda USL 4 (Italy) . . . . . [6426A-39]

9:45 am: **Laser safety aspects for refractive eye surgery with femtosecond laser pulses,** K. König, R. LeHarzic, Fraunhofer-Institut für Biomedizinische Technik (Germany); R. Bückle, JenLab GmbH (Germany) . . . . . [6426A-40]

10:00 am: **Femtosecond laser corneal surgery with in-situ determination of the laser attenuation and ablation threshold by second harmonic generation,** K. Plamann, V. Nuzzo, O. Albert, G. A. Mourou, École Nationale Supérieure de Techniques Avancées (France); M. Savoldelli, F. Dagonet, J. Legeais, Univ. Paris 5 (France) . . . . . [6426A-41]

Coffee Break . . . . . 10:15 to 10:30 am

10:30 am: **In-vitro visualization of corneal-wound healing in an organ culture model using multiphoton autofluorescence and second harmonic generation microscopy,** W. Lo, National Taiwan Univ. (Taiwan); H. Tan, Chang Gung Memorial Hospital (Taiwan) and Chang Gung Univ. (Taiwan); Y. Chang, Y. Sun, National Taiwan Univ. (Taiwan); S. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan) and National Taiwan Univ. College of Medicine (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6426A-42]

10:45 am: **Optical monitoring of the chorioretinal status during retinal laser thermotherapy,** L. L. Rovati, N. Zambelli, Univ. of Modena (Italy); F. Viola, G. Staurenghi, Univ. of Milano (Italy) . . . . . [6426A-43]

11:00 am: **Interferometric optical online dosimetry for selective retina treatment (SRT),** H. Stoehr, L. Ptaszynski, R. Brinkmann, Univ. zu Lübeck (Germany) . . . . . [6426A-44]

Ophthalmic Express

Chair: **Arthur Ho**,
Univ. of New South Wales (Australia)

To facilitate exchange on timely and critical issues in ophthalmic technologies, in addition to our regular sessions, the "Ophthalmic Express" session will provide-researchers and developers a forum to discuss:

- issues critical to ophthalmic applications of optical technology
- preliminary data and work in progress
- controversial or unexplained results
- critical review of key areas of development.

Lunch/Exhibition Break . . . . . 11:30 am to 12:30 pm

SESSION 10

Room: Conv. Center A2 . . . . . Sun. 12:30 to 2:00 pm

Ocular Surgery: Simulation, Experimental, Clinical

Chairs: **Jean-Marie A. Parel**, Univ. of Miami;
Michael Belkin, Tel Aviv Univ. (Israel)

12:30 pm: **A training device for photodynamic therapy and panretinal photocoagulation,** S. Barriga, ORION International Technologies, Inc.; S. Russell, M. Abramoff, The Univ. of Iowa; R. Brittain, R. Waymire, P. Nguyen, P. Soliz, ORION International Technologies, Inc. . . . . [6426A-45]

12:45 pm: **Performance index for virtual reality phacoemulsification surgery,** P. G. Söderberg, C. Laurell, W. Simawi, St Erik's Eye Hospital (Sweden); E. Skarman, P. Nordqvist, L. Nordh, Melerit AB (Sweden) . . . . . [6426A-46]

1:00 pm: **fs-laser induced flexibility increase in the crystalline lens,** S. Schumacher, R. K. Lakharia, M. Fromm, Laser Zentrum Hannover e.V. (Germany); U. Oberheide, Laserforum Koln e.V. (Germany); T. Ripken, P. Breitenfeld, Laser Zentrum Hannover e.V. (Germany); G. Gerten, Laserforum Koln e.V. (Germany); W. A. Ertmer, Univ. Hannover (Germany); H. Lubatschowksi, Laser Zentrum Hannover e.V. (Germany) . . . . . [6426A-47]

1:15 pm: **Endoscopic-approach development for minimally invasive orbital surgery,** K. M. Joos, R. Shah, J. Shen, Vanderbilt Univ. . . . . [6426A-48]

1:30 pm: **Patterned retinal coagulation with a scanning laser,** D. V. Palanker, A. Jain, Stanford Univ. Medical Ctr.; D. E. Andersen, Optimedica Corp.; M. S. Blumenkranz, Stanford Univ. . . . . [6426A-49]

1:45 pm: **Treatment of primary angle closure glaucoma by selective laser trabeculoplasly,** M. Belkin, Tel Aviv Univ. (Israel) . . . . . [6426A-50]

SESSION 11

Room: Conv. Center A2 . . . . . Sun. 2:00 to 3:15 pm

Ophthalmic Diagnostics: Spectral Techniques

Chairs: **Jerry Sebag**, Univ. of Southern California;
Rafat R. Ansari, NASA Glenn Research Ctr.

2:00 pm: **Age-related structural abnormalities in the human retina-choroid complex revealed by two-photon excited autofluorescence imaging,** M. Han, Ruprecht-Karls-Univ. Heidelberg (Germany); G. Giese, Max-Planck-Institut Für Medizinische Forschung (Germany); F. G. Holz, Univ. Bonn (Germany); M. H. Niemz, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6426A-51]

2:15 pm: **Retinal oximetry mapping with a snapshot imaging spectroscopy,** G. H. Bearman, Jet Propulsion Lab.; W. Fink, California Institute of Technology; D. W. Wilson, W. R. Johnson, Jet Propulsion Lab.; M. Humayan, A. Fawzi, Doheny Eye Institute; A. Srinivasan, Univ. of Southern California . . . [6426A-52]

2:30 pm: **Identification of spectral phenotypes in age-related macular degeneration patients,** B. Davis, VisionQuest Inc.; S. Russell, M. Abramoff, The Univ. of Iowa; S. C. Nemeth, Eye of the Wolf LLC; S. Barriga, P. Soliz, ORION International Technologies, Inc. . . . . [6426A-53]

2:45 pm: **A lenslet-based device for measuring oxygen saturation in the retina,** J. C. Ramella-Roman, The Catholic Univ. of America; D. Duncan, Johns Hopkins Univ. . . . . [6426A-54]

3:00 pm: **Independent component analysis for the detection of in-vivo intrinsic signals from an optical imager of retinal function,** S. Barriga, ORION International Technologies, Inc.; M. S. Pattichis, The Univ. of New Mexico; M. Abramoff, The Univ. of Iowa; D. Ts'o, Upstate Medical Univ./SUNY; Y. H. Kwon, R. H. Kardon, The Univ. of Iowa; P. Soliz, ORION International Technologies, Inc. . . . . [6426A-55]

Coffee Break . . . . . 3:15 to 3:30 pm

SESSION 12

Room: Conv. Center A2 . . . . . Sun. 3:30 to 5:05 pm

Ocular Imaging: Adaptive Optics

Chairs: **Wolfgang Drexler**, Cardiff Univ. (United Kingdom);
Peter Soliz, ORION International Technologies, Inc.

3:30 pm: **High-resolution adaptive optics scanning laser ophthalmoscope with dual-deformable mirrors for large aberration correction,** D. C. Chen, S. M. Jones, D. A. Silva, S. S. Olivier, Lawrence Livermore National Lab. . . . . [6426A-56]

3:45 pm: **Functional imaging with the multi-wavelength adaptive optics scanning laser ophthalmoscope,** K. F. Grieve, P. Tiruveedhula, Y. Zhang, A. Roorda, Univ. of California/Berkeley . . . . . [6426A-57]

4:00 pm: **High-speed adaptive optics imaging of the retina at a 100 MHz pixel rate,** J. Rha, R. S. Jonnal, Y. Zhang II, A. Cense, D. T. Miller, Indiana Univ. . . . . [6426A-58]

4:15 pm: **Application of adaptive optics: optical coherence tomography for in vivo imaging of microscopic structures in the retina and optic nerve head,** R. J. Zawadzki, Univ. of California/Davis; Y. Zhang II, Indiana Univ.; S. M. Jones, Lawrence Livermore National Lab.; S. S. Choi, Univ. of California/Davis Medical Ctr.; A. Cense, Indiana Univ.; D. C. Chen, Lawrence Livermore National Lab.; D. T. Miller, Indiana Univ.; S. S. Olivier, Lawrence Livermore National Lab.; J. S. Werner, Univ. of California/Davis Medical Ctr. . . . [6426A-59]

4:30 pm: **Volumetric imaging of the inner retina with adaptive optics ultra-fast spectral-domain optical coherence tomography,** Y. Zhang II, A. Cense, R. S. Jonnal, J. Rha, W. Gao, Indiana Univ.; S. M. Jones, S. S. Olivier, Lawrence Livermore National Lab.; D. T. Miller, Indiana Univ. . . . . [6426A-60]

4:45 pm: **High resolution retinal imaging with adaptive optics spectral domain optical coherence tomography,** C. E. Bigelow, N. V. Iftimia, R. D. Ferguson, T. E. Ustun, B. C. Bloom, D. X. Hammer, Physical Sciences Inc.; S. A. Burns, Indiana Univ.; A. B. Fulton, Childrens Hospital Boston . [6426A-61]

5:00 pm: **Adaptive optics and chromatic aberration correction in the human eye for ultrahigh-resolution optical coherence tomography,** E. J. Fernández, Univ. de Murcia (Spain) and Cardiff Univ. (United Kingdom); B. M. Hermann, Cardiff Univ. (United Kingdom); L. Vabre, Observatoire de Paris à Meudon (France); B. Pova_ay, A. Unterhuber, B. Hofer, J. E. Morgan, W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6426A-62]

Pascal Rol Award

Chairs: **Jerry Sebag**, Univ. of Southern California;
Jean-Marie A. Parel, Univ. of Miami

Outstanding summaries submitted to the Ophthalmic Technologies XVI conference will be nominated for the Pascal Rol Award for Best Paper in Ophthalmic Technologies. The award and prize will be presented after the last scientific session of the conference to recognize the best paper and presentation.

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Keratometry module for slit lamps,** L. Ventura, C. Riul, J. de Groote, S. J. de Faria e Sousa, G. C. Dabalas de Oliveira, Univ. de São Paulo (Brazil) . . . . . [6426A-63]

✔ **Application of decorrelation stretching method to hyperspectral fundus image processing,** T. Nagaoka, Shizuoka Cancer Ctr. Research Institute (Japan); A. Nakamura, K. Aizawa, Waseda Univ. (Japan); M. Kanazawa, T. Kezuka, M. Miura, M. Usui, Tokyo Medical Univ. (Japan); S. Ohtsubo, T. Sota, Waseda Univ. (Japan) . . . . . [6426A-64]

✔ **Prototype for measuring pupil size changes,** L. Ventura, F. Pegoraro Silva, G. Rossi, Univ. de São Paulo (Brazil) . . . . . [6426A-65]

✔ **Computed simulation of Keratectomy based on three-dimensional optical coherence tomography,** Y. Watanabe, Tokyo Medical Univ. (Japan) . . . . . [6426A-66]

✔ **Modeling and simulation of the human eye,** R. S. Duran, L. G. Nonato, L. Ventura, O. M. Bruno, Univ. de São Paulo (Brazil) . . . . . [6426A-67]

✔ **Compact retinal imaging system with liquid-crystal spatial-light-modulation adaptive optics device,** K. Cho, S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6426A-68]

✔ **Estimation of melanin content in iris of human eye: prognosis for glaucoma diagnostics,** A. N. Bashkatov, Saratov State Univ. (Russia); E. V. Koblova, Saratov State Medical Univ. (Russia); E. A. Genina, Saratov State Univ. (Russia); T. G. Kamenskikh, Saratov State Medical Univ. (Russia); L. E. Dolotov, Y. P. Sinichkin, V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6426A-69]

✔ **Collision judgment when viewing minified images through a HMD visual field expander,** G. Luo, L. Lichtenstein, E. Peli, Harvard Medical School . . . . . [6426A-84]

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Laser and Noncoherent Light Ocular Effects

Conference Chairs: **Bruce E. Stuck**, U.S. Army Medical Research Detachment; **Michael Belkin**, Tel Aviv Univ. (Israel)

Program Committee: **Jeremiah Brown, Jr.**, Ophthalmology Associates of San Antonio; **Henry D. Hacker**, U.S. Army Medical Research Detachment; **Richard C. Hollins**, Defence Science and Technology Lab. (United Kingdom); **Tamar Kadar**, Israel Institute for Biological Research (Israel); **Brian J. Lund**, Northrop Grumman Corp.; **David J. Lund**, U.S. Army Medical Research Detachment; **Russell L. McCally**, Johns Hopkins Univ.; **Leon N. McLin**, Air Force Research Lab.; **Karl Schulmeister**, Austrian Research Ctrs. Seibersdorf Research GmbH (Austria); **David H. Sliney**, U.S. Army Ctr. for Health Promotion and Preventive Medicine; **Robert J. Thomas**, Air Force Research Lab.; **Deborah Whitmer**, U.S. Army Medical Research Detachment; **Joseph A. Zuclich**, Northrop Grumman Corp.; **Harry Zwick**, U.S. Army Medical Research Detachment

Sunday 21 January

SESSION 13

Room: Conv. Ctr. B1 . . . . . Sun. 8:30 to 10:10 am

Injury and Treatment

Chair: **Bruce E. Stuck**, U.S. Army Medical Research Detachment

8:30 am: **Functional assessment of neuroprotective vaccination for laser_induced retinal injury,** M. Belkin, Tel Aviv Univ. (Israel) . . . . . [6426B-70]

8:50 am: **In Vivo visualizing the dynamics of bone marrow stem cells in mouse retina and choroidal _ retinal circulation,** H. H. Wang, H. Zwick, R. D. Cheramie, D. J. Lund, B. E. Stuck, U.S. Army Medical Research Detachment . . . . . [6426B-71]

9:10 am: **Histological aspects of retinal damage following exposure to pulsed Nd:YAG laser radiation in rabbits: indication for mechanism,** T. Kadar, D. Peri, J. Turetz, E. Fishbine, R. Sahar, I. Egoz, R. Brandeis, Israel Institute for Biological Research (Israel) . . . . . [6426B-72]

9:30 am: **New approaches to the diagnosis and management of laser eye injury,** H. D. Hacker, U.S. Army Medical Research Detachment; J. Brown, Jr., Ophthalmology Associates of San Antonio; R. D. Cheramie, U.S. Army Medical Research Detachment . . . . . [6426B-73]

9:50 am: **Acute and long term alterations in non human primate (NHP) small field (landolt ring) contrast sensitivity,** H. Zwick, U.S. Army Medical Research Detachment; K. J. Bloom, Rush Medical College; D. J. Lund, B. E. Stuck, U.S. Army Medical Research Detachment; D. O. Robbins, Ohio Wesleyan Univ. . . . . [6426B-74]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 14

Room: Conv. Ctr. B1 . . . . . Sun. 10:40 am to 12:00 pm

Laser Bioeffects

Chair: **David J. Lund**, U.S. Army Medical Research Detachment

10:40 am: **Repetitive pulses and laser-induced retinal injury thresholds,** D. J. Lund, U.S. Army Medical Research Detachment . . . . . [6426B-75]

11:00 am: **Retinal thermal damage threshold studies in the near-IR and for multiple pulses,** K. Schulmeister, J. Husinsky, B. Seiser, F. Edthofer, L. Farmer, Austrian Research Ctrs Seibersdorf Research GmbH (Austria) . . . . . [6426B-76]

11:20 am: **Laser-induced retinal injury threshold studies with wavefront correction,** B. J. Lund, Northrop Grumman Corp.; D. J. Lund, P. R. Edsall, U.S. Army Medical Research Detachment . . . . . [6426B-77]

11:40 am: **Thermoacoustical wave generation and propagation in the cornea,** A. K. Benson, S. Brady, A. Denning, L. Page, Utah Valley State College; R. L. McCally, C. B. Bargeron, Johns Hopkins Univ. . . . . [6426B-78]

Lunch/Exhibition Break . . . . . 12:00 to 1:20 pm

SESSION 15

Room: Conv. Ctr. B1 . . . . . Sun. 1:20 to 3:20 pm

Vision and Protection

Chair: **Michael Belkin**, Tel Aviv Univ. (Israel)

1:20 pm: **Some quantitative aspects of temporary blinding from high-brightness LEDs,** H. Reidenbach, Univ. of Applied Sciences Köln (Germany) . . . . . [6426B-79]

1:40 pm: **NHP spectral sensitivity metric derived from pre and post laser sub-damage exposure pursuit motor tracking task,** H. Zwick, U.S. Army Medical Research Detachment; P. E. Edsall, Northrop Grumman Corp.; K. Jenkins, R. Cunningham, U.S. Army Medical Research Detachment . . . . . [6426B-80]

2:00 pm: **Development of an advanced Aidman Vision Screener (AVS) for selective assessment of outer and inner laser induced retinal injury,** M. Boye, H. Zwick, B. E. Stuck, U.S. Army Medical Research Detachment; P. E. Edsall, Northrop Grumman Corp.; A. Akers, U.S. Army Medical Research Detachment . . . . . [6426B-81]

2:20 pm: **Solid state lighting design and photobiological safety,** Y. G. Soskind, M. D. Hopler, J. A. Campin, G. H. Pettit, Alcon Labs., Inc. . . . . [6426B-82]

2:40 pm: **Optimization of illumination and beacon design for mesopic vision,** D. J. McGraw, Light Diagnostics, Inc. . . . . [6426B-86]

3:00 pm: **Agile laser safety glasses for protection against all continuous wave lasers,** D. C. Smith, DCS Lasers & Optics LLC . . . . . [6426B-83]

Saturday-Sunday 20-21 January 2007 • Proceedings of SPIE Vol. 6427

Optical Methods for Tumor Treatment and Detection: Mechanisms and Techniques in Photodynamic Therapy XVI

Conference Chair: **David Kessel**, Wayne State Univ.

Program Committee: **Thomas H. Foster**, Univ. of Rochester; **Charles J. Gomer**, Childrens Hospital Los Angeles; **Tayyaba Hasan**, Massachusetts General Hospital; **Nancy L. Oleinick**, Case Western Reserve Univ.; **Brian W. Pogue**, Dartmouth College; **Kevin M. Smith**, Louisiana State Univ.; **Kenneth K. Wang**, Mayo Clinic

Saturday 20 January

SESSION 1

Room: Conv. Ctr. A7 ..... Sat. 9:00 to 10:35 am

Signaling Pathways

Chair: **David Kessel**, Wayne State Univ.

9:00 am: **PDT: death pathways** *(Invited Paper)*, D. Kessel, Wayne State Univ. ..... [6427-01]

9:25 am: **Cell death mechanisms signalled by PDT** *(Invited Paper)*, N. L. Oleinick, Case Western Reserve Univ. ..... [6427-02]

9:50 am: **Survivin, a member of the inhibitor of apoptosis (IAP) family, is induced by PDT and is a target for improving treatment response** *(Invited Paper)*, C. J. Gomer, Childrens Hospital Los Angeles ..... [6427-03]

10:15 am: **Tumor-cell hyperresistance to photodynamic killing arising from nitric oxide preconditioning,** A. W. Girotti, Medical College of Wisconsin; M. Niziolek, Jagiellonian Univ.; W. Korytowski, Medical College of Wisconsin ..... [6427-04]

Coffee Break ..... 10:35 to 11:10 am

SESSION 2

Room: Conv. Ctr. A7 ..... Sat. 11:10 am to 12:15 pm

Localization

Chair: **Thomas H. Foster**, Univ. of Rochester

11:10 am: **Optical molecular imaging in PDT** *(Invited Paper)*, T. H. Foster, S. Mitra, Univ. of Rochester ..... [6427-05]

11:35 am: **Correlation between cell viability and cumulative singlet oxygen luminescence from protoporphyrin IX in varying subcellular localization,** B. Li, Univ. of Toronto (Canada) and Fujian Normal Univ. (China) ..... [6427-06]

11:55 am: **Macroscopic modeling of the singlet oxygen production during PDT,** T. C. Zhu, J. C. Finlay, X. Zhou, J. Li, Univ. of Pennsylvania .... [6427-07]

Lunch/Exhibition Break ..... 12:15 to 1:30 pm

SESSION 3

Room: Conv. Ctr. A7 ..... Sat. 1:30 to 3:00 pm

New Sensitizers

Chair: **Kevin M. Smith**, Louisiana State Univ.

1:30 pm: **Potential PDT agents with extended porphyrin chromophores** *(Invited Paper)*, K. M. Smith, M. G. H. Vicente, Louisiana State Univ. . [6427-08]

2:00 pm: **Synthesis and cellular studies of water-soluble porphyrin peptide conjugates,** M. Sibrian-Vazquez, T. J. Jensen, R. P. Hammer, M. G. H. Vicente, Louisiana State Univ. ..... [6427-09]

2:20 pm: **Production and PDT effect of different fractions of the Hypericum perforatum extract PMF against HL-60 leukemic cells,** D. Skalkos, Univ. of Ioannina (Greece); M. Tsontou, G. Filippidis, Foundation for Research and Technology-Hellas (Greece); H. Dimitriou, Univ. of Crete (Greece); M. Farsari, Foundation for Research and Technology-Hellas (Greece); M. Kalmanti, Univ. of Crete (Greece) ..... [6427-10]

2:40 pm: **White-light PDT induced apoptosis in normal rat urothelium and in orthotopic transitional cell carcinoma bladder tumors after short intravesical instillation of the Hypericum perforatum L polar methanolic extracted fraction (PMF),** I. Tsimaris, N. E. Stavropoulos, Hatzikosta General Hospital (Greece); D. Stefanou, E. Arkoumani, D. Skalkos, Univ. of Ioannina (Greece); U. O. Nseyo, Univ. of Florida ..... [6427-11]

Coffee Break ..... 3:00 to 3:30 pm

✔ Posters-Saturday

Posters will be placed on display from Saturday morning. Authors will be present to discuss their posters during the Saturday afternoon coffee break.

Poster authors: Please put up your posters before the conference or during the Saturday morning coffee break.

✔ **New near-infrared photosensitizers based on bacteriochlorin p derivatives: preliminary results of in-vivo investigation,** I. Meerovich, N.N.Blokhin Russian Cancer Research Center (Russia); M. Grin, Moscow State Academy of Fine Chemical Technology (Russia); G. A. Meerovich, General Physics Institute (Russia); A. Tsyprovskiy, O. Mass, Moscow State Academy of Fine Chemical Technology (Russia); S. Barkanova, Organic Intermediates and Dyes Institute (Russia); N. Oborotova, A. Baryshnikov, Russian Research Ctr. Kurchatov Institute (Russia); A. F. Mironov, Moscow State Academy of Fine Chemical Technology (Russia) ..... [6427-32]

✔ **Phenylthiosubstituted phthalocyanines as new photosensitizers for photodynamic therapy,** I. Meerovich, Russian Research Ctr. Kurchatov Institute (Russia); V. M. Derkacheva, Organic Intermediates and Dyes Institute (Russia); G. A. Meerovich, General Physics Institute (Russia); N. Oborotova, Z. S. Smirnova, A. Polozkova, I. Kubasova, Russian Research Ctr. Kurchatov Institute (Russia); E. Lukyanets, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia); A. Baryshnikov, Russian Research Ctr. Kurchatov Institute (Russia) ..... [6427-33]

✔ **Study of the correlation between blood porphyrin luminescence and tumor growth,** L. C. Courrol, Faculdade de Tecnologia de São Paulo (Brazil); F. R. d. O. Silva, Escola Politécnica da Univ. de São Paulo (Brazil); M. H. Bellini, N. Schor, N. D. Vieira, Jr., Univ. Federal de São Paolo (Brazil) ..... [6427-34]

✔ **A complete mathematical model of microscopic photodynamic therapy dosimetry in vivo,** K. K. Wang, S. Mitra, T. H. Foster, Univ. of Rochester ..... [6427-35]

✔ **Monte Carlo simulation of elastic-scattering spectroscopic measurement using the optical pharmacokinetic system (OPS): analysis of sensitivity to heterogeneous chromophore distribution,** C. Kanick, R. S. Parker, Univ. of Pittsburgh ..... [6427-36]

✔ **Interaction of human serum albumin and tryptophan with hydrophilic photosensitizers and their action on erythrocyte photohemolysis,** H. R. Vardapetyan, Russian-Armenian (Slavonic) State Univ. (Armenia); G. V. Gyulkhandanyan, Institute of Biotechnology (Armenia); S. G. Tiratsuyan, A. A. Hovhannisyan, L. S. Hunanyan, A. S. Martirosyan, S. Marutyan, Yerevan State Univ. (Armenia); R. K. Kazaryan, Yerevan State Medical Univ. (Armenia); S. S. Ghambaryan, Institute of Biotechnology (Armenia) ..... [6427-37]

✔ **Fluence rate variability among light delivery devices for esophageal photodynamic therapy,** J. C. Finlay, S. M. Hahn, G. G. Ginsberg, Univ. of Pennsylvania ..... [6427-38]

✔ **Development of high-yielding photonic light delivery system for photodynamic therapy of esophageal carcinomas,** A. Premasiri, G. S. Happawana, Southern Methodist Univ. ..... [6427-39]

✔ **Analysis of colon tumors in rats by near-infrared Raman spectroscopy,** J. Duarte, Univ. Federal de São Paulo (Brazil) and Univ. do Vale do Paraíba (Brazil); R. Hage, Univ. Federal de Sao Paulo (Brazil) and Univ. do Vale do Paraíba (Brazil); L. Silveira, Jr., F. L. Silveira, Univ. do Vale do Paraíba (Brazil); H. Plapler, Univ. Federal de São Paolo (Brazil) ..... [6427-40]

✔ **The measurement of the phosphorescence and singlet oxygen fluorescence time-resolved waveforms of Photofrin(II)(R) and Talaporfin Sodium with pulsed excitation,** S. Hakomori, S. Ohmori, K. Masuda, K. Yamamoto, T. Arai, Keio Univ. (Japan) ..... [6427-41]

✔ **Toxic and phototoxic activities of water-soluble porphyrins for dangerous micro-organisms in vitro,** G. V. Gyulkhandanyan, S. S. Ghambaryan, Institute of Biotechnology (Armenia); R. K. Ghazaryan, Yerevan State Medical Univ. (Armenia); M. Manrikyan, S. Yeritsyan, L. Matevosyan, A. Ghazazyan, Ctr. of Prophylaxis of Particularly Dangerous Diseases (Armenia); A. G. Gyulkhandanyan, Yerevan State Univ. (Armenia) . . . . . [6427-42]

✔ **Infrared light can be used for photodynamic therapy by using rare earth phosphors for visible light generation,** J. E. Collins, T. Lakshman, A. Rao, H. Bell, B. Nguyen, J. S. Friedberg, Presbyterian Medical Ctr. . . . . [6427-43]

✔ **Staurosporine-induced apoptosis alters NADH autofluorescence lifetime of 143B osteosarcoma,** H. Wang, V. Gukassyan, C. Chen, Y. Wei, F. Kao, National Yang Ming Univ. (Taiwan) . . . . . [6427-44]

✔ **In-vitro study on methemoglobin formation following hexyl-aminolevulinate induced photodynamic therapy,** E. L. P. Larsen, L. L. Randeberg, O. A. Gederaas, H. E. Krokan, D. R. Hjelme, L. O. Svaasand, Norwegian Univ. of Science and Technology (Norway) . . . . . [6427-45]

✔ **Enhancing PDT drug delivery by enzymatic cleavage of porphyrin phosphates,** C. K. C. Chang, B. Xu, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6427-45]

✔ **A multisensory fiber-optic PDT probe for multiple photosensitizers,** T. F. Chang, M. Boesen, R. A. Weersink, Princess Margaret Hospital (Canada); E. H. Sargent, Univ. of Toronto (Canada); L. D. Lilge, Princess Margaret Hospital (Canada) . . . . . [6427-47]

✔ **Photodynamic therapy (PDT) using intratumoral injection of the 5-aminolevulinic acid (ALA) for the treatment of eye cancer in cattle,** R. Hage, Univ. Federal de São Paulo (Brazil); G. Mancilha, R. A. Zângaro, Univ. do Vale do Paraíba (Brazil); H. Plapler, Univ. Federal de São Paulo (Brazil) . . . . . [6427-48]

✔ **Photosensitizer dosimetry system development, calibration, and testing for use in distributed PDT research centers,** D. S. Kepshire, J. Gruber, G. Burke, Dartmouth College; J. A. O'Hara, Dartmouth Medical School; B. W. Pogue, Dartmouth College . . . . . [6427-49]

✔ **Effects of HMME-PDT on human breast cancer cells by 532-nm laser,** H. Yin, X. Li, J. Liu, Sun Yat-Sen Univ. (China) . . . . . [6427-50]

✔ **The apoptosis induced by HMME-based photodynamic therapy in rabbit vascular smooth muscle cells,** H. Yin, X. Li, H. Lin, J. Liu, H. Yu, Sun Yat-Sen Univ. (China) . . . . . [6427-51]

SESSION 4

Room: Conv. Ctr. A7 . . . . . Sat. 3:30 to 4:50 pm

ALA

Chair: **Charles J. Gomer**, Childrens Hospital Los Angeles

3:30 pm: **Assessing noninvasive detection of protoporphyrin IX fluorescence in vivo to quantify glioma tumor growth,** S. L. Gibbs, J. A. O'Hara, P. J. Hoopes, B. W. Pogue, Dartmouth College . . . . . [6427-12]

3:50 pm: **Fluorescence and reflectance spectroscopies inform the choice of optimal treatment parameters in a clinical trial of ALA-PDT in superficial basal cell carcinoma,** W. J. Cottrell, Univ. of Rochester; A. R. Oseroff, Roswell Park Cancer Institute; T. H. Foster, Univ. of Rochester . . . . . [6427-13]

4:10 pm: **The combination of hyperbaric oxygen therapy and photodynamic therapy augments the antimicrobial activity of methylene blue and 5-aminolevulinic acid in vitro,** S. K. Bisland, F. N. Dadani, C. Chien, M. Kurcharzyk, B. C. Wilson, Princess Margaret Hospital (Canada) . . [6427-14]

4:30 pm: **Characterization of time-domain fluorescence properties of typical photosensitizes for photodynamic therapy,** J. Russell, McMaster Univ. (Canada); J. E. Hayward, M. S. Patterson, Juravinski Cancer Ctr. (Canada); Q. Fang, McMaster Univ. (Canada) . . . . . [6427-15]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 5

Room: Conv. Ctr. A7 . . . . . Sun. 8:50 to 10:30 am

Clinical PDT

Chair: **Kenneth K. Wang**, Mayo Clinic

8:50 am: **Photodynamic therapy and the treatment of head and neck cancers** *(Invited Paper)***,** M. A. Biel, Univ. of Minnesota . . . . . [6427-16]

9:20 am: **Photodynamic therapy for Barrett's esophagus for high-grade dysplasia** *(Invited Paper)***,** K. K. Wang, Mayo Clinic . . . . . [6427-17]

9:50 am: **Studies of photodynamic effect of Pd-bacteriopheophorbide (WST09) in canine prostate model,** F. W. Hetzel, Univ. of Colorado at Denver and Health Sciences Ctr.; D. Blanc, Negma-Lerads (France); Q. Chen, K. Dole, D. Luck, Univ. of Colorado at Denver and Health Sciences Ctr.; Z. Huang, Univ. of Colorado at Denver . . . . . [6427-18]

10:10 am: **Three-dimensional reconstruction of the distribution of hemoglobin, oxygenation, and sensitizer concentration in the human prostate before and after photodynamic therapy,** J. C. Finlay, X. Zhou, T. C. Zhu, A. Dimofte, S. B. Malkowicz, S. M. Hahn, D. C. Stripp, Univ. of Pennsylvania . . . . . [6427-19]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 6

Room: Conv. Ctr. A7 . . . . . Sun. 11:00 am to 12:20 pm

Dosimetry

Chair: **Brian W. Pogue**, Dartmouth College

11:00 am: **Photosensitizer dosimetry controlled PDT: is there proof that improved tools improve treatment outcome?,** B. W. Pogue, C. Sheng, Dartmouth College; X. Zhou, Univ. of Pennsylvania; P. J. Hoopes, Dartmouth Hitchcock Medical Ctr.; T. Hasan, Massachusetts General Hospital . . [6427-20]

11:20 am: **Conformal light delivery using tailored cylindrical diffusers,** C. A. Rendon, Univ. of Toronto (Canada); R. A. Weersink, Princess Margaret Hospital (Canada); L. D. Lilge, Univ. of Toronto (Canada) . . . . . [6427-21]

11:40 am: **Modeling light fluence rate distribution in optically heterogeneous prostate photodynamic therapy using a kernel method,** J. Li, T. C. Zhu, Univ. of Pennsylvania . . . . . [6427-22]

12:00 pm: **Interstitial photodynamic therapy for primary prostate cancer incorporating real-time treatment dosimetry,** A. Johansson, J. Axelsson, S. Svanberg, Lunds Tekniska Högskola (Sweden); K. M. Kälkner, S. Nilsson, Karolinska Univ. Hospital (Sweden); J. Swartling, T. Johansson, J. Stensson, S. Pålsson, SpectraCure AB (Sweden); K. Svanberg, Lund Univ. Hospital (Sweden); S. Andersson-Engels, Lunds Tekniska Högskola (Sweden) [6427-23]

Lunch/Exhibition Break . . . . . 12:20 to 1:40 pm

SESSION 7

Room: Conv. Ctr. A7 . . . . . Sun. 1:30 to 3:00 pm

Vascular Responses

Chair: **Tayyaba Hasan**, Massachusetts General Hospital

1:30 pm: **In vivo, on-line monitoring of molecular response to photodynamic therapy: Molecular imaging of vascular endothelial growth factor** *(Invited Paper)***,** S. K. Chang, I. Rizvi, N. Solban, T. Hasan, Massachusetts General Hospital . . . . . [6427-24]

2:00 pm: **Fluence rate dependencies on the microvascular response of photodynamic therapy as monitored by interstitial Doppler optical coherence tomography,** B. A. Standish, X. Jin, J. A. Smolen, A. Mariampillai, H. Li, N. R. Munce, A. I. Vitkin, Princess Margaret Hospital (Canada); V. X. D. Yang, Princess Margaret Hospital (Canada) and Ryerson Univ. (Canada) and Sunnybrook Health Science Ctr. (Canada) . . . . . [6427-25]

2:20 pm: **Two-photon photodynamic therapy and its application to age-related macular degeneration,** A. Karotki, S. K. Bisland, M. Khurana, Princess Margaret Hospital (Canada) and Univ. of Toronto (Canada); E. R. Simpson, Princess Margaret Hospital (Canada); M. C. W. Campbell, Univ. of Waterloo (Canada); H. Collins, H. L. Anderson, Univ. of Oxford (United Kingdom); D. T. Cramb, Univ. of Calgary (Canada); B. C. Wilson, Princess Margaret Hospital (Canada) and Univ. of Toronto (Canada) . . . . . [6427-26]

2:40 pm: **Tumor vascular volume determines photosensitizer uptake in MATLyLu prostate tumor model,** X. Zhou, Dartmouth College; B. Chen, Dartmouth College and Dartmouth Medical School; P. J. Hoopes, Dartmouth Medical School; T. Hasan, Massachusetts General Hospital; B. W. Pogue, Dartmouth College and Massachusetts General Hospital . . . . . [6427-27]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Room: Conv. Ctr. A7 . . . . . Sun. 3:30 to 4:50 pm

Imaging

Chair: **Soumya Mitra**, Univ. of Rochester

3:50 pm: **Pharmacokinetic study of a systemically administered novel lipid formulation of mTHPC in an animal tumor model,** J. Svensson, A. Johansson, Lunds Tekniska Högskola (Sweden); S. Gräfe, biolitec AG (Germany); K. Svanberg, N. Bendsö, Lund Univ. (Sweden); S. Andersson-Engels, Lunds Tekniska Högskola (Sweden); T. A. Trebst, CeramOptec GmbH (Germany) . . . . . [6427-29]

4:10 pm: **Diffuse optical measurements of tissue blood flow and oxygenation during clinical prostate and pleural photodynamic therapy,** G. Yu, T. Durduran, C. Zhou, T. C. Zhu, J. C. Finlay, T. M. Busch, S. B. Malkowicz, J. S. Friedberg, S. M. Hahn, A. G. Yodh, Univ. of Pennsylvania . . . . . [6427-30]

4:30 pm: **Optical imaging of macroscopic and microscopic intratumor distribution of photosensitizers in tumors in vivo,** S. Mitra, T. H. Foster, Univ. of Rochester . . . . . [6427-31]

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Mechanisms for Low-Light Therapy II

Conference Chairs: **Michael R. Hamblin**, Harvard Medical School; **Ronald W. Waynant**, U.S. Food and Drug Administration; **Juanita Anders**, USUHS

Program Committee: **Stuart K. Bisland**, Princess Margaret Hospital (Canada); **James D. Carroll**, THOR International, Ltd. (United Kingdom); **Mary Dyson**, King's College London (United Kingdom); **Valentin M. Grimblatov**, Photonics Healthcare Lab.

Sunday 21 January

SESSION 1

Room: Conv. Ctr. C1 . . . . . Sun. 8:30 to 10:30 am

Reviews and Dosimetry

Chair: **Michael R. Hamblin**, Massachusetts General Hospital

8:30 am: **Cellular chromophores and signaling in LLLT,** M. R. Hamblin, Massachusetts General Hospital . . . . . [6428-01]

8:50 am: **Light dosimetry for low-level laser therapy: accounting for differences in tissue and depth,** R. A. Weersink, Princess Margaret Hospital (Canada) . . . . . [6428-02]

9:10 am: **A systematic review of LLLT mechanisms and efficacy in acute pain,** J. M. Bjordal, Univ. i Bergen (Norway) . . . . . [6428-03]

9:30 am: **In-vitro effect of phototherapy with low- intensity laser on HSV-1 and epithelial cells,** F. d. P. Eduardo, D. U. Menhert, Univ de São Paulo (Brazil); T. A. Monesi, Univ. de São Paulo (Brazil); D. M. Zezell, Instituto de Pesquisas Energéticas e Nucleares (Brazil); M. M. Schubert, Univ. of Washington; C. d. P. Eduardo, M. Martins Marques, Univ. de São Paulo (Brazil) . . . [6428-04]

9:50 am: **Advancing to on-line and individual dosimetry for LLT,** V. M. Grimblatov, Columbia Univ. Medical Ctr.; A. Goldfarb, Metrplus Healthcare Lab; M. Shneyder, Columbia Univ. Medical Ctr. . . . . [6428-05]

10:10 am: **Photobiomodulation dosimetry. What are the thresholds and what are the limits?,** J. Carrol, THOR Laser Inc. (United Kingdom) . . [6428-06]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 2

Room: Conv. Ctr. C1 . . . . . Sun. 11:00 am to 1:00 pm

In Vitro Studies

Chair: **Juanita Anders**, Uniformed Services Univ. of the Health Sciences

11:00 am: **How phototherapy affects angiogenesis,** M. Dyson, Dyderm Ltd. (United Kingdom) and Kings College London (United Kingdom) . . . . [6428-07]

11:20 am: **Noninvasive diode laser activation of transient receptor potential proteins and nociceptors,** N. Jiang, B. Y. Cooper, Univ. of Florida; M. I. Nemenov, Stanford Univ. and Lasmed LLC . . . . . [6428-08]

11:40 am: **Photopuncture: a first approach on pain relief using a 617nm LED device,** A. Amat, SOR Internacional SA (Spain) . . . . . [6428-23]

12:00 pm: **Increased expression of mitochondrial benzodiazepine receptors following low-level- light treatment facilitates enhanced protoporphyrin IX production in glioma-derived cells in vitro,** S. K. Bisland, N. Hassanali, C. Johnson, B. C. Wilson, Princess Margaret Hospital (Canada) . . . . . [6428-10]

12:20 pm: **Characterization of photosensitizer in different formulations for enhanced light-activated disinfection in root canal treatment,** S. George, A. Kishen, National Univ. of Singapore (Singapore) . . . . . [6428-11]

12:40 pm: **Effect of low intensity laser interaction with a human skin fibroblast cell using fiber-optic nano-probes,** G. Pal, A. Dutta, K. Mitra, M. S. Grace, Florida Institute of Technology; J. Anders, Uniformed Services Univ. of the Health Sciences; E. Gorman, R. W. Waynant, D. B. Tata, U.S. Food and Drug Administration . . . . . [6428-12]

Lunch/Exhibition Break . . . . . 12:40 to 2:00 pm

SESSION 3

Room: Conv. Ctr. C1 . . . . . Sun. 2:00 to 3:40 pm

Animal Experiments

Chair: **Ronald W. Waynant**, U.S. Food and Drug Administration

2:00 pm: **Near-IR induced suppression of metabolic activity in aggressive cancers,** D. B. Tata, U.S. Food and Drug Administration; M. Fahey, K. Mitra, Florida Institute of Technology; J. Anders, Uniformed Services Univ. of the Health Sciences; R. W. Waynant, U.S. Food and Drug Administration [6428-13]

2:20 pm: **Low-level light therapy for wound healing and arthritis in animal models,** M. R. Hamblin, Harvard Medical School; T. N. Demidova, A. P. Castano, T. Dai, E. V. Salomatina, A. N. Yaroslavsky, Massachusetts General Hospital; M. H. Smotrich, Palomar Medical Technologies, Inc. . . . . [6428-14]

2:40 pm: **Effect of phototherapy with low-intensity laser on cranio-encephalic trauma in rats,** D. T. Meneguzzo, C. Y. Okada, M. K. Koike, S. K. Moreira, C. d. P. Eduardo, B. A. Silva, Jr., M. Martins Marques, Univ. de São Paulo (Brazil) . . . . . [6428-15]

3:00 pm: **The Erchonia laser for plastic surgery recovery,** J. M. Nelson, ... [6428-16]

3:20 pm: **Do G protein-coupled receptors play a role in the cellular response to light?,** J. Anders, H. Moges, T. Romanczyk, Uniformed Services Univ. of the Health Sciences . . . . . [6428-17]

Coffee Break . . . . . 3:40 to 4:10 pm

SESSION 4

Room: Conv. Ctr. C1 . . . . . Sun. 4:10 to 5:50 pm

Clinical Studies

Chair: **Stuart K. Bisland**, Princess Margaret Hospital (Canada)

4:10 pm: **Laser acupuncture for the treatment of sensory neural deafness,** S. Anwar, Anwar Shah's First C.P. and Paralysis Clinic and Research Ctr. (Pakistan); M. N. Malik, Children's Hospital & Institute of Child Health (Pakistan); F. M. Qazi, Jinnah Hospital (Pakistan) . . . . . [6428-18]

4:30 pm: **Laser therapy in the management of dental and orofacial trauma,** A. A. Darbar, Smile Creations (United Kingdom) . . . . . [6428-19]

4:50 pm: **The influence of non-coherent red light irradiation on the liver repair in case of experimental toxic hepatitis,** S. A. Araslanov, Kirov State Medical Academy (Russia) . . . . . [6428-20]

5:10 pm: **Studies on the mechanism for low-light effects utilizing color filters in the human ultra-weak photon-emission field 0.0,** R. Van Wijk, E. P. Van Wijk, International Institute of Biophysics (Germany) . . . . . [6428-21]

5:30 pm: **Dose and intensity dependent effects on normal human neural progenitor cells using 810-nm low-power laser,** T. Romanczyk, H. Moges, Uniformed Services Univ. of the Health Sciences; E. Gorman, R. W. Waynant, I. K. Ilev, U.S. Food and Drug Administration; A. Sasso, Uniformed Services Univ. of the Health Sciences; W. Boyce, Univ. of Maryland/College Park; J. Anders, Uniformed Services Univ. of the Health Sciences . . . . . [6428-22]

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Development of electric punctural diagnostics methods for treatment-and-diagnostic complexes,** I. A. Chesnokov, Federal State Unitary Enterprise (Russia); E. P. Lyapina, Saratov State Medical Univ. (Russia); N. A. Bushuev, Y. Anisimov, Federal State Unitary Enterprise (Russia); A. A. Shuldyakov, Y. Eliseev, Saratov State Medical Univ. (Russia); A. Kornaukhov, S. I. Anisimov, Nizhni Novgorod State Univ. (Russia) . . . . . [6428-09]

Conference 6429

Room: Marriott San Jose Ballroom Salon III

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6429

Coherence Domain Optical Methods and Optical Coherence Tomography in Biomedicine XI

Conference Chairs: **James G. Fujimoto**, Massachusetts Institute of Technology; **Joseph A. Izatt**, Duke Univ.; **Valery V. Tuchin**, Saratov State Univ. (Russia)

Program Committee: **Peter E. Andersen**, Risø National Lab. (Denmark); **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Zhongping Chen**, Univ. of California/Irvine; **Johannes F. DeBoer**, Massachusetts General Hospital; **Wolfgang Drexler**, Cardiff Univ. (United Kingdom); **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria); **Adrian G. Podoleanu**, Univ. of Kent (United Kingdom); **Andrew M. Rollins**, Case Western Reserve Univ.; **Natalia M. Shakhova**, Institute of Applied Physics (Russia); **Guillermo J. Tearney**, Massachusetts General Hospital; **Lihong V. Wang**, Washington Univ. in St. Louis; **Ruikang K. Wang**, Oregon Health and Science Univ.

Monday 22 January

SESSION 1

Room: Marriott San Jose Ballroom Salon III . . . . . Mon. 8:30 to 10:00 am

Retinal Imaging I

Chair: **James G. Fujimoto**, Massachusetts Institute of Technology

8:30 am: **Swept source at 1060 nm for Fourier domain optical coherence tomography,** J. Zhang, Q. Wang, B. Rao, Z. Chen, Univ. of California/Irvine; K. Hsu, Micron Optics, Inc. . . . . [6429-01]

8:45 am: **Combined confocal/ en face optical coherence tomography imaging of the human eye fundus in vivo in the 1050-nm spectral region,** R. G. Cucu, Univ. of Kent at Canterbury (United Kingdom); J. A. Rogers, M. W. Hathaway, J. Pedro, Ophthalmic Technologies Inc. (Canada); R. B. Rosen, The New York Eye and Ear Infirmary; A. G. Podoleanu, Univ. of Kent at Canterbury (United Kingdom) . . . . . [6429-02]

9:00 am: **Spatially encoded frequency domain optical coherence tomography system for volumetric in vivo imaging at 1050 nm,** B. Považay, B. M. Hermann, A. Unterhuber, Cardiff Univ. (United Kingdom); H. Sattmann, Medizinische Univ. Wien (Austria); F. Zeiler, Ludwig Boltzmann Institut (Austria); B. Hofer, J. E. Morgan, Cardiff Univ. (United Kingdom); A. Chavez-Pirson, NP Photonics, Inc.; C. Glittenberg, S. Binder, Ludwig Boltzmann Institut (Austria); W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6429-03]

9:15 am: **Phase-insensitive optical coherence angiography of the choroid by 1-micrometer band swept-source optical coherence tomography,** Y. Yasuno, Univ. of Tsukuba (Japan); Y. Hong, Univ. of Tsukuba (Japan) and Korea Advanced Institute of Science and Technology (South Korea); S. Makita, Univ. of Tsukuba (Japan); M. Miura, Tokyo Medical Univ. (Japan); T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [6429-04]

9:30 am: **High-speed imaging of human retina in vivo with swept-source optical coherence tomography,** H. Lim, S. Yun, C. Kerbage, M. Mujat, B. H. Park, E. Lee, J. F. DeBoer, Massachusetts General Hospital . . . [6429-05]

9:45 am: **Fourier domain mode-locked (FDML) lasers at 1050 nm and 202,000 sweeps per second for OCT retinal imaging,** R. A. Huber, D. C. Adler, V. J. Srinivasan, J. G. Fujimoto, Massachusetts Institute of Technology [6429-06]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Marriott San Jose Ballroom Salon III . . . . . Mon. 10:30 am to 12:00 pm

Retinal Imaging II

Chair: **Christoph K. Hitzenberger**, Medizinische Univ. Wien (Austria)

10:30 am: **Ophthalmic imaging with adaptive optics polarization-sensitive spectral-domain optical coherence tomography,** B. Cense, Y. Zhang II, R. S. Jonnal, J. Rha, Indiana Univ.; B. H. Park, M. Mujat, J. F. DeBoer, Massachusetts General Hospital; D. T. Miller, Indiana Univ. . . . . [6429-07]

10:45 am: **Ultrahigh-resolution adaptive optics: optical coherence tomography: toward isotropic 3-μm resolution for in vivo retinal imaging,** R. J. Zawadzki, Univ. of California/Davis; Y. Zhang II, Indiana Univ.; S. M. Jones, Lawrence Livermore National Lab.; R. D. Ferguson, Physical Sciences Inc.; S. S. Choi, Univ. of California/Davis Medical Ctr.; B. Cense, Indiana Univ.; D. C. Chen, Lawrence Livermore National Lab.; D. T. Miller, Indiana Univ.; S. S. Olivier, Lawrence Livermore National Lab.; J. S. Werner, Univ. of California/Davis Medical Ctr. . . . . [6429-08]

11:00 am: **Three-dimensional imaging of photoreceptors using ultra-high-resolution optical coherence tomography with pancorrection,** E. J. Fernández, Cardiff Univ. (United Kingdom) and Univ. de Murcia (Spain); B. M. Hermann, B. Pova_ay, A. Unterhuber, B. Hofer, J. E. Morgan, W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6429-09]

11:15 am: **Resonant Doppler Fourier domain optical coherence tomography for enhanced retinal blood flow imaging in vivo,** R. A. Leitgeb, A. H. Bachmann, C. Blatter, T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6429-10]

11:30 am: **Optical coherence angiography for the human eye,** S. Makita, Univ. of Tsukuba (Japan); Y. Hong, Univ. of Tsukuba (Japan) and Korea Advanced Institute of Science and Technology (South Korea); M. Yamanari, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6429-11]

11:45 am: **Automatic retinal blood vessel parameters calculation in spectral domain optical coherence tomography,** H. M. Wehbe, M. Ruggeri, S. Jiao, G. Gregori, C. A. Puliafito, Univ. of Miami School of Medicine . . . . . [6429-12]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

Room: Marriott San Jose Ballroom Salon III . . . . . Mon. 1:30 to 3:00 pm

In vivo Imaging Applications

Chair: **Ruikang K. Wang**, Oregon Health and Science Univ.

1:30 pm: **In vivo imaging of the embryonic heart using gated optical coherence tomography,** M. W. Jenkins, O. Q. Chughtai, A. N. Basavanhally, M. Watanabe, A. M. Rollins, Case Western Reserve Univ. . . . . [6429-13]

1:45 pm: **In vivo 3D transcranial imaging of mice with ultrafast spectral domain optical coherence tomography,** R. K. Wang, Z. Ma, S. Hurst, A. Gruber, S. L. Jacques, Oregon Health and Science Univ. . . . . [6429-14]

2:00 pm: **Diagnosis of non-melanoma skin cancer with optical coherence tomography,** J. B. Thomsen, Risø National Lab. (Denmark); M. Mogensen, Univ. of Copenhagen (Denmark); T. M. Jørgensen, A. Tycho, L. Thrane, P. E. Andersen, Risø National Lab. (Denmark); G. B. E. Jemec, Univ. of Copenhagen (Denmark) . . . . . [6429-15]

2:15 pm: **GRIN lens rod based probe for spectral domain optical coherence tomography of the larynx in awake patients,** S. Guo, J. Perez, J. Su, J. M. Ridgway, D. E. Vokes, B. J. Wong, Z. Chen, Univ. of California/Irvine . . . . . [6429-16]

2:30 pm: **Optical coherence tomography (OCT) in clinical endoscopy: summary,** N. M. Shakhova, V. A. Kamensky, V. M. Gelikonov, Institute of Applied Physics (Russia); N. D. Gladkova, E. V. Zagaynova, Nizhny Novgorod State Medical Academy (Russia) . . . . . [6429-17]

2:45 pm: **Comprehensive optical frequency domain imaging of the human and porcine esophagus in vivo,** M. J. Suter, B. J. Vakoc, N. S. Nishioka, A. Desjardins, M. S. Shishkov, R. Motaghian Nezam, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6429-18]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Marriott San Jose Ballroom Salon III . . . . . Mon. 3:00 to 5:00 pm

Doppler and Polarization-Sensitive OCT

Chair: **Peter E. Andersen**, Risø National Lab. (Denmark)

3:00 pm: **Polarization memory effect in the polarization-sensitive optical coherence tomography system,** Y. Chen, Q. Zhu, Univ. of Connecticut . . . . . [6429-19]

3:15 pm: **New approach to cross-polarized optical coherence tomography based on orthogonal arbitrarily polarized modes,** G. V. Gelikonov, V. M. Gelikonov, Institute of Applied Physics (Russia) . . . . . [6429-20]

3:30 pm: **One-camera spectral-domain polarization-sensitive optical coherence tomography,** B. Baumann, M. Pircher, E. Götzinger, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6429-21]

3:45 pm: **In vivo blood flow imaging with ultrafast spectral domain optical Doppler tomography by removing the artifacts produced by optical heterogeneity of sample,** R. K. Wang, Z. Ma, Oregon Health and Science Univ. . . . . [6429-22]

4:00 pm: **Quantification of three-dimensional velocity vector using fiber-based frequency domain optical Doppler tomography,** Y. Ahn, W. Jung, Z. Chen, Univ. of California/Irvine . . . . . [6429-23]

4:15 pm: **Imaging vasculature independent of flow direction using spectral domain optical coherence tomography,** J. P. Fingler, J. B. Williams, C. Yang, S. E. Fraser, California Institute of Technology . . . . . [6429-24]

4:30 pm: **4D Doppler imaging of cardiac and vascular flow dynamics using Kasai autocorrelation on a swept source optical coherence tomography system,** A. Mariampillai, Univ. of Toronto (Canada); B. A. Standish, N. R. Munce, J. A. Smolen, Princess Margaret Hospital (Canada); A. I. Vitkin, Princess Margaret Hospital (Canada) and Univ. of Toronto (Canada); J. Jiang, Thorlabs, Inc.; V. X. D. Yang, Princess Margaret Hospital (Canada) and Ryerson Univ. (Canada) and Sunnybrook Health Science Ctr. (Canada) . . . . . [6429-25]

4:45 pm: **SDOCT Doppler velocimetry for investigating the morphological influences on blood flow in the developing chick embryo heart,** A. M. Davis, Duke Univ.; F. G. Rothenberg, Duke Univ. Medical Ctr.; L. Taber, Washington Univ. in St. Louis; J. A. Izatt, Duke Univ. . . . . [6429-26]

Tuesday 23 January

SESSION 5

Room: Marriott San Jose Ballroom Salon III . . . . . Tues. 8:30 to 10:00 am

Retinal Imaging III

Chair: **Johannes F. DeBoer**, Massachusetts General Hospital

8:30 am: **Spectral domain optical coherence tomography for in-vivo three-dimensional retinal imaging of small animals,** M. Ruggeri, H. M. Wehbe, S. Jiao, G. Gregori, M. E. Jockovich, A. S. Hackam, Y. Duan, C. A. Puliafito, Univ. of Miami School of Medicine . . . . . [6429-27]

8:45 am: **Imaging the human retina and cone mosaic in vivo with PS-OCT,** M. Pircher, B. Baumann, E. Götzinger, C. K. Hitzenberger, Medizinische Univ. Wien (Austria) . . . . . [6429-28]

9:00 am: **Quantitative analysis and interpretation of photoreceptor layers based on clinical measurements with high resolution, three-dimensional spectral optical coherence tomography,** M. Wojtkowski, B. Sikorski, T. Bajraszewski, M. Szkulmowski, A. Szkulmowska, J. J. Kaluzny, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland) . . . . . [6429-29]

9:15 am: **Clinical applications of retinal imaging by polarization sensitive OCT,** C. K. Hitzenberger, M. Pircher, E. Götzinger, B. Baumann, S. Michels, W. Geitzenauer, C. Vass, U. Schmidt-Erfurth, Medizinische Univ. Wien (Austria) . . . . . [6429-30]

9:30 am: **Complex conjugate resolved retinal SDOCT using integrating buckets,** Y. K. Tao, M. Zhao, J. A. Izatt, Duke Univ. . . . . [6429-31]

9:45 am: **In vivo optophysiology of the human retina: challenges and limitations,** B. M. Hermann, A. Unterhuber, B. Pova_ay, B. Hofer, W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6429-32]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Room: Marriott San Jose Ballroom Salon III . . . . . Tues. 10:30 am to 12:00 pm

Retinal and Other Ophthalmic Applications

Chair: **Wolfgang Drexler**, Cardiff Univ. (United Kingdom)

10:30 am: **Cornea curvature measurement using a single shot C-scan OCT image,** L. Plesea, A. G. Podoleanu, M. G. Cid, Univ. of Kent at Canterbury (United Kingdom) . . . . . [6429-33]

10:45 am: **High-speed and depth-range imaging of the human eye with frequency domain optical coherence tomography,** C. Kerbage, H. Lim, M. Mujat, J. F. DeBoer, Massachusetts General Hospital . . . . . [6429-34]

11:00 am: **Imaging subsurface photodisruption in human sclera with FD-OCT,** B. Rao, J. Su, Univ. of California/Irvine; D. Chai, Univ. of Michigan; G. Chaudhary, Z. Chen, Univ. of California/Irvine; T. Juhasz, IntraLase Corp. . . . . [6429-35]

11:15 am: **Endoscopic optical coherence tomography of the retina at 1310-nm using paired-angle rotating scanning,** M. V. Sarunic, J. Wu, California Institute of Technology; M. S. Humayun, Univ. of Southern California; C. Yang, California Institute of Technology . . . . . [6429-36]

11:30 am: **In vivo human retinal imaging with pulsed illumination spectral-domain optical coherence tomography,** J. You, Massachusetts General Hospital and Korea Advanced Institute of Science and Technology (South Korea); T. C. Chen, Harvard Medical School; M. Mujat, B. H. Park, J. F. DeBoer, Massachusetts General Hospital . . . . . [6429-37]

11:45 am: **Three-dimensional tracking for spectral domain optical coherence tomography,** D. X. Hammer, C. E. Bigelow, N. V. Iftimia, T. E. Ustun, B. C. Bloom, R. D. Ferguson, Physical Sciences Inc.; T. E. Milner, Univ. of Texas at Austin . . . . . [6429-38]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 7

Room: Marriott San Jose Ballroom Salon III . . . . . Tues. 1:30 to 3:00 pm

Novel Techniques

Chair: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign

1:30 pm: **Transversal filter banks for clutter mapping and optical Doppler tomography,** H. Ren, California Institute of Technology . . . . . [6429-39]

1:45 pm: **Linear OCT system with increased measurement depth for biomedical applications,** G. Hüttmann, Medizinisches Laserzentrum Lübeck GmbH (Germany); V. Hellemanns, Univ. zu Lübeck (Germany); P. Koch, Thorlabs-HL AG (Germany) . . . . . [6429-40]

2:00 pm: **Fourier domain optical coherence microscopy with extended depth of field,** M. L. Villiger, École Polytechnique Fédérale de Lausanne (Switzerland); P. Meda, Univ. de Genève (Switzerland); W. Pralong, T. Lasser, R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland)[6429-41]

2:15 pm: **Choice of image reconstruction algorithm impacts signal to noise ratio in 3x3 fiber coupler based homodyne optical coherence tomography,** E. J. McDowell, Z. Yaqoob, M. V. Sarunic, C. Yang, California Institute of Technology . . . . . [6429-42]

2:30 pm: **Depth-resolved monitoring of analytes diffusion in ocular tissues,** K. V. Larin, M. G. Ghosn, Univ. of Houston; V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6429-43]

2:45 pm: **Real-time monitoring of laser therapy through phase-sensitive OCT imaging of thermal denaturation in tissue,** B. J. Vakoc, G. J. Tearney, B. E. Bouma, Massachusetts General Hospital . . . . . [6429-44]

Coffee Break . . . . . 3:00 to 3:30 pm

Poster Preview Session

Chair: **Joseph A. Izatt**, Duke Univ.

Poster authors will have the opportunity to make brief presentations of their papers.

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Speckle reduction using wave front modulation for multifunctional optical coherence tomography,** B. H. Park, J. F. DeBoer, Massachusetts General Hospital . . . . . [6429-71]

✔ **High-resolution frequency domain second harmonic optical coherence tomography,** J. Su, Univ. of California/Irvine . . . . . [6429-72]

✔ **Ultrahigh-speed axial-lateral parallel time domain optical coherence tomography,** Y. Watanabe, K. Yamada, M. Sato, Yamagata Univ. (Japan) . . . . . [6429-73]

✔ **Auto-calibration of OCT spectrometers,** M. Mujat, B. H. Park, B. Cense, J. F. DeBoer, Massachusetts General Hospital . . . . . [6429-74]

✔ **Investigation of coherent amplification with a semiconductor optical amplifier employed in a swept source OCT system,** B. Rao, J. Zhang, Q. Wang, Z. Chen, Univ. of California/Irvine . . . . . [6429-75]

✔ **Optimization of spectrometer design for FD-OCT,** Z. Hu, A. M. Rollins, Case Western Reserve Univ. . . . . [6429-76]

✔ **Dispersion compensation in OFDI-OCT by using dispersion shifted fiber,** K. Asaka, NTT Photonics Labs. (Japan); K. Ohbayashi, Kitasato Univ. (Japan) . . . . . [6429-77]

✔ **An ultra-broad bandwidth, high-power 800-nm superluminescent emitting diode that is highly insensitive to optical feedback,** J. Wang, W. Xu, J. Jin, X. Zhao, Z. Wu, W. Zhu, L. T. Li, D. Eu, InPhenix Inc. . [6429-78]

✔ **Ultrahigh-resolution spectral-domain optical coherence tomography with frequency-scanning of a spectrum-broadened mode-locked Cr:forsterite laser,** C. Lu, M. Tsai, Y. Wang, C. Lee, C. Yang, National Taiwan Univ. (Taiwan) . . . . . [6429-79]

✔ **Polarization sensitive optical frequency domain imaging using frequency multiplexing,** W. Oh, S. Yun, B. J. Vakoc, J. F. DeBoer, G. J. Tearney, B. E. Bouma, Massachusetts General Hospital . . . . . [6429-80]

✔ **Pilot study of spatial-domain optical coherence tomography based on a solid-block Fourier transform spectrometer: modeling,** Y. Cho, B. Jung, B. Kim, Yonsei Univ. (South Korea); K. Nahm, Hallym Univ. (South Korea); K. Im, Yonsei Univ. (South Korea) . . . . . [6429-81]

✔ **Wavelength tunable broadband source based on Ti:Sapphire femtosecond laser applicable to FD-OCT system,** T. Eom, Gwangju Institute of Science and Technology (South Korea); E. S. Choi, Chosun Univ. (South Korea); H. Choi, J. H. Sung, C. Kee, D. Ko, J. Lee, Gwangju Institute of Science and Technology (South Korea) . . . . . [6429-82]

✔ **A probe of flexible holder for clinical oral cancer diagnosis with optical coherence tomography,** M. Tsai, H. Lee, C. Lu, Y. Wang, C. Chang, C. Yang, C. Chiang, National Taiwan Univ. (Taiwan) . . . . . [6429-83]

✔ **High-speed optical-frequency domain imaging by one frame imaging within one single frequency sweep,** H. Furukawa, T. Amano, D. Choi, H. Hiro-Oka, K. Ohbayashi, Kitasato Univ. (Japan) . . . . . [6429-84]

✔ **A method of improving scanning speed and resolution of OFDR-OCT using multiple SSG-DBR lasers simultaneously,** D. Choi, H. Hiro-Oka, T. Amano, H. Furukawa, Kitasato Univ. (Japan); N. Fujiwara, H. Ishii, NTT Corp. (Japan); K. Ohbayashi, Kitasato Univ. (Japan) . . . . . [6429-85]

✔ **Kasai autocorrelation estimation of flow velocity >6 cm/sec without aliasing on time-domain OCT,** D. Morofke, Ryerson Univ. (Canada); M. Kolios, Ryerson Univ. (Canada) and Univ. Health Network (Canada) and Sunnybrook Health Science Ctr. (Canada); A. I. Vitkin, Princess Margaret Hospital (Canada); V. X. D. Yang, Ryerson Univ. (Canada) and Univ. Health Network (Canada) . . . . . [6429-86]

✔ **Optical delay line using rotating rhombic prisms,** G. Lamouche, M. L. Dufour, B. Gauthier, National Research Council Canada (Canada); V. Bartolovic, Novacam Technologies Inc. (Canada); M. D. Hewko, J. Monchalin, National Research Council Canada (Canada) . . . . . [6429-87]

✔ **10-channel fiber array fabrication technique for a parallel optical coherence tomography system,** L. J. Arauz, Y. Luo, J. Castillo, R. K. Kostuk, The Univ. of Arizona . . . . . [6429-88]

✔ **Visualization of PDD sensitizer's concentration using Fourier domain optical coherence tomography,** Y. Nakamichi, S. Saeki, T. Saito, T. Hiro, M. Matsuzaki, Yamaguchi Univ. (Japan) . . . . . [6429-89]

✔ **Spectroscopic approaches to full-field OCT,** J. Moreau, A. Dubois, C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6429-90]

✔ **Visibility inter-comparisons in interferometric tissue calibration,** P. Vacas-Jacques, M. Strojnik Scholl, G. Paez, Ctr. de Investigaciones en Óptica, A.C. (Mexico) . . . . . [6429-91]

✔ **In vivo imaging of human retina and choroid using a rapidly swept laser,** E. C. W. Lee, J. F. DeBoer, M. Mujat, H. Lim, S. Yun, Massachusetts General Hospital . . . . . [6429-92]

✔ **Birefringence measurement of retinal nerve fiber layer using polarization-sensitive spectral domain optical coherence tomography with Jones matrix-based analysis,** M. Yamanari, Univ. of Tsukuba (Japan); M. Miura, Tokyo Medical Univ. (Japan) and Univ. of Tsukuba (Japan); S. Makita, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6429-93]

✔ **Morphological and functional retina imaging with,** K. K. Bizheva, H. Singh, Univ. of Waterloo (Canada); A. Chavez-Pirson, NP Photonics, Inc.; D. Wang, Univ. of Waterloo (Canada) . . . . . [6429-94]

✔ **Regional polarization sensitivity of articular cartilage by using polarization sensitive optical coherence tomography,** T. Xie, Univ. of California/Irvine . . . . . [6429-95]

✔ **Determination of 3D optic axis orientation in cartilage by polarization-sensitive optical coherence tomography,** S. J. Matcher, N. V. Ugryumova, The Univ. of Exeter (United Kingdom) . . . . . [6429-96]

✔ **Measurement of tissue birefringence of the hyperlipidemic rat liver with polarization-sensitive optical coherence tomography,** Y. Wang, C. Lu, M. Tsai, C. Yang, L. Lu, C. Wu, National Taiwan Univ. (Taiwan); C. Sun, Industrial Technology Research Institute (Taiwan) . . . . . [6429-97]

✔ **Study on diagnosis of micro-biomechanical structure using optical coherence tomography,** S. Saeki, Y. Hashimoto, T. Saito, T. Hiro, M. Matsuzaki, Yamaguchi Univ. (Japan) . . . . . [6429-98]

✔ **Dynamic OCT of mentally stress-induced sweating in sweat glands of the human finger tip,** M. Ohmi, Y. Ueda, M. Haruna, Osaka Univ. (Japan) . . . . . [6429-99]

✔ **A motion-sensitive 3D optical coherence microscope operating at 1300 nm for the visualization of early frog development,** B. M. Hoeling, Pomona College; S. S. Feldman, D. T. Strenge, A. M. Bernard, E. R. Hogan, D. C. Petersen, Harvey Mudd College; S. E. Fraser, J. M. Tyszka, Y. Kee, California Institute of Technology; R. C. Haskell, Harvey Mudd College . . . . . [6429-100]

✔ **Full-field optical coherence tomography image-restoration based on Hilbert transformation,** J. Na, W. J. Choi, Gwangju Institute of Science and Technology (South Korea); E. S. Choi, Chosun Univ. (South Korea); S. Y. Ryu, B. H. Lee, Gwangju Institute of Science and Technology (South Korea) . . . . . [6429-101]

✔ **From medical to art diagnostics OCT: a novel tool for varnish ablation control,** M. Gora, Nicolaus Copernicus Univ. (Poland); A. Rycyk, J. Marczak, Wojskowa Akademia Techniczna (Poland); P. Targowski, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland) . . . . . [6429-102]

✔ **Rapid two-dimensional transversal scanning fiber probe for optical coherence tomography,** G. Huang, Z. Ding, Zhejiang Univ. (China) . . . . . [6429-103]

✔ **Spectral-domain optical coherence tomography for endoscopic imaging,** X. Chen, W. Li, Q. Li, D. Yu, Tianjin Univ. (China) . . . . . [6429-104]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 9

Room: Marriott San Jose Ballroom Salon III . . . . . Wed. 8:30 to 10:00 am

Fourier Domain OCT

Chair: **Andrew M. Rollins**, Case Western Reserve Univ.

8:30 am: **Complex-conjugate-resolved imaging using two-harmonic FD-OCT,** A. B. Vakhtin, K. A. Peterson, D. J. Kane, Southwest Sciences, Inc. . . . . [6429-45]

8:45 am: **Full-range complex ultrahigh-resolution Fourier domain optical coherence tomography,** H. Singh, D. Wang, K. K. Bizheva, Univ. of Waterloo (Canada) . . . . . [6429-46]

9:00 am: **Inherent media dispersion compensation by frequency domain optical coherence tomography,** A. R. Tumlinson, A. M. Winkler, The Univ. of Arizona; B. M. Hermann, B. Pova_ay, W. Drexler, Cardiff Univ. (United Kingdom); J. K. Barton, The Univ. of Arizona . . . . . [6429-47]

9:15 am: **Dual-beam heterodyne FDOCT with high-axial resolution,** A. H. Bachman, T. Lasser, R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6429-48]

9:30 am: **High-speed Fourier-domain optical coherence tomography using a chirped supercontinuum pulse source,** S. Moon, D. Lee, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6429-49]

9:45 am: **Fourier domain optical coherence tomography using optical frequency comb,** T. Bajraszewski, M. Wojtkowski, A. Szkulmowska, W. T. Fojt, M. Szkulmowski, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland) . [6429-50]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 10

Room: Marriott San Jose Ballroom Salon III . . . . . Wed. 10:30 am to 12:00 pm

Fourier Domain Swept Source OCT

Chair: **Zhongping Chen**, Univ. of California/Irvine

10:30 am: **Discretely swept optical-frequency domain imaging toward high-resolution, high-speed, high-sensitivity,** K. Ohbayashi, T. Amano, H. Hiro-Oka, H. Furukawa, D. Choi, P. Jayavel, Kitasato Univ. (Japan); R. Yoshimura, NTT Photonics Labs. (Japan); K. Asaka, N. Fujiwara, H. Ishii, NTT Corp. (Japan); M. Suzuki, M. Nakanishi, K. Shimizu, Kitasato Univ. (Japan) . . . . . [6429-51]

10:45 am: **Frequency swept source with a rotating slit for,** J. Kim, Univ. of California/Irvine; J. Eom, Kangwon National Univ. (South Korea); J. S. Nelson, Univ. of California/Irvine . . . . . [6429-52]

11:00 am: **Enhancement of OFDR-OCT sensitivity using semiconductor optical amplifier,** K. Ohbayashi, P. Jayavel, Kitasato Univ. (Japan) . . . [6429-53]

11:15 am: **Semiconductor optical amplifier based swept wavelength source at 1060 nm using a scanning Fabry-Perot filter and an YDFA-based booster amplifier,** P. E. Andersen, L. Thrane, Risø National Lab. (Denmark); K. Hsu, Micron Optics, Inc.; A. O. Bjarklev, Danmarks Tekniske Univ. (Denmark)[6429-54]

11:30 am: **Depth and frequency encoding (DFE) for increasing the ranging depth in optical frequency domain imaging,** R. Motaghian Nezam, B. J. Vakoc, A. Desjardins, Massachusetts General Hospital; A. H. Chau, Massachusetts Institute of Technology; B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6429-55]

11:45 am: **Phase-sensitive optical coherence tomography with a Fourier domain mode-locked (FDML) laser at up to 380,000 scans per second,** D. C. Adler, R. A. Huber, J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6429-56]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 11

Room: Marriott San Jose Ballroom Salon III . . . . . Wed. 1:30 to 3:00 pm

Full-Field Imaging Techniques

Chair: **Adrian G. Podoleanu**,
Univ. of Kent at Canterbury (United Kingdom)

1:30 pm: **Line-field swept source optical coherence tomography at 850 nm,** S. Lee, B. Kim, Yonsei Univ. (South Korea) . . . . . [6429-57]

1:45 pm: **Real-time ultrahigh-resolution imaging by dual-channel full-field optical coherence tomography,** M. Akiba, K. P. Chan, Yamagata Promotional Organization for Industrial Technology (Japan) . . . . . [6429-58]

2:00 pm: **High-resolution line scanning optical coherence microscopy,** Y. Chen, S. Huang, A. D. Aguirre, J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6429-59]

2:15 pm: **Optimization of line-field spectral domain optical coherence tomography for in vivo high-speed 3D retinal imaging,** Y. Nakamura, S. Makita, M. Yamanari, M. Itoh, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan) . . . . . [6429-60]

2:30 pm: **Measurement of topographic phase image of living cells by white-light phase-shifting microscope with active stabilization of optical path difference,** T. Yamauchi, H. Iwai, M. Miwa, Y. Yamashita, Hamamatsu Photonics K.K. (Japan) . . . . . [6429-61]

2:45 pm: **High numerical aperture full-field optical coherence tomography with space-invariant resolution without scanning the focus,** D. L. Marks, T. S. Ralston, P. S. Carney, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6429-62]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 12

Room: Marriott San Jose Ballroom Salon III . . . . . Wed. 3:30 to 5:30 pm

Novel Contrast Mechanisms

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

3:30 pm: **Experimental investigation of depolarization of circular light using polarization sensitive OCT,** I. Charalambous, R. G. Cucu, A. G. Podoleanu, Univ. of Kent at Canterbury (United Kingdom); A. Dogariu, College of Optics & Photonics/Univ. of Central Florida . . . . . [6429-63]

3:45 pm: **Scatterer size-based analysis of optical coherence tomography Images,** C. Pitris, P. Ioannides, A. Kartakoulis, Univ. of Cyprus (Cyprus)[6429-64]

4:00 pm: **Angle-resolved Fourier domain OCT for biological imaging with low-speckle noise,** A. E. Desjardins, B. J. Vakoc, G. J. Tearney, B. E. Bouma, Massachusetts General Hospital and Consultant . . . . . [6429-65]

4:15 pm: **Functional imaging by dynamic speckle in digital holographic optical coherence imaging,** K. Jeong, D. D. Nolte, J. J. Turek, Purdue Univ. . . . . [6429-66]

4:30 pm: **Digital speckle reduction in optical coherence tomography,** A. Ozcan, A. Bilenca, Wellman Ctr. for Photomedicine; A. Desjardins, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6429-67]

4:45 pm: **Phase-resolved spectral-domain magnetomotive optical coherence tomography,** V. Crecea, A. L. Oldenburg, T. S. Ralston, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6429-68]

5:00 pm: **Molecular imaging of hemoglobin using ground state recovery pump-probe optical coherence tomography,** B. E. Applegate, J. A. Izatt, Duke Univ. . . . . [6429-69]

5:15 pm: **Backscattering albedo contrast in OCT using plasmon-resonant gold nanorods,** A. L. Oldenburg, Univ. of Illinois at Urbana-Champaign; M. N. Hansen, A. Wei, Purdue Univ.; S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6429-70]

Conference 6430A • Room: Conv. Ctr. K

Sunday-Monday 21-22 January 2007 • Proceedings of SPIE Vol. 6430A

Advanced Biomedical and Clinical Diagnostic Systems V

Conference Chairs: **Tuan Vo-Dinh**, Duke Univ.; **Warren S. Grundfest**, Univ. of California/Los Angeles; **David A. Benaron**, Spectros Corp.; **Gerald E. Cohn**, Cyber Tech Applied Science

Cochairs: **James N. Herron**, The Univ. of Utah; **James F. Leary**, Purdue Univ.; **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Richard B. Thompson**, Univ. of Maryland/Baltimore; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Zygmunt K. Gryczynski**, Univ. of North Texas

Program Committee: **Leslie Baillie**, Univ. of Maryland/College Park; **Jennifer K. Barton**, The Univ. of Arizona; **Irving J. Bigio**, Boston Univ.; **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industrielles (France); **Stephen G. Bown**, Univ. College London (United Kingdom); **Sabato D'Auria**, Consiglio Nazionale delle Ricerche (Italy); **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Amir H. Gandjbakhche**, National Institutes of Health; **Chris D. Geddes**, Univ. of Maryland/Baltimore; **Ewa M. Goldys**, Macquarie Univ. (Australia); **Joseph A. Izatt**, Duke Univ.; **Omar S. Khalil**, Abbott Labs.; **Richard M. Levenson**, CRI Inc.; **Hong Liu**, Univ. of Oklahoma; **Laura Marcu**, Univ. of California/Davis; **Joseph A. Miragliotta**, Johns Hopkins Univ.; **Mary-Ann Mycek**, Univ. of Michigan; **Teresa N. Petersen**, Univ. of Aalborg (Denmark); **Richard A. Robb**, Mayo Clinic; **Marcia L. Vernon**, Institut National d'Optique (Canada); **Georges A. Wagnières**, École Polytechnique Fédérale de Lausanne (Switzerland); **William P. Wiesmann**, Sekos, Inc.; **Tony Wilson**, Univ. of Oxford (United Kingdom); **Ruth M. Woodward**, HT Consultants Ltd. (United Kingdom); **Xiao-Hong N. Xu**, Old Dominion Univ.

Sunday 21 January

SESSION 1

Room: Conv. Ctr. K . . . . . Sun. 8:30 to 9:10 am

Advanced Nano-Micro Biomedical Systems

Chairs: **Tuan Vo-Dinh**, Duke Univ.; **Gerald E. Cohn**, Cyber Tech Applied Science

8:30 am: **Real-time optical detection of competitive surface hybridization on micro-arrays,** J. A. Bishop, C. Wilson, A. Chagovetz, S. Blair, The Univ. of Utah . . . . . [6430A-02]

8:50 am: **Programmable multilayered nanoparticles for in-situ manufacture of therapeutic genes in nanomedicine,** J. F. Leary, M. Seale, E. Haglund, C. Cooper, L. M. Reece, J. Huang, D. W. Knapp, D. Bergstrom, Purdue Univ. . . . . [6430A-03]

SESSION 2

Room: Conv. Ctr. K . . . . . Sun. 9:10 to 11:40 am

Raman Techniques and Systems

Chairs: **Anita Mahadevan-Jansen**, Vanderbilt Univ.; **Warren S. Grundfest**, Univ. of California/Los Angeles

9:10 am: **Towards improved assignment and quantification of spectral features in tissue modulated non-invasive Raman spectroscopy of human fingertips**, J. Chaiken, E. D. Voss, Syracuse Univ. and LighTouch Medical, Inc. . . . . [6430A-51]

9:30 am: **SERS nanoprobes and instruments for medical diagnostics,** T. Vo-Dinh, Duke Univ. . . . . [6430A-04]

9:50 am: **Combined Raman spectroscopy optical coherence tomography (RS-OCT),** C. A. Patil, Vanderbilt Univ.; T. G. van Leeuwen, Univ. Twente (Netherlands); A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6430A-05]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Raman spectroscopy applied for colorectal study,** A. A. Martin, P. O. Andrade, R. A. Bitar, A. M. Espírito Santo, H. d. S. Martinho, Univ. do Vale do Paraíba (Brazil) . . . . . [6430A-06]

11:00 am: **Ex vivo Raman spectroscopy after fluorescence guided cystoscopy in bladder cancer detection.,** M. C. M. Grimbergen, C. F. P. van Swol, R. J. A. van Moorselaar, Univ. Medical Ctr. Utrecht (Netherlands); A. Mahadevan-Jansen, Vanderbilt Univ.; R. Bosch, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [6430A-07]

11:20 am: **Transcutaneous Raman spectroscopy of bone: global sampling and ring/disk fiber optic probes,** M. V. Schulmerich, M. D. Morris, T. M. Vanasse, S. A. Goldstein, Univ. of Michigan . . . . . [6430A-08]

Lunch/Exhibition Break . . . . . 11:40 am to 12:40 pm

SESSION 3

Room: Conv. Ctr. K . . . . . Sun. 12:40 to 2:40 pm

Fluorescence Methods and Systems

Chairs: **Eva M. Sevick-Muraca**, Baylor College of Medicine; **Urs Utzinger**, The Univ. of Arizona

12:40 pm: **Detection of cell metabolism via wavelength- and time-resolved intracellular autofluorescence,** Y. Wu, W. Zheng, J. Y. Qu, The Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6430A-09]

1:00 pm: **Miniaturized side-viewing imaging probe for fluorescence lifetime imaging (FLIM): validation with fluorescence dyes, tissue structural proteins and cardiovascular tissue,** D. S. Elson, Imperial College London (United Kingdom); J. A. Jo, Univ. of California/Davis; C. W. Hollars, Ctr. for Biophotonics Science and Technology and Lawrence Livermore National Lab.; L. Marcu, Univ. of California/Davis . . . . . [6430A-10]

1:20 pm: **Optical detection of breast tumors- a comparison of diagnostic performance of autofluorescence, diffuse reflectance and Raman spectroscopy,** S. K. Majumder, M. D. Keller, A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6430A-11]

1:40 pm: **Intrinsic fluorescence spectroscopy for lung cancer detection,** Y. S. Fawzy, Perceptronix Medical Inc. (Canada); H. Zeng, British Columbia Cancer Agency . . . . . [6430A-12]

2:00 pm: **Sentinel lymph-node mapping using a fluorescent contrast agents and near-infrared optical imaging,** E. M. Sevick-Muraca, R. Sharma, H. P. Jessica, A. Joshi, J. C. Rasmussen, R. Elledge, M. E. Mawad, Baylor College of Medicine . . . . . [6430A-13]

2:20 pm: **In-vivo optical detection of brain tumor and tumor margin: a combined auto fluorescence and diffuse reflectance spectroscopic study,** S. K. Majumder, S. C. Gebhart, R. C. Thompson, K. D. Weaver, Vanderbilt Univ.; M. D. Johnson, Univ. of Rochester; W. Lin, Florida International Univ.; A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6430A-76]

SESSION 4

Room: Conv. Ctr. K . . . . . Sun. 2:40 to 4:50 pm

Optical Coherence Tomography Systems

Chairs: **Jennifer K. Barton**, The Univ. of Arizona; **Jianan Y. Qu**, Hong Kong Univ. of Science and Technology (Hong Kong China)

2:40 pm: **Complex polarization ratio to determine tissue polarization properties using polarization-sensitive optical coherence tomography,** J. Park, B. Elmaanaoui, H. G. Rylander III, T. E. Milner, Univ. of Texas/ Austin . . . . . [6430A-14]

3:00 pm: **Portable real-time OCT system for intra-operative imaging and staging of breast cancer,** F. T. Nguyen, A. M. Zysk, Univ. of Illinois at Urbana-Champaign; J. G. Kotynek, F. J. Bellafiore, K. M. Rowland, P. A. Johnson, Carle Foundation Hospital; E. J. Chaney, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6430A-15]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Video rate in vivo and ex vivo optical coherence tomography imaging,** A. Rizwan, The Univ. of Texas/Arlington . . . . . [6430A-16]

4:10 pm: **Miniature probe for high-speed optical coherence tomography,** A. Rizwan, The Univ. of Texas/Arlington . . . . . [6430A-17]

4:30 pm: **High-resolution three-dimensional optical coherence tomography,** Y. Chen, Massachusetts Institute of Technology; P. M. Andrews, Georgetown Univ. Medical Ctr.; A. D. Aguirre, Massachusetts Institute of Technology; J. M. Schmitt, LightLab Imaging; J. G. Fujimoto, Massachusetts Institute of Technology . . . . . [6430A-18]

Monday 22 January

SESSION 5

Room: Conv. Ctr. K . . . . . Mon. 8:10 to 10:10 am

Advanced Research and Clinical Systems

Chairs: **Steven Blair**, The Univ. of Utah; **David A. Benaron**, Spectros Corp.

8:10 am: **Development of low-cost instrumentation for noninvasive detection of Helicobacter Pylori,** A. Kannath, H. N. Rutt, Univ. of Southampton (United Kingdom) . . . . . [6430A-19]

8:30 am: **Hand-held probe-based optical imaging system toward breast cancer diagnosis,** J. Ge, B. Jayachandran, S. Regalado, B. Zhu, A. Godavarty, Florida International Univ. . . . . [6430A-20]

8:50 am: **Novel optical spectroscopy system for breast cancer diagnostics,** E. A. Sergeeva, Institute of Applied Physics (Russia); L. Da Silva, BioTelligent (Russia); I. Y. Pavlycheva, S. V. Smetanina, A. A. Artifexova, Nizhny Novgorod State Medical Academy (Russia); G. Y. Golubyatnikov, V. A. Kamensky, N. M. Shakhova, I. V. Turchin, Institute of Applied Physics (Russia); S. A. Belkov, G. G. Kochemasov, BIOFIL Ltd. (Russia) . . . . . [6430A-21]

9:10 am: **Needle-probe system for the measurement of tissue refractive index,** A. M. Zysk, Univ. of Illinois at Urbana-Champaign; S. G. Adie, J. J. Armstrong, The Univ. of Western Australia (Australia); M. S. Leigh, The Univ. of Western Australia; A. Paduch, The Univ. of Western Australia (Australia); F. T. Nguyen, Univ. of Illinois at Urbana-Champaign; D. D. Sampson, The Univ. of Western Australia (Australia); S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6430A-22]

9:30 am: **A clinical research device for ovarian cancer detection by optical spectroscopy in the UVC-VIS,** R. George, A. Chandrasekaran, N. D. Kirkpatrick, M. A. Brewer, U. Utzinger, The Univ. of Arizona . . . [6430A-23]

9:50 am: **Near-infrared Raman spectroscopy for in-vivo diagnosis of cervical dysplasia: a probability-based multi-class diagnostic algorithm,** S. K. Majumder, E. Kanter, A. Robichaux Viehoever, H. Jones III, A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6430A-74]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Room: Conv. Ctr. K . . . . . Mon. 10:40 am to 1:00 pm

Biomedical Imaging and Diagnostic Systems

Chairs: **Jagdish P. Singh**, Mississippi State Univ.; **Richard M. Levenson**, Cambridge Research & Instrumentation, Inc.

10:40 am: **Hyperspectral imaging fluorescence system for cancer diagnostics,** T. Vo-Dinh, Q. H. Liu, C. Chen, M. Martin, Duke Univ.; M. Panjehpour, B. F. Overholt, Thompson Cancer Survival Ctr. . . . . [6430A-24]

11:00 am: **Brain tumor demarcation with liquid-crystal spectral imaging: initial clinical results and experience,** S. C. Gebhart, S. K. Majumder, R. C. Thompson, K. D. Weaver, Vanderbilt Univ.; M. D. Johnson, Univ. of Rochester; A. Mahadevan-Jansen, Vanderbilt Univ. . . . . [6430A-25]

11:20 am: **Preliminary results from a multiwavelength time-domain optical molecular imaging system,** D. J. Hall, D. R. Vera, R. F. Mattrey, Univ. of California/San Diego . . . . . [6430A-26]

11:40 am: **Simple device for the direct visualization of oral neoplasia,** P. M. Lane, The BC Cancer Research Ctr. (Canada); C. F. Poh, S. Ng, The Univ. of British Columbia (Canada); M. Williams, The BC Cancer Research Ctr. (Canada); L. Zhang, The Univ. of British Columbia (Canada); M. Rosin, C. E. MacAulay, The BC Cancer Research Ctr. (Canada) . . . . . [6430A-27]

12:00 pm: **Multiple LEDs luminous system in capsule endoscope,** O. Mang, H. Lee, National Central Univ. (Taiwan) . . . . . [6430A-28]

12:20 pm: **Protein profile study of breast tissues using high-performance liquid chromatography-laser induced fluorescence (HPLC-LIF),** S. Chidangil, Manipal Academy of Higher Education (India) . . . . . [6430A-29]

12:40 pm: **Photothermal and optical spectroscopy analysis of burned bones,** J. Bante-Guerra, M. A. Conde Conteras, Ctr. de Investigación y de Estudios Avanzados (Mexico); V. Tiesler Blos, C. Medina, Univ. Autónoma de Yucatán (Mexico); P. Quintana Owen, J. J. Alvarado-Gil, Ctr. de Investigación y de Estudios Avanzados (Mexico) . . . . . [6430A-30]

Lunch Break . . . . . 1:00 to 2:00 pm

SESSION 7

Room: Conv. Ctr. K . . . . . Mon. 2:00 to 3:20 pm

Biosensing and Bioanalysis Systems

Chairs: **Francesco Baldini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Richard B. Thompson**, Univ. of Maryland/Baltimore

2:00 pm: **Development of a compact optical oxygen sensor for breath gas analysis,** C. S. Burke, J. P. Moore, A. K. McEvoy, D. Wencel, C. Higgins, B. D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6430A-31]

2:20 pm: **Optical assessment of intravascular and intracellular parameters related to tissue viability,** A. Mayevsky, Bar-Ilan Univ. (Israel) and The Mina & Everard Faculty of Life Sciences (Israel) and CritiSense Ltd. (Israel); M. Cohen-Kashi, N. Dekel, CritiSense Ltd. (Israel); A. Deutsch, E. Pewzner, CritiSense Ltd. . . . . [6430A-32]

2:40 pm: **In-vivo continuous measurement of interstitial pH for intensive care applications,** F. Baldini, A. Giannetti, A. A. Mencaglia, Istituto di Fisica Applicata Nello Carrara (Italy) . . . . . [6430A-33]

3:00 pm: **Hyperchromatic cytometry or how to measure anything in a cell,** A. Tarnok, A. Mittag, Univ. Leipzig (Germany) . . . . . [6430A-34]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 8

Room: Conv. Ctr. K . . . . . Mon. 3:50 to 5:30 pm

Advanced Diagnostics Systems

Chairs: **Jianan Y. Qu**, Hong Kong Univ. of Science and Technology (Hong Kong China); **James F. Leary**, Purdue Univ.

3:50 pm: **Design, fabrication, and characterization of polymeric bioMEMS for the fetection of feline immunodeficiency virus (FIV),** B. Cohen, A. Gadre, A. E. Kaloyeros, Albany NanoTech . . . . . [6430A-35]

4:10 pm: **Time-resolved confocal fluorescence spectroscopy reveals the structure and metabolic state of epithelial tissue,** Y. Wu, W. Zheng, J. Y. Qu, The Hong Kong Univ. of Science and Technology (Hong Kong China) [6430A-36]

4:30 pm: **Diagnosis of hepercholesterolemic rabbits via SQUID magnetocardiography,** H. Yang, National Taiwan Univ. (Taiwan); H. Horng, S. Yang, National Taiwan Normal Univ. (Taiwan); C. Wu, National Taiwan Univ. Hospital (Taiwan) and E-Da Hospital (Taiwan) . . . . . [6430A-37]

4:50 pm: **Real-time photo-acoustic microscopy,** R. J. Zemp, Texas A&M Univ.; R. Bitton, Univ. of Southern California; K. Maslov, Texas A&M Univ.; K. K. Shung, Univ. of Southern California; G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6430A-38]

5:10 pm: **Noise-immune oximetry in thick tissue,** C. Vazquez-Jaccaud, Ctr. de Investigaciones en Óptica, A.C. (Mexico) . . . . . [6430A-39]

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Nikiforos Kollias**, Johnson & Johnson CPPW

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Europium tetracycline biosensor for the determination of cholesterol,** L. C. Courrol, Faculdade de Tecnologia de São Paulo (Brazil); F. R. d. O. Silva, R. D. Mansano, Escola Politécnica da USP (Brazil); N. D. Vieira, Jr., Comissão Nacional de Energia Nuclear (Brazil) . . . . . [6430A-40]

✔ **Distortion improvement of capsule endoscope image,** O. Mang, Y. Chen, National Central Univ. (Taiwan) . . . . . [6430A-41]

✔ **Raman spectroscopic characterization on cervical Neoplasia,** H. K. Chiang, X. Shi, Y. Tsai, National Yang-Ming Univ. (Taiwan); T. Wang, Mackay Memorial Hospital (Taiwan) . . . . . [6430A-42]

✔ **Monitoring bio-effects of Nitroglycerin on Hb-O2 in a single RBC,** H. K. Chiang, H. Y. Cheng, H. s. Ruan, National Yang-Ming Univ. (Taiwan); T. J. Fang, Armed Forces Songshan Hospital (Taiwan) . . . . . [6430A-43]

✔ **Correlating chemical changes in subchondral bone mineral due to aging or defective type II collagen by Raman spectroscopy,** K. A. Dehring, B. J. Roessler, M. D. Morris, Univ. of Michigan . . . . . [6430A-44]

✔ **A remote and noncontact measurement of the blood pulse waveform with a laser Doppler vibrometer,** C. L. Desjardins, College of the Holy Cross and Naval Undersea Warfare Ctr.; L. T. Antonelli, Naval Undersea Warfare Ctr. . . . . [6430A-45]

✔ **Measurement of hemoglobin saturation using continuous-wave multiwavelength near-infrared spectroscopy: correlation of scatter-related spectral residuals with increased levels of hypovolemia induced by lower-body negative pressure,** O. O. Soyemi, B. R. Soller, M. R. Landry, Y. Yang, Univ. of Massachusetts Medical School; K. L. Ryan, V. A. Convertino, U.S. Army Institute of Surgical Research . . . . . [6430A-46]

✔ **Pigmented skin conditions diagnosed by Raman spectroscopy,** R. A. Bitar, Univ. do Vale do Paraíba (Brazil); A. O. Fernandes, S. Cartaxo, Univ. Federal de São Paulo (Brazil); H. d. S. Martinho, A. M. Espírito Santo, Univ. do Vale do Paraíba (Brazil); I. D. A. O. Santos, L. M. Ferreira, Univ. Federal de São Paulo (Brazil); A. A. Martin, M. Moreno, Univ. do Vale do Paraíba (Brazil) . . . . . [6430A-47]

✔ **Tumor progression investigated by in vivo polarimetry and optical coherence tomography,** J. Chung, Y. Ahn, W. Jung, M. J. Hammer-Wilson, P. B. B. Wilder-Smith, Z. Chen, Univ. of California/Irvine . . . . . [6430A-48]

✔ **Integrated endoscopy system for simultaneous fluorescence imaging and spectroscopy: Improvement of the lung cancer diagnostic specificity,** Y. S. Fawzy, Perceptronix Medical Inc. (Canada) . . . . [6430A-49]

✔ **Synchrotron microtomography and 3D image analysis for studying the degradability of biocompatible ceramics within biopsies sampled after sinus floor augmentation,** A. Rack, Forschungszentrum Karlsruhe (Germany); M. Stiller, C. Knabe, O. Dalügge, Charité Berlin (Germany); G. Weidemann, H. Riesemeier, J. Goebbels, Bundesanstalt für Materialforschung und -prüfung (Germany) . . . . . [6430A-50]

✔ **Multi-wavelength photoplethysmography for simultaneous recording of skin blood pulsations at different vascular depths,** J. Spigulis, L. Gailite, A. Lihachev, Latvijas Univ. (Latvia) . . . . . [6430A-52]

✔ **Minimally invasive NIR spectroscopy for breast tissue characterization during core needle biopsy,** B. Yu, Duke Univ.; E. B. Rollins, G. Sisney, J. M. Harter, Univ. of Wisconsin/Madison; N. Ramanujam, Duke Univ. . . . . [6430A-73]

✔ **Auto fluorescence spectroscopy for early diagnosis of _cancer eye_,** S. K. Majumder, Vanderbilt Univ.; N. Ghosh, Ctr. for Advanced Technology (India); S. M. Rathod, Abasaheb Garware College (India); P. K. Gupta, Indian Institute of Science (India) . . . . . [6430A-75]

✔ **Non-invasive, photonics-based diagnostic, imaging, and monitoring techniques for the recognition and quantification of cancerous cells and chronic inflammatory conditions,** N. Davies, Univ. of Toronto and Fibersense & Signals Inc.; D. Davies-Shaw, Univ. of California/Davis . . . . . [6430A-77]

Tuesday 23 January 2007 • Proceedings of SPIE Vol. 6430B

Quality and Reliability of Technologies for Medicine and Biomedical Devices

Conference Chair: **Ramesh Raghavachari**, U.S. Food and Drug Administration

Cochair: **Joshua Pfefer**, U.S. Food and Drug Administration

Program Committee: **Anthony J. Durkin**, Univ. of California/Irvine; **Jeeseong Hwang**, National Institute of Standards and Technology; **Orhan H. Suleiman**, U.S. Food and Drug Administration

Tuesday 23 January

SESSION 9

Room: Conv. Ctr. E . . . . . Tues. 8:50 to 9:50 am

Optical Assessment of Product Quality

Chair: **Ramesh Raghavachari**, U.S. Food and Drug Administration

8:50 am: **The need for surgical smoke evacuation: visualization technique to augment the awareness,** T. de Boorder, R. M. Verdaasdonk, J. H. G. M. Klaessens, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . [6430B-53]

9:10 am: **A steady-state optical probe to evaluate stability of proteins in dry format,** M. T. Cicerone, J. Johnson, National Institute of Standards and Technology . . . . . [6430B-54]

9:30 am: **Detection of bruises on apples using spatial-frequency-domain imaging,** E. R. Anderson, EA Photonics; J. S. You, Beckman Laser Institute . . . . . [6430B-55]

SESSION 10

Room: Conv. Ctr. E . . . . . Tues. 9:50 am to 12:00 pm

Standardization and Design

Chair: **Jeeseong Hwang**, National Institute of Standards and Technology

9:50 am: **Multicenter clinical trials of in-vivo fluorescence: are the measurements equivalent?** *(Invited Paper)***,** B. M. Pikkula, D. Serachitopol, The Univ. of Texas M.D. Anderson Cancer Ctr.; C. E. MacAulay, N. B. MacKinnon, The BC Cancer Research Ctr. (Canada); J. S. Lee, The Univ. of Texas M.D. Anderson Cancer Ctr.; D. D. Cox, Rice Univ.; E. N. Atkinson, M. Follen, The Univ. of Texas M.D. Anderson Cancer Ctr.; R. R. Richards-Kortum, Rice Univ. . . . . [6430B-56]

10:10 am: **Review of tissue simulating phantoms for optical spectroscopy, imaging and dosimetry,** B. W. Pogue, Dartmouth College; M. S. Patterson, Juravinski Cancer Ctr. (Canada) and McMaster Univ. (Canada) . . . . . [6430B-57]

Coffee Break . . . . . 10:30 to 11:00 am

11:00 am: **Design of a multispectral digital colposcope,** N. B. MacKinnon, M. Cardeno, S. Au, C. E. MacAulay, BC Cancer Agency (Canada); D. Serachitopol, B. M. Pikkula, M. Follen, The Univ. of Texas M.D. Anderson Cancer Ctr.; S. Y. Park, The Univ. of Texas/Austin; R. R. Richards-Kortum, Rice Univ. . . . . [6430B-58]

11:20 am: **Nanocrystal-based biomimetic system for quantitative flow cytometry,** P. B. Yim, National Institute of Standards and Technology; M. Dobrovolskaia, Science Applications International Corp.; H. Kang, M. Clarke, National Institute of Standards and Technology; A. Patri, Science Applications International Corp.; J. Hwang, National Institute of Standards and Technology . . . . . [6430B-59]

11:40 am: **Design for manufacture of a multichannel fluorometer platform using TracePro™ optical/optomechanical system design software,** E. Heinz, Heinz Optical Engineering; R. A. Hassler, L. A. Smith, Lambda Research Corp. . . . . [6430B-60]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 11

Room: Conv. Ctr. E . . . . . Tues. 1:00 to 2:20 pm

Quality of Novel Medical Diagnostic Devices

Chair: **Anthony J. Durkin**, Beckman Laser Institute and Medical Clinic

1:00 pm: **Models for translational research in biomedicine** *(Invited Paper)***,** R. J. Nordstrom, National Institutes of Health . . . . . [6430B-61]

1:20 pm: **Quantitative determination of glucose concentration using swept-source spectral interferometry and spectral phase analysis,** S. Oh, The Univ. of Texas/Austin and Florida International Univ. and Miami Children's Hospital; K. V. Larin, Univ. of Houston; T. E. Milner, The Univ. of Texas/Austin . [6430B-62]

1:40 pm: **In-vivo fluoroscence lifetime imaging system based on time-correlated single-photon counting,** M. Hassan, J. D. Riley, V. V. Chernomordik, A. H. Gandjbakhche, National Institutes of Health . . . . . [6430B-63]

2:00 pm: **The Use of Multispectral Imaging to Quantitate Skin and Food Autofluorescsence in Different Mouse Strains Through Diet Changes,** P. J. Dwyer, CRi, Inc.; S. A. MacLaurin, Novartis Institutes for BioMedical Research, Inc. . . . . [6430B-64]

SESSION 12

Room: Conv. Ctr. E . . . . . Tues. 2:20 to 3:20 pm

Analysis Methods

Chair: **Joshua Pfefer**, U.S. Food and Drug Administration

2:20 pm: **Standardization and postprocessing techniques in the network for translational research in optical imaging** *(Invited Paper, Presentation Only)***,** F. S. Azar, Siemens Corporate Research . . . . . [6430B-65]

2:40 pm: **Sensitivity and robustness of methods for analyzing time-resolved fluorescence measurements of layered biological tissue,** A. Agrawal, U.S. Food and Drug Administration; C. C. Parker, Virginia State Univ. and US Food and Drug Administration; T. Qazi, K. M. Agrawal, Virginia State Univ.; J. Pfefer, U.S. Food and Drug Administration . . . . . [6430B-66]

3:00 pm: **Cutting the Gordian knot of "chemometrics" science-based calibration proves specificity from spectroscopic first principles (and saves money in the process),** R. Marbach, VTT Elektroniikka (Finland) . . . [6430B-67]

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Ramesh Raghavachari**, U.S. Food and Drug Administration

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Mobile LED home-phototherapy unit for management of neonatal jaundice,** M. Hamza, Mansoura Univ. (Egypt); A. M. Hamza, Howard Univ.; M. H. Sayed El-Ahl, Tabarak Children's Hospital (Egypt); A. M. Hamza, National Research Ctr. (Egypt); Y. M. Hamza, Tabarak Children's Hospital (Egypt) . . . . . [6430B-68]

✔ **Orange fiber laser for ophthalmology,** M. Adachi, K. Kojima, K. Hayashi, NIDEK Co., Ltd. (Japan) . . . . . [6430B-69]

✔ **Laser sources in dentistry and radiation safety regulations,** M. Lepore, Seconda Univ. degli Studi di Napoli (Italy); D. De Luca, Univ. degli Studi di Napoli Federico II (Italy); G. M. Gaeta, Seconda Univ. degli Studi di Napoli (Italy) . . . . . [6430B-70]

✔ **Fluorescence intermittency and spectral shift of single bio-conjugated nanocrystals studied by single molecule confocal microscopy and spectroscopy,** H. Kang, National Institute of Standards and Technology; M. Maye, Brookhaven National Lab.; M. Clarke, P. B. Yim, K. A. Briggman, National Institute of Standards and Technology; O. Gang, Brookhaven National Lab.; J. Hwang, National Institute of Standards and Technology . . . . . [6430B-71]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Saturday 20 January 2007 • Proceedings of SPIE Vol. 6431

Multimodal Biomedical Imaging II

Conference Chair: **Fred S. Azar**, Siemens Corporate Research

Cochair: **Dimitris N. Metaxas**, Rutgers Univ.

Program Committee: **Mostafa Analoui**, Pfizer Inc.; **Nicholas Ayache**, Institut National de Recherche en Informatique et en Automatique (France); **David A. Boas**, Massachusetts General Hospital; **Nada N. Boustany**, Rutgers Univ.; **Britton Chance**, Univ. of Pennsylvania; **Laurence P. Clarke**, National Cancer Institute; **Sergio Fantini**, Tufts Univ.; **Keyvan Farahani**, National Institutes of Health; **Xavier Intes**, Rensselaer Polytechnic Institute; **Mario Khayat**, ART Advanced Research Technologies Inc. (Canada); **Sacha Loiseau**, Mauna Kea Technologies (France); **Nassir Navab**, Technische Univ. München (Germany); **Tim Nielsen**, Philips Research Labs. (Germany); **Vasilis Ntziachristos**, Massachusetts General Hospital; **Brian W. Pogue**, Dartmouth College; **Susanta K. Sarkar**, GlaxoSmithKline; **Yanjun Wu**, GlaxoSmithKline; **Birsen Yazici**, Rensselaer Polytechnic Institute; **Arjun G. Yodh**, Univ. of Pennsylvania; **Yantian Zhang**, National Institutes of Health

Saturday 20 January

SESSION 1

Room: Conv. Ctr. A6 ..... Sat. 8:30 to 10:00 am

Advances in Spectroscopic Imaging and Microscopy

Chairs: **Sergio Fantini**, Tufts Univ.;
Fred S. Azar, Siemens Corporate Research

8:30 am: **Optical scatter imaging: a microscopic modality for rapid morphological assay of living cells** *(Invited Paper)***,** N. N. Boustany, Rutgers Univ. ..... [6431-01]

9:00 am: **Near-infrared optical tomography: endoscopic imaging approach** *(Invited Paper)***,** D. Piao, H. Xie, C. Musgrove, C. F. Bunting, W. Zhang, G. Zhang, Oklahoma State Univ.; S. Vemulapalli, Univ. of Oklahoma Health Sciences Ctr.; H. Dehghani, Univ. of Exeter (United Kingdom); B. W. Pogue, Dartmouth College ..... [6431-02]

9:30 am: **Fast optical response to electrical activation in peripheral nerves** *(Invited Paper)***,** S. Fantini, Y. Tong, J. M. Martin, D. K. Chen, A. Sassaroli, Tufts Univ.; P. R. Clervil, Tufts New England Medical Ctr.; P. R. Bergethon, Boston Univ. ..... [6431-03]

SESSION 2

Room: Conv. Ctr. A6 ..... Sat. 10:00 am to 12:30 pm

Analysis and Reconstruction Techniques

Chairs: **Tim Nielsen**, Philips Research Labs. (Germany);
Fred S. Azar, Siemens Corporate Research

10:00 am: **Inferring baseline and functional blood flow, volume, and cerebral metabolism from measurements of blood oxygenation,** T. J. Huppert, Massachusetts General Hospital; M. Allen, The Univ. of Texas/Arlington; D. A. Boas, Massachusetts General Hospital ..... [6431-04]

10:20 am: **Optimized time-domain fluorescence tomography algorithm,** F. Leblond, S. Fortier, ART Advanced Research Technologies Inc. (Canada) ..... [6431-05]

Coffee Break ..... 10:40 to 11:00 am

11:00 am: **Fluorescence diffuse optical image reconstruction with a priori information** *(Invited Paper)***,** B. Yazici, M. Guven, K. Kwon, Rensselaer Polytechnic Institute; V. Ntziachristos, Massachusetts General Hospital [6431-06]

11:30 am: **Image reconstruction and evaluation of system performance for optical fluorescence tomography** *(Invited Paper)***,** T. Nielsen, B. Brendel, T. Köhler, R. Ziegler, Philips Research Labs. (Germany); A. Ziegler, Philips GmbH (Germany); L. Bakker, M. van Beek, M. B. van der Mark, M. van der Voort, R. Harbers, Philips Research Labs. (Netherlands); K. Licha, M. Pessel, Schering AG (Germany); J. P. Meeuwse, Philips Applied Technologies; A. Feuerabend, Philips GmbH (Germany); D. van Pijkeren, S. Deckers, Philips Medical Systems ..... [6431-07]

12:00 pm: **Cell segmentation for division rate estimation in computerized video time-lapse microscopy** *(Invited Paper)***,** D. N. Metaxas, Rutgers Univ. ..... [6431-08]

Lunch Break ..... 12:30 to 1:30 pm

SESSION 3

Room: Conv. Ctr. A6 ..... Sat. 1:30 to 4:20 pm

Multimodality Imaging

Chairs: **Catherine S. Klifa**, Univ. of California/San Francisco;
Dimitris N. Metaxas, Rutgers Univ.

1:30 pm: **Concurrent diffuse optical and MRI measurement of blood flow in human skeletal muscle,** G. Yu, T. F. Floyd, T. Durduran, C. Zhou, J. Wang, J. A. Detre, A. G. Yodh, Univ. of Pennsylvania ..... [6431-09]

1:50 pm: **Structural a-priori information in near-infrared optical tomography,** H. Dehghani, Univ. of Exeter (United Kingdom); C. M. Carpenter, P. K. Yalavarthy, B. W. Pogue, Dartmouth College; J. P. Culver, Washington Univ. .... [6431-10]

2:10 pm: **Combination of magnetic resonance imaging and diffuse optical spectroscopy to predict radiation response in the breast: an exploratory pilot study** *(Invited Paper)***,** C. S. Klifa, Univ. of California/San Francisco; J. Hattangadi, Harvard Medical School; A. Li, Univ. of California/Irvine; M. Watkins, Univ. of California/San Francisco; B. J. Tromberg, Univ. of California/Irvine; N. M. Hylton, Univ. of California/San Francisco .... [6431-11]

2:40 pm: **Simultaneous monitoring of multiple contrast agents using a hybrid MR-DOT system,** G. Gulsen, M. B. Unlu, O. Birgul, O. Nalcioglu, Univ. of California/Irvine ..... [6431-12]

3:00 pm: **Multimodal endo-microscopy: the second technological revolution in medical applications of cellular and molecular imaging** *(Invited Paper)***,** B. Viellerobe, F. Lacombe, V. Dentan, S. Loiseau, Mauna Kea Technologies (France) ..... [6431-13]

Coffee Break ..... 3:30 to 3:50 pm

3:50 pm: **Optical tomography as adjunct to x-ray mammography: methods and results** *(Invited Paper)***,** M. Khayat, Z. Ichalalene, N. Mincu, F. Leblond, O. Guilman, S. Djeziri, ART Advanced Research Technologies Inc. (Canada) ..... [6431-14]

SESSION 4

Room: Conv. Ctr. A6 ..... Sat. 4:20 to 6:40 pm

Network for Translational Research in Optical Imaging: Breast Cancer Diffuse Optical Imaging

Chairs: **Brian W. Pogue**, Dartmouth College;
Fred S. Azar, Siemens Corporate Research

4:20 pm: **Pressure-enhanced near-infrared breast imaging: system and phantom tests,** S. Jiang, B. W. Pogue, K. D. Paulsen, Dartmouth College ..... [6431-15]

4:40 pm: **Clinical data analysis for combined Tomosynthesis/diffuse optical tomographic breast imaging,** Q. Fang, Massachusetts General Hospital; G. L. Boverman, Northeastern Univ.; S. A. Carp, J. J. Selb, R. H. Moore, D. B. Kopans, D. A. Boas, Massachusetts General Hospital ..... [6431-16]

5:00 pm: **Proposed methods to improve false positive and false negative rates in MR breast imaging, through combination with NIR broadband spectroscopy/tomography** *(Invited Paper)***,** B. W. Pogue, C. M. Carpenter, P. K. Yalavarthy, H. Deghgani, S. Jiang, X. Wang, Dartmouth College; W. A. Wells, Dartmouth Medical School; C. A. Kogel, S. P. Poplack, Dartmouth Hitchcock Medical Ctr.; J. B. Weaver, K. D. Paulsen, Dartmouth College ..... [6431-17]

5:30 pm: **Correlation between stand-alone diffuse optical tomography and MRI in breast cancer imaging** *(Invited Paper)*, R. Choe, S. D. Konecky, A. Corlu, K. Lee, T. Durduran, M. D. Schnall, M. A. Rosen, B. Chance, A. G. Yodh, Univ. of Pennsylvania . . . . . [6431-18]

6:00 pm: **A comparison of optical reconstruction methods incorporating spectral and MR-derived spatial information,** C. M. Carpenter, S. Srinivasan, B. W. Pogue, K. D. Paulsen, H. Dehghani, Dartmouth College . . . . . [6431-19]

6:20 pm: **Characterization of breast lesions using diffuse optical tomography and positron emission tomography,** S. D. Konecky, R. Wiener, Univ. of Pennsylvania; N. Hajjioui, Siemens Corporate Research; R. Choe, A. Corlu, K. Lee, S. M. Srinivas, J. R. Saffer, R. Freifelder, Univ. of Pennsylvania; F. S. Azar, Siemens Corporate Research; J. S. Karp, A. G. Yodh, Univ. of Pennsylvania . . . . . [6431-20]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Nanobio intelligence,** V. K. Chitlangi, Poornima College of Engineering (India) . . . . . [6431-21]

✔ **Multi-modal and multi-wavelength imaging in Xenografts bearing human tumor cells,** S. Kwon, S. Ke, W. Wang, A. G. Cameron, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6431-22]

✔ **Fast interactive registration tool for reproducible multi-spectral imaging for wound healing and treatment evaluation,** H. J. Noordmans, R. de Roode, R. M. Verdaasdonk, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6431-23]

✔ **A new reconstruction method for fast SSFP-based 1H-spectroscopic imaging,** M. Althaus, MeVis GmbH (Germany) . . . . . [6431-24]

✔ **Phantom for optical pumping hyperpolarized noble gas MRI,** K. Yang, Z. Yao, Q. Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6431-25]

✔ **X-Ray and optical multimodality tomographer for small animal examination,** A. Da Silva, M. Leabad, T. Bordy, D. Jean-Marc, P. Peltie, P. Rizo, Lab. d'Electronique de Technologie de l'Information (France) . . . . . [6431-26]

✔ **Time-domain optical brain imaging combined with DC magneto-encephalography for studying neurovascular coupling,** H. Wabnitz, T. Sander, Physikalisch-Technische Bundesanstalt (Germany); A. Liebert, Physik-Tech Bundesanstalt (Poland); M. Moeller, Hochschule für Technik und Wirtschaft des Saarlandes (Germany); S. Leistner, B. Mackert, Charite Berlin (Germany); L. Trahms, R. Macdonald, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [6431-27]

✔ **Multimodal (optical/SPECT/PET/CT) imaging a specific human cancer marker and metabolic status in small animal xenograft,** S. Ke, W. Wang, S. Kwon, K. E. Adams, A. G. Cameron, S. Yallampalli, M. E. Mawad, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6431-28]

✔ **Multimodal confocal mosaicing of basal cell carcinomas in Mohs surgical skin excisions,** Y. G. Patel, D. S. Gareau, Y. Li, Memorial Sloan Kettering Cancer Ctr.; K. S. Nehal, M. Rajadhyaksha, Memorial Sloan-Kettering Cancer Ctr. . . . . [6431-29]

✔ **Dual-labeled HER2 antibody for in-vivo detection of metastatic cancer in lymph,** L. Sampath, R. Schiff, S. Ke, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6431-30]

✔ **Modeling in-vivo fluorescence of small animals using TracePro software,** S. J. Leavesley, B. P. Rajwa, Purdue Univ.; L. A. Smith, R. A. Hassler, Lambda Research Corp.; J. P. Robinson, Purdue Univ. . . . . [6431-31]

✔ **Imaging with a three-dimensional fusion microscope,** G. S. Laevsky, W. C. Warger II, C. A. DiMarzio, Northeastern Univ. . . . . [6431-32]

✔ **A new application for displaying and fusing multimodal data sets,** K. G. Baum, Syracuse Univ. and KGB Technologies; M. Helguera, Rochester Institute of Technology; A. Krol, Upstate Medical Univ./SUNY . . . . [6431-33]

✔ **Interstitial fluid pressure due to externally applied force in breast,** A. Darling, P. K. Yalavarthy, H. Dehghani, B. W. Pogue, Dartmouth College . . . . . [6431-34]

✔ **Using fluorescence molecular tomography for multimodality fusion imaging,** S. Balasubramanian, Purdue Univ.; B. Carmignani, N. G. Kujala, L. Ma, C. J. Smith, P. Yu, Univ. of Missouri/Columbia . . . . . [6431-35]

✔ **Combined spectral-domain optical coherence phase and two-photon microscopy for quantitative structural and functional imaging,** C. Joo, Massachusetts General Hospital and Massachusetts Institute of Technology; J. A. Lankester, Stanford Univ.; J. F. DeBoer, Massachusetts General Hospital . . . . . [6431-36]

✔ **X-ray guided three-dimensional diffuse optical tomography: in-vivo study of osteoarthritis in finger joint,** Q. Zhang, Z. Yuan, E. Sobel, H. Jiang, Univ. of Florida . . . . . [6431-37]

✔ **Simultaneous magnetic resonance and optical tomographic imaging apparatus for small animals ina vertical bore 9.4 T magnet,** J. M. Masciotti, A. H. Hielscher, Columbia Univ. . . . . [6431-38]

✔ **An all optical approach for monitoring physical fatigue,** V. Saxena, Univ. of Southern California; L. Marcu, Univ. of California/Davis; T. Papaioannou, Cedars-Sinai Medical Ctr.; G. Karunasiri, Naval Postgraduate School . . . . . [6431-39]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Sunday 21 January 2007 • Proceedings of SPIE Vol. 6432

Endoscopic Microscopy II

Conference Chairs: **Guillermo J. Tearney**, Massachusetts General Hospital; **Thomas D. Wang**, Stanford Univ.

Program Committee: **Arthur F. Gmitro**, The Univ. of Arizona; **Martin R. Harris**, OptiScan Pty. Ltd. (Australia); **Ralf Kiesslich**, Johannes Gutenberg Univ. Mainz (Germany); **Stephen Lam**, British Columbia Cancer Agency (Canada); **Hiroshi Mashimo**, Harvard Medical School; **Kenzi Murakami**, Olympus Corp. (Japan); **Norman S. Nishioka**, Massachusetts General Hospital; **Mark J. Schnitzer**, Stanford Univ.; **Peter T. C. So**, Massachusetts Institute of Technology

Sunday 21 January

SESSION 1

Room: Conv. Ctr. A8 . . . . . Sun. 8:30 to 10:30 am

Novel Techniques

Chair: **Thomas D. Wang**, Stanford Univ.

8:30 am: **Novel concept of GRIN optical systems for high- resolution microendoscopy, Part 1: physical aspects,** B. Messerschmidt, A. Kraeplin, Grintech GmbH (Germany); S. Schenkl, I. Riemann, M. Stark, A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); A. V. Tchernook, R. Le Harzic, JenLab GmbH (Germany); K. Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6432-01]

8:50 am: **Novel concept of GRIN optical systems for high-resolution microendoscopy, Part 2: biomedical applications,** A. V. Tchernook, JenLab GmbH (Germany); B. Messerschmidt, Grintech GmbH (Germany); R. Le Harzic, JenLab GmbH (Germany); S. Schenkl, M. Stark, I. Riemann, K. Koenig, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6432-02]

9:10 am: **In-vitro imaging of mouse colorectal tissue by nonlinear micro-endoscope biopsy probe,** H. Choi, S. Chen, D. Kim, L. Munro, M. L. Culpepper, P. T. C. So, Massachusetts Institute of Technology . . . . . [6432-03]

9:30 am: **MEMS-based dual-axes confocal microscope for in-vivo imaging,** W. Piyawattanametha, H. Ra, M. J. Mandella, J. T. C. Liu, L. K. Wong, P. Hsiung, C. H. Contag, G. S. Kino, T. D. Wang, O. D. Solgaard, Stanford Univ. . [6432-04]

9:50 am: **Design of a multispectral channel for in-vivo confocal microscopy,** H. Makhlouf, A. A. Tanbakuchi, A. R. Rouse, A. F. Gmitro, The Univ. of Arizona . . . . . [6432-05]

10:10 am: **Spectrally modulated full-field optical coherence microscopy for ultra-high-resolution endoscopic imaging,** W. Oh, B. E. Bouma, N. Iftimia, R. Yelin, G. J. Tearney, Massachusetts General Hospital . . . . . [6432-06]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 2

Room: Conv. Ctr. A8 . . . . . Sun. 11:00 am to 1:00 pm

Endoscopic OCT

Chair: **Guillermo J. Tearney**, Massachusetts General Hospital

11:00 am: **Serial endoscopy in azoxymethane treated mice using ultra-high-resolution optical coherence tomography,** L. P. Hariri, The Univ. of Arizona; Z. Qiu, Medizinische Univ. Wien (Austria); A. R. Tumlinson, The Univ. of Arizona; B. Považay, B. M. Hermann, H. Sattmann, A. Unterhuber, Medizinische Univ. Wien (Austria); J. B. McNally, The Univ. of Arizona; W. Drexler, Medizinische Univ. Wien (Austria); J. K. Barton, The Univ. of Arizona . . . . . [6432-07]

11:20 am: **In-vivo comprehensive microscopy of the human distal esophagus using optical frequency domain imaging,** M. J. Suter, B. J. Vakoc, N. S. Nishioka, A. Desjardins, M. S. Shishkov, S. Motaghiannezam, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6432-08]

11:40 am: **Endoscopic OCT detection of neoplasia in Barrett's esophagus,** E. V. Zagaynova, Nizhny Novgorod State Medical Academy (Russia); N. D. Gladkova, Nizhny Novgorod State Medical Academy (Russia) and Institute of Applied Physics (Russia); G. Zuccaro, The Cleveland Clinic Foundation; F. I. Feldchtein, Imalux Corp. and Institute of Applied Physics (Russia) [6432-09]

12:00 pm: **A 3mm catheter for constant depth-resolution probing in Fourier domain optical coherence endoscopy,** K. Lee, College of Optics & Photonics/ Univ. of Central Florida; L. Wu, H. Xie, Univ. of Florida; J. P. Rolland, College of Optics & Photonics/Univ. of Central Florida . . . . . [6432-10]

12:20 pm: **Optical coherant tomography bioimaging using 3D scanning micromirror,** J. Singh, Institute of Microelectronics (Singapore); C. C. Hoe, National Univ. of Singapore (Singapore); T. H. S. Jason, Institute of Microelectronics (Singapore); N. Chen, National Univ. of Singapore (Singapore); C. S. Premachandran, Institute of Microelectronics (Singapore); C. J. R. Sheppard, National Univ. of Singapore (Singapore); M. C. Olivo, National Cancer Ctr. of Singapore (Singapore) . . . . . [6432-11]

12:40 pm: **In vivo three-dimensional optical coherence tomography employing a,** W. Jung, Univ. of California/Irvine; D. T. McCormick, Univ. of California/Berkeley; Y. Ahn, J. Zhang, Univ. of California/Irvine; N. C. Tien, Case Western Reserve Univ.; Z. Chen, Univ. of California/Irvine . . . . . [6432-12]

Lunch/Exhibition Break . . . . . 1:00 to 2:00 pm

SESSION 3

Room: Conv. Ctr. A8 . . . . . Sun. 2:00 to 3:00 pm

Endoscopic Microscopy I

Chair: **Arthur F. Gmitro**, The Univ. of Arizona

2:00 pm: **In-vivo peptide-mediated detection colonic dysplasia with confocal fluorescence microendoscopy,** P. Hsiung, J. Hardy, Stanford Univ.; P. Sahbaie, Veterans Affairs Palo Alto Health Care System; S. Friedland, Veterans Affairs Palo Alto Health Care System and Stanford Univ. School of Medicine; C. H. Contag, Stanford Univ.; T. D. Wang, Veterans Affairs Palo Alto Health Care System and Stanford Univ. School of Medicine . . . . . [6432-13]

2:20 pm: **To see the unseeable: confocal miniprobes for routine microscopic imaging during endoscopy,** A. Osdoit, F. Lacombe, S. Loiseau, Mauna Kea Technologies (France) . . . . . [6432-14]

2:40 pm: **Fluorescence confocal endomicroscopy in biological imaging,** S. G. Thomas, J. S. Allen, P. M. Delaney, OptiScan Pty. Ltd. (Australia); W. McLaren, E. Murr, Optiscan Pty. Ltd. (Australia); M. R. Harris, OptiScan Pty. Ltd. (Australia) . . . . . [6432-15]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. A8 . . . . . Sun. 3:30 to 4:50 pm

Endoscopic Microscopy II

Chair: **Arthur F. Gmitro**, The Univ. of Arizona

3:30 pm: **Confocal micro-endoscope for use in a clinical setting,** J. A. Udovich, A. R. Rouse, A. A. Tanbakuchi, M. A. Brewer, R. Sampliner, A. F. Gmitro, The Univ. of Arizona . . . . . [6432-16]

3:50 pm: **Investigation of computer-aided colonic crypt pattern analysis,** X. Qi, Y. Pan, M. V. Sivak, Jr., Case Western Reserve Univ.; K. Olowe, Univ. Hospitals of Cleveland; A. M. Rollins, Case Western Reserve Univ. . . [6432-17]

4:10 pm: **Novel endoscopic imaging system for early cancer diagnosis,** M. Igarashi, K. Gono, Olympus Medical Systems Corp. (Japan) . . . . . [6432-18]

4:30 pm: **Flicker fluorimetry: a new technique for quantitative fluorescence excitation and emission endoscopy,** D. J. McGraw, Light Diagnostics, Inc. . . . . [6432-20]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Scanning OCT endoscope with 2-axism magnetic micro-mirror,**
J. J. Bernstein, T. W. Lee, F. J. Rogomentich, The Charles Stark Draper Lab., Inc.; K. H. Kim, G. N. Maguluri, B. E. Bouma, J. F. DeBoer, Massachusetts General Hospital . . . . . [6432-19]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Saturday-Sunday 20-21 January 2007 • Proceedings of SPIE Vol. 6433

Optical Fibers and Sensors for Medical Diagnostics and Treatment Applications VII

Conference Chair: **Israel Gannot**, The George Washington Univ. and Tel Aviv Univ. (Israel)

Program Committee: **Richard O. Claus**, Virginia Polytechnic Institute and State Univ.; **Ilko K. Ilev**, U.S. Food and Drug Administration; **Karl-Friedrich Klein**, Fachhochschule Giessen-Friedberg (Germany); **Pierre Lucas**, The Univ. of Arizona; **Yuji Matsuura**, Tohoku Univ. (Japan)

Saturday 20 January

SESSION 1

Room: Conv. Ctr. C3 . . . . . Sat. 9:00 to 10:40 am

Chair: **Pierre Lucas**, The Univ. of Arizona

9:00 am: **A novel hyperspectral lifetime probe for autofluorescence,** P. De Beule, C. W. Dunsby, D. M. Owen, N. P. Galletly, U. Anand, P. Anand, P. M. W. French, Imperial College London (United Kingdom) . . . . . [6433-01]

9:20 am: **Miniature optical fiber pressure microsensors for in-vivo measurement of intramuscular pressure,** P. S. Cottler, D. Blevins, J. Averett, Luna Innovations, Inc.; D. Morrow, Mayo Clinic; R. L. Lieber, Univ. of California/San Diego; K. R. Kaufman, Mayo Clinic; T. A. Wavering, Luna Innovations, Inc. . . . . [6433-02]

9:40 am: **Therapeutic endoscopy, diagnosis, & intervention,** J. L. Bala, Micro Invasive Technology, Inc.; S. D. Schwaitzberg, Cambridge Health Alliance . . . . . [6433-03]

10:00 am: **Modification of mid-infrared radiation spatial structure caused by COP/Ag hollow waveguide,** M. Nemec, H. Jelínkov, P. Koranda, M. Fibrich, Czech Technical Univ. (Czech Republic); M. Miyagi, K. Iwai, Sendai National College of Technology (Japan); Y. Shi, Fudan Univ. (China); Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6433-04]

10:20 am: **Hollow-core photonic crystal fiber surface enhanced Raman probe,** H. Yan, Tsinghua Univ. (China); C. Gu, Univ. of California/Santa Cruz; C. Yang, J. Liu, G. Jin, J. Zhang, Tsinghua Univ. (China); L. Hou, Yanshan Univ. (China); Y. Yao, Tsinghua Univ. (China) . . . . . [6433-05]

Coffee Break . . . . . 10:40 to 11:10 am

SESSION 2

Room: Conv. Ctr. C3 . . . . . Sat. 11:10 am to 1:00 pm

Chair: **Israel Gannot**, The George Washington Univ.

Keynote Presentation

11:10 am: **Next generation optical biochips for diagnostics,** B. McGraith, Dublin City Univ. (Ireland) . . . . . [6433-06]

11:40 am: **The influence of fiber_s photosensitivity by doping process,** F. Tu, Huazhong Univ. of Science and Technology (China) . . . . . [6433-07]

12:00 pm: **Study of optical fiber damage under tight bend with high optical power at 2140 nm,** X. Sun, J. Li, A. S. Hokansson, OFS . . . . . [6433-08]

12:20 pm: **Simultaneous delivery of Er:YAG and Ho:YAG lasers by using a hollow optical fibers for endoscopic lithotripsy,** K. Iwai, Sendai National College of Technology (Japan); M. Yuji, Tohoku Univ. (Japan); M. Miyagi, Sendai National College of Technology (Japan) . . . . . [6433-09]

12:40 pm: **Spatially resolved reflectance spectroscopy using angularly variable fiber geometry: theoretical principles and experimental applications,** A. M. J. Wang, Rice Univ. . . . . [6433-10]

Lunch/Exhibition Break . . . . . 1:00 to 2:00 pm

SESSION 3

Room: Conv. Ctr. C3 . . . . . Sat. 2:00 to 3:20 pm

Chair: **Yuji Matsuura**, Tohoku Univ. (Japan)

2:00 pm: **Stability of solarization resistant fibers for low drift absorbance measurements in the 200 to 300 nm region,** M. Belz, World Precision Instruments, Inc. . . . . [6433-11]

2:20 pm: **Special optical fibres for guiding of UV laser radiation for biomedical applications,** G. Hillrichs, H. Dietz, Fachhochschule Merseburg (Germany); K. Klein, Fachhochschule Giessen-Friedberg (Germany) . [6433-12]

2:40 pm: **Polymer/metal sulfide coated hollow glass waveguides for delivery of Er:YAG laser radiation,** J. A. Harrington, V. S. Johnson, B. F. Bowden, Rutgers Univ. . . . . [6433-13]

3:00 pm: **Fiber-optic components for fluorescence measurements in TLC-technique,** K. Klein, H. Eckhardt, Fachhochschule Giessen-Friedberg (Germany); B. Spangenberg, M. Teichert, Fachhochschule Offenburg (Germany) . . . . . [6433-14]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Room: Conv. Ctr. C3 . . . . . Sat. 3:50 to 5:30 pm

Chair: **James A. Harrington**, Rutgers Univ.

3:50 pm: **Sensing for smart medical home,** I. Gannot, The George Washington Univ. . . . . [6433-15]

4:10 pm: **UV LED fiber optic detection system for microliter protein analysis,** M. Belz, World Precision Instruments, Inc.; F. A. Klein, Fachhochschule Giessen-Friedberg (Germany) . . . . . [6433-16]

4:30 pm: **Singlemode photonic crystal fiber for the middle infrared,** L. N. Butvina, O. V. Sereda, E. M. Dianov, Fiber Optics Research Ctr, Russian Academy of Science (Russia); N. V. Lichkova, V. N. Zagorodnev, Institute of Microelectronics Technology (Russia) . . . . . [6433-17]

4:50 pm: **A confocal fiber-optic laser approach for precise intraocular lens dioptric power testing,** I. K. Ilev, R. W. Faaland, D. Calogero, U.S. Food and Drug Administration . . . . . [6433-18]

5:10 pm: **Remote FTIR reflectometry for clinical diagnostic using hollow optical-fiber probe,** Y. Matsuura, S. Kino, Tohoku Univ. (Japan) . . . . [6433-19]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 5

Room: Conv. Ctr. C3 . . . . . Sun. 8:40 to 10:40 am

Chair: **Ilko K. Ilev**, U.S. Food and Drug Administration

8:40 am: **Hollow fiber with an inorganic inner coating layer,** K. Iwai, M. Miyagi, Sendai National College of Technology (Japan); Y. Shi, X. Zhu, Fudan Univ. (China); Y. Matsuura, Tohoku Univ. (Japan) . . . . . [6433-29]

9:00 am: **Laser-induced fluorescence as a diagnostic tool integrated into a scanning fiber endoscope for mouse imaging,** C. M. Brown, L. Maggio-Price, E. J. Seibel, Univ. of Washington . . . . . [6433-20]

9:20 am: **Applications of rigid and flexible GRIN endoscopes,** S. Schenkl, A. Ehlers, Saarland Univ. (Germany) and Fraunhofer-Institut für Biomedizinische Technik (Germany); I. Riemann, Fraunhofer-Institut für Biomedizinische Technik (Germany); B. Messerschmidt, GrinTech GmbH (Germany); K. König, Saarland Univ. (Germany) and Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6433-21]

9:40 am: **Hollow fiber-optic Raman probes for small experimental animals,** T. Katagiri, Y. Hattori, T. Suzuki, The Institute of Physical and Chemical Research (Japan); Y. Matsuura, Tohoku Univ. (Japan); H. Sato, The Institute of Physical and Chemical Research (Japan) . . . . . [6433-22]

10:00 am: **Acupuncture site evaluation using acupuncture needle assembled to optical coherence tomography : Feasibility study,** C. Na, Beckman Laser Institute and Medical Clinic; W. Jung, Y. Ahn, Univ. of California/Irvine; B. H. Lee, Gwangju Institute of Science and Technology (South Korea); Z. Chen, Univ. of California/Irvine . . . . . [6433-23]

10:20 am: **Application of chalcogenide glasses for cell-based biosensors,** P. Lucas, A. Wilhelm, M. R. Riley, The Univ. of Arizona . . . . . [6433-24]

Coffee Break . . . . . 10:40 to 11:10 am

SESSION 6

Room: Conv. Ctr. C3 . . . . . Sun. 11:10 am to 12:45 pm

Chair: **Israel Gannot**, The George Washington Univ. and Tel Aviv Univ. (Israel)

11:10 am: **All fiberoptic scanning endo-microscope for two photon fluorescence and SHG imaging** *(Invited Paper)***,** X. Li, Univ. of Washington . . . . . [6433-25]

11:35 am: **Three-dimensional miniature endoscopy through a single fiber via spectral encoding** *(Invited Paper)***,** D. Yelin, I. Rizvi, M. W. White, J. T. Motz, T. Hasan, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital [6433-26]

12:00 pm: **Modern technologies to build inexpensive, high performance micro-endoscopes for cellular imaging** *(Invited Paper)***,** T. S. Tkaczyk, College of Optical Sciences/The Univ. of Arizona . . . . . [6433-27]

12:25 pm: **New Tellurium based glasses for use in bio-sensing applications,** A. Wilhelm, The Univ. of Arizona; C. Boussard, Univ. de Rennes I (France); P. Lucas, M. R. Riley, The Univ. of Arizona; B. Bureau, Univ. de Rennes I (France) . . . . . [6433-28]

Sunday-Wednesday 21-24 January 2007 • Proceedings of SPIE Vol. 6434

Optical Tomography and Spectroscopy of Tissue VII

Conference Chairs: **Britton Chance**, Univ. of Pennsylvania; **Robert R. Alfano**, City College/CUNY; **Bruce J. Tromberg**, Univ. of California/Irvine; **Mamoru Tamura**, Hokkaido Univ. (Japan); **Eva M. Sevick-Muraca**, Baylor College of Medicine

SPIE and the organizers gratefully acknowledge

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for their generous sponsorship of the Best Student Paper Award given as a part of the conference on Optical Tomography and Spectroscopy of Tissue.

Sunday 21 January

SESSION 1

Room: Conv. Ctr. A1 ..... Sun. 8:50 to 10:30 am

Theory/Algorithm/Modeling

Chairs: **Andreas H. Hielscher**, Columbia Univ.; **Hamid Dehghani**, Dartmouth College

8:50 am: **Forward and inverse models for diffuse optical tomography using the multilevel Feynman-Kac formula,** N. Cao, M. Ortner, A. Nehorai, Washington Univ. in St. Louis ..... [6434-01]

9:10 am: **Generalized least-squares minimization for magnetic reasonance-guided diffuse optical tomography,** P. K. Yalavarthy, B. W. Pogue, H. Dehghani, S. Jiang, K. D. Paulsen, Dartmouth College ..... [6434-02]

9:30 am: **A globally convergent numerical method for optical tomography,** M. V. Klibanov, Univ. of North Carolina/Charlotte; A. A. Timonov, Univ. of South Carolina ..... [6434-03]

9:50 am: **Stochastic image reconstruction in bioluminescence tomography with the equation of radiative transfer,** A. D. Klose, Columbia Univ. [6434-05]

10:10 am: **Diffuse optical tomagraphy by multigrid FEM strategy,** Y. Ma, F. Gao, Tianjin Univ. (China) ..... [6434-06]

Coffee Break ..... 10:30 am

SESSION 2

Room: Conv. Ctr. A1 ..... Sun. 10:50 am to 12:30 pm

Instrumentation and Technology I

Chairs: **Andreas H. Hielscher**, Columbia Univ.; **Hamid Dehghani**, Dartmouth College

10:50 am: **Detection of layer-specific hemodynamics in the adult head,** R. B. Saager, A. J. Berger, Univ. of Rochester ..... [6434-07]

11:10 am: **Optimal selection of wavelengths in steady-state, multi-spectral, diffuse optical tomography,** D. R. Kashyap, N. Chu, A. Apte, B. P. Wang, H. Liu, The Univ. of Texas/Arlington ..... [6434-08]

11:30 am: **Computational aspects of endoscopic near-infrared optical tomography: initial investigations,** C. Musgrove, C. F. Bunting, Oklahoma State Univ.; H. Dehghani, B. W. Pogue, Dartmouth College; D. Piao, Oklahoma State Univ. ..... [6434-09]

11:50 am: **Improved probe design for diffuse optical tomography: a phantom study,** N. Chen, W. Mo, National Univ. of Singapore (Singapore) ..... [6434-10]

12:10 pm: **Optimal probe design for dual-modality in-vivo breast imaging,** C. Xu, Q. Zhu, Univ. of Connecticut ..... [6434-11]

Lunch/Exhibition Break ..... 12:30 pm

SESSION 3

Room: Conv. Ctr. A1 ..... Sun. 2:00 to 3:20 pm

Fluorescence Imaging/Spectroscopy (algorithm/model/tomography)

Chairs: **Stefan Andersson-Engels**, Lunds Tekniska Högskola (Sweden); **Eva M. Sevick-Muraca**, Baylor College of Medicine; **Amir Gandjbackche**, National Institutes of Health; **Dirk Grosenick**, Physikalisch-Technische Bundesanstalt (Germany)

2:00 pm: **Choice of data-types in the recovery of parameters in fluorescence optical imaging,** J. D. Riley, M. Hassan, V. Cheronmordik, A. Gandjbackche, National Institutes of Health ..... [6434-12]

2:20 pm: **Dataset reduction in fluorescence-mediated tomography using multispectral emission,** J. Axelsson, National Defence Research Establishment (Sweden); J. Svensson, S. Andersson-Engels, Lunds Tekniska Högskola (Sweden) ..... [6434-13]

2:40 pm: **A direct approach to time-domain fluorescence tomography based on asymptotic lifetime analysis,** A. T. N. Kumar, Massachusetts General Hospital; S. B. Raymond, Massachusetts Institute of Technology; D. A. Boas, B. J. Bacskai, Massachusetts General Hospital ..... [6434-14]

3:00 pm: **Model improvements for fluorescence-enhanced small animal imaging with frequency domain technique,** T. Pan, Texas A&M Univ.; J. C. Rasmussen, E. M. Sevick-Muraca, Baylor College of Medicine . [6434-15]

Coffee Break ..... 3:20 pm

SESSION 4

Room: Conv. Ctr. A1 ..... Sun. 3:40 to 4:40 pm

Fluorescence Imaging/Image Reconstruction (Experimental)

Chairs: **Stefan Andersson-Engels**, Lunds Tekniska Högskola (Sweden); **Eva M. Sevick-Muraca**, Baylor College of Medicine

3:40 pm: **Three-dimensional fluorescence-enhanced optical tomography using adaptive, tetrahedral finite-element meshing,** J. H. Lee, A. Joshi, E. M. Sevick-Muraca, Baylor College of Medicine ..... [6434-16]

4:00 pm: **Reconstruction of absorption and fluorescence contrast for scanning time-domain fluorescence mammography,** R. Ziegler, T. Nielsen, T. Köhler, Philips Research Labs. (Germany); D. Grosenick, O. Steinkellner, A. Hagen, R. Macdonald, H. H. Rinneberg, Physikalisch-Technische Bundesanstalt (Germany) ..... [6434-17]

4:20 pm: **Phantom study on combined cw and time-domain fluorescence mammography,** D. Grosenick, O. Steinkellner, A. Hagen, Physikalisch-Technische Bundesanstalt (Germany); R. Ziegler, T. Nielsen, Philips Research Labs. (Germany); R. Macdonald, H. H. Rinneberg, Physikalisch-Technische Bundesanstalt (Germany) ..... [6434-18]

Monday 22 January

SESSION 5

Room: Conv. Ctr. A1 . . . . . Mon. 8:30 to 10:30 am

Instrumentation and Technology II

Chairs: **Quing Zhu**, Univ. of Connecticut; **Heidrun Wabnitz**, Physikalisch-Technische Bundesanstalt (Germany)

8:30 am: **Time-domain optical brain imaging and spectroscopy: correction of dead-time related errors in time-correlated single photon counting at high-count rates,** H. Wabnitz, M. Moeller, Physikalisch-Technische Bundesanstalt (Germany); W. Becker, Becker & Hickl GmbH (Germany); R. Macdonald, Physikalisch-Technische Bundesanstalt (Germany) . . . [6434-19]

8:50 am: **Improved dual-mode light sources for pulsed and cw excitation in diffuse optical tomography,** K. Lauritsen, D. Klemme, M. Langkopf, M. Wahl, PicoQuant GmbH (Germany); R. Häring, Toptica Photonics AG (Germany); A. Hagen, D. Grosenick, Physikalisch-Technische Bundesanstalt (Germany); R. Erdmann, PicoQuant GmbH (Germany) . . . . . [6434-20]

9:10 am: **Optical tomography of complex structures with diffuse light,** S. D. Konecky, G. Y. Panasyuk, K. Lee, V. A. Markel, A. G. Yodh, J. C. Schotland, Univ. of Pennsylvania . . . . . [6434-21]

9:30 am: **Three-dimensional optical tomographic reconstruction for early detection of tissue changes in human breast phantoms,** S. Shin, Y. Yang, M. Singh, Kyungpook National Univ. (South Korea) . . . . . [6434-22]

9:50 am: **Polarization memory effect and visibility improvement in turbid media,** X. Ni, S. A. Kartazayeva, W. B. Wang, W. Cai, S. K. Gayen, City College/CUNY; R. R. Alfano, City College/CUNY and Alfanix Technology Ltd. . [6434-23]

10:10 am: **Noncontact imaging of absorption and scattering spectra using spatially modulated illumination with a computed-tomography imaging spectrometer,** J. R. Weber, D. J. Cuccia, Beckman Laser Institute and Medical Clinic; D. W. Wilson, W. R. Johnson, G. H. Bearman, Jet Propulsion Lab.; B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-24]

Coffee Break . . . . . 10:30 am

SESSION 6

Room: Conv. Ctr. A1 . . . . . Mon. 10:50 am to 12:30 pm

Fluorescence Imaging Technology I

Chairs: **Stefan Andersson-Engels**, Lunds Tekniska Högskola (Sweden); **Eva M. Sevick-Muraca**, Baylor College of Medicine

10:50 am: **Breast cancer diagnosis from fluorescence spectroscopy using artificial neural network,** J. Choi, J. Park, J. Lee, S. Gupta, J. Ye, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6434-25]

11:10 am: **Enhanced stabilization of indocyanine green in the presence of cyclodextrin,** V. B. Rodriguez, D. J. MacDonald, X. Li, S. H. Pun, Univ. of Washington . . . . . [6434-26]

11:30 am: **Subsurface diffuse optical tomography can localize absorber and fluorescent objects but recovered image sensitivity is nonlinear with depth,** D. S. Kepshire, S. C. Davis, H. Dehghani, K. D. Paulsen, B. W. Pogue, Dartmouth College . . . . . [6434-27]

11:50 am: **Improved quantification of fluorescence in 3D in a realistic mouse phantom,** S. Srinivasan, B. W. Pogue, S. C. Davis, Dartmouth College; F. Leblond, Advanced Research Technologies (Canada) . . . . . [6434-28]

12:10 pm: **NIR fluorescence-based lymph tomography with spatially patterned excitation,** A. Joshi, Baylor College of Medicine; W. Bangerth, The Univ. of Texas/Austin; J. C. Rasmussen, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6434-29]

Lunch Break . . . . . 12:30 pm

SESSION 7

Room: Conv. Ctr. A1 . . . . . Mon. 1:30 to 3:10 pm

Fluorescence Imaging Technology II

Chairs: **Stefan Andersson-Engels**, Lunds Tekniska Högskola (Sweden); **Eva M. Sevick-Muraca**, Baylor College of Medicine

1:30 pm: **Time-domain fluorescence diffuse optical tomography utilizing generalized pulse-spectrum technique,** A. Y. B. Marjono, S. Okawa, The Univ. of Electro-Communications (Japan); F. Gao, Tianjin Univ. (China); Y. Yamada, The Univ. of Electro-Communications (Japan) . . . . . [6434-30]

1:50 pm: **Spectrally resolved 3D bioluminescence tomography,** H. Dehghani, B. W. Pogue, S. C. Davis, Dartmouth College; M. S. Patterson, Juravinski Cancer Ctr. (Canada) . . . . . [6434-31]

2:10 pm: **Scanning fluorescence diffuse optical tomography based on a phase-difference technique,** B. Yuan, Univ. of Connecticut and Columbia Univ.; Q. Zhu, Univ. of Connecticut . . . . . [6434-32]

2:30 pm: **Multispectral MR-guided diffuse optical tomography for imaging fluorescence and absorption exogenous contrast,** S. C. Davis, S. Jiang, S. Srinivasan, R. Springett, H. Dehghani, B. W. Pogue, K. D. Paulsen, Dartmouth College . . . . . [6434-33]

2:50 pm: **Continuous-wave fluorescence tomography of breast cancer,** A. Corlu, R. Choe, T. Durduran, A. G. Yodh, Univ. of Pennsylvania . . . [6434-34]

Coffee Break . . . . . 3:10 pm

SESSION 8

Room: Conv. Ctr. A1 . . . . . Mon. 3:30 to 4:30 pm

Fluorescence Imaging Technology III

Chairs: **Stefan Andersson-Engels**, Lunds Tekniska Högskola (Sweden); **Eva M. Sevick-Muraca**, Baylor College of Medicine

3:30 pm: **Development of a time-domain fluorescence mammograph,** A. Hagen, O. Steinkellner, D. Grosenick, Physikalisch-Technische Bundesanstalt (Germany); R. Ziegler, T. Nielsen, Philips Research Labs. (Germany); K. Lauritsen, PicoQuant GmbH (Germany); R. Macdonald, H. H. Rinneberg, Physikalisch-Technische Bundesanstalt (Germany) . . . . . [6434-35]

3:50 pm: **Free space in-vivo fluorescence enhanced optical tomography reconstruction of small animal cancer,** L. Herve, A. Koenig, A. Da Silva, J. Dinten, J. Boutet, M. Berger, CEA-LETI (France); V. Josserand, J. Coll, Institut Albert Bonniot (France); I. F. Texier Nogues, P. Peltie, P. Rizo, CEA-LETI (France) . . . . . [6434-36]

4:10 pm: **Experimental validation of time-dependent radiative transport-based small animal tomography,** J. C. Rasmussen, A. Joshi, Baylor College of Medicine; T. Wareing, J. McGhee, Transpire, Inc.; E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6434-37]

Tuesday 23 January

SESSION 9

Room: Conv. Ctr. A1 . . . . . Tues. 8:00 to 10:00 am

Network for Translational Research in Optical Imaging: Breast Cancer Diffuse Optical Imaging

Chairs: **Brian W. Pogue**, Dartmouth College; **Sergio Fantini**, Tufts Univ.

8:00 am: **Spectral imaging of tissue for tumor oximetry,** N. Liu, Y. Yu, A. Sassaroli, S. Fantini, Tufts Univ. . . . . [6434-38]

8:20 am: **Reconstruction of tissue dynamics in the compressed breast using multiplexed measurements and temporal basis functions,** G. L. Boverman, Northeastern Univ.; Q. Fang, S. A. Carp, J. J. Selb, Massachusetts General Hospital; E. L. Miller, Northeastern Univ.; D. A. Boas, Massachusetts General Hospital . . . . . [6434-39]

8:40 am: **A novel image reconstruction method for a two-layer tissue structure accounts for chest-wall effects in breast imaging,** M. Das, Q. Zhu, Univ. of Connecticut . . . . . [6434-40]

9:00 am: **Reference selection of in-vivo breast imaging using perturbation approach,** C. Xu, Q. Zhu, Univ. of Connecticut . . . . . [6434-41]

9:20 am: **Optical high resolution cross section imaging of a human breast model using independent component analysis in CW and time-domain,** M. Xu, M. Alrubaiee, S. K. Gayen, R. R. Alfano, City College/CUNY . . [6434-42]

9:40 am: **Mapping the sensitivity of diffuse optical spectroscopy in heterogeneous tissue,** A. Li, A. E. Cerussi, C. Klifa, R. Kwong, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-43]

Coffee Break . . . . . 10:00 am

SESSION 10

Room: Conv. Ctr. A1 . . . . . Tues. 10:20 am to 12:20 pm

Breast II—Instrumentation & New Analysis Method

Chairs: **Mamoru Tamura**, Hokkaido Univ. (Japan); **Xingde Li**, Univ. of Washington

10:20 am: **Development of a non-contact optical scanning system for frequency domain and broadband spectroscopy of breast tissue,** E. D'Amico, Univ. of Illinois at Urbana-Champaign; E. Frasnelli, G. Ossato, S. Perfetto, Univ. of California/Irvine; W. W. Mantulin, Univ. of Illinois at Urbana-Champaign; E. Gratton, Beckman Laser Institute and Medical Clinic . [6434-44]

10:40 am: **Joint analysis of non-concurrent magnetic resonance imaging and diffuse optical tomography of breast cancer,** F. S. Azar, Siemens Corporate Research; K. Lee, R. Choe, A. Corlu, S. D. Konecky, A. G. Yodh, Univ. of Pennsylvania . . . . . [6434-45]

11:00 am: **Optimal probing of optical contrast of breast lesions of different size located at different depths by US localization,** Q. Zhu, C. Xu, P. Guo, A. Aquirre, B. Yuan, F. Huang, D. Castilo, J. K. Gamelin, Univ. of Connecticut; S. Tannenbaum, M. Kane, P. Hedge, S. Kurtzman, Univ. of Connecticut Health Ctr. . . . . [6434-46]

11:20 am: **MRI-localized region spectroscopy with near-infrared tomography: analysis of wavelengths, spatial prior false positives, and experimental feasibility,** J. Wang, S. C. Davis, S. Srinivasan, S. Jiang, B. W. Pogue, K. D. Paulsen, Dartmouth College . . . . . [6434-47]

11:40 am: **Hybrid multi-angle diffuse optical tomography instrument for human breast imaging,** K. Lee, S. D. Konecky, R. Choe, A. Corlu, T. Durduran, A. G. Yodh, Univ. of Pennsylvania . . . . . [6434-48]

12:00 pm: **Sensitivity and repeatability of diffuse optical tomography: toward breast cancer neo-adjuvant treatment monitoring,** N. Mincu, S. Djeziri, Z. Ichalalene, F. Leblond, M. Khayat, Advanced Research Technologies (Canada) . . . . . [6434-49]

Lunch/Exhibition Break . . . . . 12:20 pm

SESSION 11

Room: Conv. Ctr. A1 . . . . . Tues. 1:20 to 4:30 pm

Breast III—Clinical Study

Chair: **Arjun G. Yodh**, Univ. of Pennsylvania

1:20 pm: **Preliminary tests of handheld breast cancer scanner,** B. Chance, J. Zhang, E. F. Conant, Univ. of Pennsylvania . . . . . [6434-50]

1:40 pm: **Tissue bound water studies on breast tumor using diffuse optical spectroscopy,** S. H. Chung, A. E. Cerussi, Beckman Laser Institute and Medical Clinic; S. I. Merritt, Masimo Corp.; D. Hsiang, R. Mehta, Univ. of California/Irvine; B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-51]

2:00 pm: **Intrinsic near-infrared spectroscopic markers of breast tumors,** S. Kukreti, A. E. Cerussi, B. J. Tromberg, E. Gratton, Beckman Laser Institute and Medical Clinic . . . . . [6434-52]

2:20 pm: **Implications of performing optical imaging under mammographic compression: changes in the physiological state of the breast and potential novel optical cancer markers,** S. A. Carp, J. J. Selb, Q. Fang, E. A. Rafferty, R. H. Moore, D. B. Kopans, D. A. Boas, Massachusetts General Hospital . . . . . [6434-53]

2:40 pm: **Variations in chemotherapy response during the first week of therapy,** A. E. Cerussi, W. Tanamai, S. Kukreti, N. S. Shah, D. Hsiang, R. Mehta, A. Durkin, M. Compton, S. H. Chung, J. A. Butler, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-54]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Monitoring and assessing chemotherapy response of advanced breast cancers using optical tomography with ultrasound localization,** Q. Zhu, Univ. of Connecticut; S. Tannenbaum, M. Kane, Univ. of Connecticut Health Ctr.; C. Xu, Univ. of Connecticut; P. Hedge, S. Kurtzman, Univ. of Connecticut Health Ctr. . . . . [6434-55]

3:50 pm: **Characterization of tumor blood flow contrast and its application to neo-adjuvant chemotherapy monitoring,** R. Choe, C. Zhou, T. Durduran, B. Czerniecki, J. C. Tchou, A. DeMichele, M. A. Rosen, A. G. Yodh, Univ. of Pennsylvania . . . . . [6434-56]

4:10 pm: **Neo-adjuvant chemotherapy monitoring with NIR tomography,** S. Jiang, B. W. Pogue, C. M. Carpenter, Dartmouth College; C. A. Kogel, J. Forero, Dartmouth Hitchcock Medical Ctr.; K. D. Paulsen, Dartmouth College; S. P. Poplack, G. N. Schwartz, P. A. Kaufman, Dartmouth Hitchcock Medical Ctr. . . . . [6434-57]

Panel Discussion . . . . . 4:30 to 5:30 pm

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Comparison of spatial differencing schemes in radiactive transfer equation applied to biomedical tissues,** H. K. Kim, A. H. Hielscher, Columbia Univ. . . . . [6434-04]

✔ **Differentiation of benign from malignant breast masses using phase-contrast diffuse optical tomography,** X. Liang, Q. Zhang, C. Li, S. R. Grobmyer, Univ. of Florida; L. L. Fajardo, The Univ. of Iowa; H. Jiang, Univ. of Florida . . . . . [6434-76]

✔ **Bruise age estimation using diffuse reflectance spectroscopy,** J. W. McMurdy III, Brown Univ.; S. Duffy, Rhode Island Hospital; G. P. Crawford, Brown Univ. . . . . [6434-77]

✔ **Hemodynamic changes in diabetic pig muscle,** X. Xing, E. R. Mohler, C. Zhou, T. Durduran, G. Lech, Y. Shi, R. Wilensky, J. Moore, A. G. Yodh, G. Yu, Univ. of Pennsylvania . . . . . [6434-78]

✔ **Study on the property measurement for tissue phantom and human tissue used of F-D DOT system,** D. Ho, G. Eom, S. Lee, B. Kim, Yonsei Univ. (South Korea) . . . . . [6434-79]

✔ **Simultaneous functional imaging of the brain using a NIRS/EEG instrument,** L. Z. Li, P. Du, Q. Luo, H. Gong, Huazhong Univ. of Science and Technology (China) . . . . . [6434-80]

✔ **Effects of the range and number of modulation frequencies in diffuse optical spectroscopy techniques,** R. Kwong, A. E. Cerussi, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-81]

✔ **Parametric reconstruction method in optical tomography with discrete wavelet transform,** X. Gu, J. M. Masciotti, A. H. Hielscher, Columbia Univ. . . . . [6434-82]

✔ **Determination of tissue optical properties based on Monte Carlo simulation,** Z. Ma, Tianjin Univ. (China) . . . . . [6434-83]

✔ **Spatially varying absorptive or scattering inclusions in a diffusive slab: a perturbation approach to the time-resolved transmittance,** R. Esposito, Univ. degli Studi di Napoli Federico II (Italy); M. Lepore, Seconda Univ. degli Studi di Napoli (Italy); S. M. De Nicola, Istituto di Cibernetica Eduardo Caianiello (Italy) . . . . . [6434-84]

✔ **Determination of optical properties in turbid medium based on time-resolved detection,** Q. Dongli, Tianjin Univ. (China) . . . . . [6434-85]

✔ **A linear featured-data reconstruction method for time-domain fluorescence molecular tomography,** F. Gao, Tainjin Univ. (China) [6434-86]

✔ **Fluorescence diffuse optical tomography by full time-resolved scheme,** F. Gao, Tianjin Univ. (China) . . . . . [6434-87]

✔ **Fluorescence tomography in a murine model of Alzheimer_s disease,** S. B. Raymond, Massachusetts General Hospital; A. T. N. Kumar, Massachusetts General Hospital and Martinos Ctr. for Biomedical Imaging; D. A. Boas, B. J. Bacskai, Massachusetts General Hospital . . . . . [6434-88]

✔ **Assessment of clearance rate of a polymersome molecular beacon by in-ivo fluorescence pharmacokinetics,** U. Sunar, P. P. Ghoroghchian, Univ. of Pennsylvania; X. Intes, ART Advanced Research Technologies Inc. (Canada); D. Hammer, M. J. Therien, A. G. Yodh, Univ. of Pennsylvania . . . . . [6434-89]

✔ **Numerical optix: a time-domain simulator of fluorescent-light diffusion in turbid medium,** G. Ma, J. Delorme, O. Guilman, F. Leblond, Advanced Research Technologies (Canada) . . . . . [6434-90]

✔ **Optical fluorescence imaging with a priori information,** M. Guven, K. Kwon, B. Yazici, Rensselaer Polytechnic Institute; V. Ntziachristos, Massachusetts General Hospital . . . . . [6434-91]

✔ **Study on real-time surgical navigation system using forward-illuminated fluorescence tomography,** D. Furukawa, S. Saeki, T. Saito, Yamaguchi Univ. (Japan) . . . . . [6434-92]

✔ **Qualitative and quantitative fluorescence imaging in turbid media employing spatially modulated illumination,** A. Mazhar, D. J. Cuccia, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-93]

✔ **Diffuse optical spectroscopy measurements of healing in breast tissue after core biopsy,** W. Tanamai, C. Chen, S. Siavoshi, Univ. of California/ Irvine; A. E. Cerussi, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-94]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 12

Room: Conv. Ctr. A1 . . . . . Wed. 8:00 to 10:20 am

Pre clinical/Animal

Chairs: **Hanli Liu**, The Univ. of Texas/Arlington;
Arjun G. Yodh, Univ. of Pennsylvania

8:00 am: **Monitoring of chemotherapy effects on rat breast tumors: a correlation between optical signals and histology,** J. Kim, The Univ. of Texas/ Arlington; D. J. Cuccia, J. Lee, A. E. Cerussi, A. J. Durkin, B. J. Tromberg, Beckman Laser Institute and Medical Clinic . . . . . [6434-58]

8:20 am: **Simultaneously multiparametric spectroscopic monitoring of tissue viability in the brain and small intestine,** M. Tolmasov, E. Barbiro-Michaely, A. Mayevsky, Bar-Ilan Univ. (Israel) . . . . . [6434-59]

8:40 am: **Changes in intrinsic optical signals during loss of tissue viability of brains in rats: effect of brain temperature,** S. Kawauchi, S. Sato, H. Ooigawa, H. Nawashiro, M. Kikuchi, National Defense Medical College (Japan) [6434-60]

9:00 am: **Diffuse optical monitoring of hemodynamic changes in neonatal piglet brain due to head trauma injury,** C. Zhou, S. Eucker, T. Durduran, G. Yu, J. Ralston, S. Friess, R. Ichord, S. S. Margulies, A. G. Yodh, Univ. of Pennsylvania . . . . . [6434-61]

9:20 am: **Monitoring of tissue oxygenation changes following the use of vasoactive agents using diffuse optical spectroscopy,** J. Lee, J. K. Kim, K. Kreuter, B. J. Tromberg, M. Brenner, Beckman Laser Institute and Medical Clinic . . . . . [6434-62]

9:40 am: **Effects of radiotherapy on rat breast tumor hemodynamics monitored by near-infrared spectroscopy,** J. Kim, The Univ. of Texas/Arlington and The Univ. of Texas Southwestern Medical Ctr. at Dallas; V. A. Bourke, C. Chang, D. Zhao, R. P. Mason, The Univ. of Texas Southwestern Medical Ctr. at Dallas; H. Liu, The Univ. of Texas/Arlington . . . . . [6434-63]

10:00 am: **Differential optical imaging in animal models using infrared transillumination,** G. W. Faris, S. Dixit, T. Le, K. Amin, SRI International . . . . . [6434-64]

Coffee Break . . . . . 10:20 am

SESSION 13

Room: Conv. Ctr. A1 . . . . . Wed. 10:40 am to 12:20 pm

Instrumentation and Technology III

Chairs: **Andreas H. Hielscher**, Columbia Univ.;
Quing Zhu, Univ. of Connecticut

10:40 am: **A digital-signal-processor-based optical tomography system for dynamic functional imaging,** A. H. Hielscher, J. M. Lasker, Y. Li, J. M. Masciotti, C. Fong, Columbia Univ. . . . . [6434-65]

11:00 am: **Integrated near-infrared and magnetic-resonance imaging of the human brain,** V. Y. Toronov, Univ. of Illinois at Urbana-Champaign . . . [6434-66]

11:20 am: **Dual-spectral band continuous-wave endoscopic near-infrared optical tomography for hemoglobin and oxygen saturation imaging,** H. Xie, Oklahoma State Univ.; B. W. Pogue, Dartmouth College; D. Piao, Oklahoma State Univ. . . . . [6434-67]

11:40 am: **Novel instrument for wide-field Doppler and hemodynamics imaging,** M. Atlan, The Univ. of Texas/Austin; B. C. Forget, Univ. Pierre et Marie Curie (France); M. Gross, Ecole Normale Supérieure (France) . . . . . [6434-68]

12:00 pm: **Development of broadband multichannel NIRS (Near- Infrared Spectroscopy) imaging system for quantification of spatial distribution of hemoglobin derivatives,** D. R. Kashyap, N. Chu, A. Apte, B. P. Wang, H. Liu, The Univ. of Texas/Arlington . . . . . [6434-69]

Lunch/Exhibition Break . . . . . 12:20 pm

SESSION 14

Room: Conv. Ctr. A1 . . . . . Wed. 1:20 to 3:20 pm

Clinical/Human Subject Studies

Chairs: **Stephen J. Matcher**, The Univ. of Exeter (United Kingdom);
Mamoru Tamura, Hokkaido Univ. (Japan)

1:20 pm: **Two-dimensional/three-dimensional hybrid interstitial diffuse optical tomography of human prostate during photodynamic therapy: phantom and clinical results,** X. Zhou, T. C. Zhu, J. C. Finlay, J. Li, A. Dimofte, S. M. Hahn, Univ. of Pennsylvania . . . . . [6434-70]

1:40 pm: **A study of nonselective attention with fNIRS and ERP,** T. Li, L. Z. Li, Q. Luo, H. Gong, Huazhong Univ. of Science and Technology (China) [6434-71]

2:00 pm: **The study of photosensitizer "Photosence" accumulation dynamic in eye tissues using laser spectroscopic technique.,** M. V. Budsinskaya, Biospec (Russia) . . . . . [6434-72]

2:20 pm: **Combined optical and near-infrared reflectance measurements of vasomotion in both skin and underlying muscle,** C. Thorn, A. C. Shore, S. J. Matcher, The Univ. of Exeter (United Kingdom) . . . . . [6434-73]

2:40 pm: **Functional imaging of muscle oxygenation and oxygen consumption in the knee extensor muscles during isometric contractions by spatially resolved near-infrared spectroscopy,** K. J. Kek, T. Miyakawa, N. Kudo, K. Yamamoto, Hokkaido Univ. (Japan) . . . . . [6434-74]

3:00 pm: **Preoperative measurement of CO_2 reactivity and cerebral autoregulation in neonates with severe congenital heart defects,** T. Durduran, C. Zhou, G. Yu, R. Choe, Univ. of Pennsylvania; D. W. Silvestre, Children's Hospital of Philadelphia; J. J. Wang, Univ. of Pennsylvania; S. C. Nicolson, L. M. Montenegro, Children's Hospital of Philadelphia; J. A. Detre, A. G. Yodh, Univ. of Pennsylvania; D. J. Licht, Children's Hospital of Philadelphia . . . . . [6434-75

Best Student Paper Award

Room: Conv. Ctr. A1 . . . . . Wed. 3:20 pm

Chairs: **Britton Chance**, Univ. of Pennsylvania;
Bruce J. Tromberg, Beckman Laser Institute and Medical Clinic

Sunday-Wednesday 21-24 January 2007 • Proceedings of SPIE Vol. 6435

Optical Interactions with Tissue and Cells XVIII

Conference Chairs: **Steven L. Jacques**, Oregon Health and Science Univ.; **William P. Roach**, Air Force Research Lab.

Program Committee: **Wei R. Chen**, Univ. of Central Oklahoma; **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio; **E. Duco Jansen**, Vanderbilt Univ.; **Abraham Katzir**, Tel Aviv Univ. (Israel); **Jessica C. Ramella-Roman**, The Catholic Univ. of America; **Robert J. Thomas**, Air Force Research Lab.; **Alfred Vogel**, Medizinisches Laserzentrum Lübeck GmbH (Germany); **Lihong V. Wang**, Washington Univ.

Monday 22 January

SESSION 1

Room: Conv. Ctr. C3 . . . . . Mon. 8:30 to 10:00 am

Theory/Modeling I

Chair: **William P. Roach**, Air Force Research Lab.

8:30 am: **The ratio of entropy to enthalpy for thermal transitions in biological cells, tissues and materials, and its implications for biology** *(Invited Paper)***,** S. L. Jacques, Oregon Health and Science Univ. . . . . [6435-01]

9:00 am: **Time-resolved light distribution properties and the optical parameters determination in biological tissue,** B. Yu, H. Li, Fujian Normal Univ. (China) . . . . . [6435-02]

9:20 am: **Comparative analysis of histological results and model predictions of visible lesion thresholds for thermal and LIB induced skin damage at 1.3 μm and 1.5 μm,** J. J. Zohner, D. J. Stolarski, Northrop Grumman Corp.; G. M. Pocock, J. R. Cowart, Air Force Research Lab.; C. D. Clark III, Northrop Grumman Corp.; R. J. Thomas, Air Force Research Lab.; C. P. Cain, Northrop Grumman Corp.; S. S. Kumru, B. A. Rockwell, Air Force Research Lab. . . . . [6435-03]

9:40 am: **Modeling of surface thermodynamics and damage thresholds in the IR and THz regime,** C. D. Clark III, Northrop Grumman Corp.; R. J. Thomas, B. A. Rockwell, J. Stolarski, Air Force Research Lab.; G. D. Buffington, L. J. Irvin, Fort Hays State Univ. . . . . [6435-04]

Coffee Break . . . . . 10:00 to 10:50 am

SESSION 2

Room: Conv. Ctr. C3 . . . . . Mon. 10:50 am to 12:10 pm

Theory/Modeling II

Chair: **William P. Roach**, Air Force Research Lab.

10:50 am: **A thermal model of laser absorption,** D. G. Mixon, W. P. Roach, Air Force Research Lab. . . . . [6435-05]

11:10 am: **Electromagnetic properties of tissue in the optical region,** K. M. Yaws, D. G. Mixon, W. P. Roach, Air Force Research Lab. . . . . [6435-06]

11:30 am: **Polarized light propagation in multilayer scattering medium,** G. Li, M. F. S. Salek, U. Utzinger, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6435-07]

11:50 am: **A scaling Monte Carlo method for diffuse reflectance computation from multi-layered media,** Q. Liu, N. Ramanujam, Duke Univ. . . . . [6435-08]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. C3 . . . . . Mon. 1:30 to 3:20 pm

Thermal Effects I

Chair: **E. Duco Jansen**, Vanderbilt Univ.

1:30 pm: **Propagation effects in the assessment of laser damage thresholds to the eye and skin** *(Invited Paper)***,** R. J. Thomas, R. L. Vincelette, C. Clark, Air Force Research Lab. . . . . [6435-09]

2:00 pm: **Damage threshold of in-vivo rabbit cornea by 2-micrometer laser irradiation,** B. Chen, The Univ. of Texas/Austin; J. Oliver, Air Force Research Lab.; S. Dutta, A. Cummins, The Univ. of Texas/Austin; S. L. Thomsen, The Univ. of Texas/Austin and Pathology Consultant to Engineers and Physicists; H. G. Rylander III, A. J. Welch, The Univ. of Texas/Austin . . . . . [6435-10]

2:20 pm: **Thermal lensing effect in an artificial eye,** R. L. Vincelette, Air Force Research Lab.; A. J. Welch, The Univ. of Texas/Austin; R. J. Thomas, Air Force Research Lab.; T. E. Milner, The Univ. of Texas/Austin; B. A. Rockwell, Air Force Research Lab. . . . . [6435-11]

2:40 pm: **An observation of ablation effect of soft biotissue by pulsed Er:YAG laser,** Z. Xianzeng, S. Xie, Z. Zhenlin, Fujian Normal Univ. (China) and Key Lab. of OptoElectronic Science and Technology for Medicine of Ministry of Education (China); Y. Qing, Fujian Normal Univ. (China) . . . . . [6435-12]

3:00 pm: **CO_2 laser milling of hard tissue,** M. M. Ivanenko, D. Harbecke, M. Klasing, H. Steigerwald, M. Werner, P. Hering, Ctr. of Advanced European Studies and Research (Germany) . . . . . [6435-13]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Room: Conv. Ctr. C3 . . . . . Mon. 3:50 to 4:50 pm

Thermal Effects II

Chair: **E. Duco Jansen**, Vanderbilt Univ.

3:50 pm: **Utility of birefringence changes due to collagen thermal denaturation rate process analysis: vessel wall temperature estimation for new short term heating balloon angioplasty,** K. Kaneko, N. Shimazaki, M. Gotoh, E. Nakatani, T. Arai, Keio Univ. (Japan) . . . . . [6435-14]

4:10 pm: **Air leak seal for lung dissection plane with diode laser irradiation: an ex-vivo study,** M. Gotoh, K. Kaneko, H. Tokunaga, T. Arai, Keio Univ. (Japan) . . . . . [6435-15]

4:30 pm: **Control of thermal effect for biomedical tissue by free-electron laser,** S. Suzuki, T. Kanai, K. Awazu, Osaka Univ. (Japan) . . . . . [6435-16]

Tuesday 23 January

SESSION 5

Room: Conv. Ctr. C3 . . . . . Tues. 8:50 to 10:30 am

Imaging, Spectroscopy, and Optical Properties

Chair: **Lihong V. Wang**, Washington Univ. in St. Louis

8:50 am: **Reduced scattering coefficient determination by noncontact oblique angle illumination: methodological considerations,** T. Lindbergh, M. Larsson, I. Fredriksson, T. Strömberg, Linköpings Univ. (Sweden) . [6435-17]

9:10 am: **Determination of light absorption, scattering and anisotropy factor of a highly scattering medium using back scattered circular polarized light,** M. Xu, M. Alrubaiee, S. K. Gayen, R. R. Alfano, City College/CUNY . . [6435-18]

9:30 am: **In vivo and in vitro Optical Properties of the Mouse Ear,** E. V. Salomatina, A. N. Yaroslavsky, Massachusetts General Hospital [6435-19]

9:50 am: **White-light oblique-incidence diffuse reflectance spectroscopy for classification of in-vivo pigmented skin lesions,** A. Garcia-Uribe, E. B. Smith, Texas A&M Univ.; M. Duvic, The Univ. of Texas M.D. Anderson Cancer Ctr.; L. V. Wang, Texas A&M Univ. . . . . [6435-20]

10:10 am: **Angular domain optical tomography in scattering media with multispectral diode lasers,** P. K. Y. Chan, F. Vasefi, G. H. Chapman, B. Kaminska, N. Pfeiffer, Simon Fraser Univ. (Canada) . . . . . [6435-21]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 6

Room: Conv. Ctr. C3 . . . . . Tues. 11:00 am to 12:20 pm

Laser Tissue Interaction I

Chair: **Alfred Vogel**, Univ. zu Lübeck (Germany)

11:00 am: **Corneal tissue engineering and characterization using ultra-fast lsers,** T. J. Moritz, D. M. Krol, Univ. of California/Davis . . . . . [6435-23]

11:20 am: **Aqueous humor outflow effects of partial thickness channel created by a femtosecond laser in ex-vivo human eyes,** D. Chai, G. Chaudhary, R. M. Kurtz, Univ. of California/Irvine; T. Juhasz, IntraLase Corp. . . . . [6435-24]

11:40 am: **Development of ultrasound technique to detect and characterize laser-induced microbubbles,** A. B. Karpiouk, F. Bourgeois, S. R. Aglyamov, A. Ben-Yakar, S. Y. Emelianov, The Univ. of Texas/Austin . . . . . [6435-25]

12:00 pm: **Visible lesion laser thresholds in Cynomolgus (Macaca fasicularis) retina with 12-ns laser pulses at 1064 nm,** J. W. Oliver, G. D. Noojin, C. P. Cain, D. J. Stolarski, H. M. Hodnett, K. Stockton, M. L. Imholte, Northrop Grumman Corp.; S. S. Kumru, Air Force Research Lab. . . . . [6435-26]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 7

Room: Conv. Ctr. C3 . . . . . Tues. 1:20 to 3:00 pm

Laser Tissue Interaction II

Chair: **Alfred Vogel**, Univ. zu Lübeck (Germany)

1:20 pm: **Laser stimulation of auditory neurons at high-repetition rate,** A. D. Izzo, P. Littlefield, J. T. Walsh, Jr., Northwestern Univ.; J. Webb, H. A. Ralph, Aculight Corp.; E. D. Jansen, Vanderbilt Univ.; C. Richter, Northwestern Univ. . . . . [6435-27]

1:40 pm: **Dynamic change of characteristics of (modified) fiber tips used with microsecond pulsed lasers in a liquid environment influencing the effectiveness and safety of treatment,** R. M. Verdaasdonk, J. H. G. M. Klaessens, R. de Roode, T. de Boorder, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6435-28]

2:00 pm: **The use of planarians as in-vivo animal model to study laser biomodulation effects,** E. Munin, N. M. Rocha Garcia, A. G. Braz, S. C. de Souza, L. P. Alves, Univ. do Vale do Paraíba (Brazil); M. A. C. Salgado, Univ. Estadual Paulista (Brazil); V. Pilla, Univ. do Vale do Paraíba (Brazil) . . . [6435-29]

2:20 pm: **The new methods of treatment for age_related macular degeneration using the ultra_short pulsed laser,** Y. Iwamoto, S. Suzuki, T. Oshima, H. Sakaguchi, M. Sawa, Osaka Univ. (Japan); M. Ohji, Shiga Univ. of Medical Science (Japan); Y. Tano, K. Awazu, Osaka Univ. (Japan) . . . [6435-30]

2:40 pm: **Studies of laser-induced bubble formation and cell viability in tissue models using ns and fs laser pulses,** F. G. Perez-Gutierrez, Univ. of California/Riverside and Ctr. de Investigación Científica y de Educación Superior de Ensenada (Mexico); G. Romo-Cardenas, S. Camacho-Lopez, A. Mina-Rosales, Ctr. de Investigación Científica y de Educación Superior de Ensenada (Mexico); G. Aguilar, Univ. of California/Riverside . . . . . [6435-31]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Room: Conv. Ctr. C3 . . . . . Tues. 3:30 to 5:20 pm

Laser Tissue Interaction III

Chair: **Robert J. Thomas**, Air Force Research Lab.

3:30 pm: **Infrared laser damage thresholds for skin at wavelengths from 0.810 to 1.54 microns for femto-to-microsecond pulse durations** *(Invited Paper)***,** C. P. Cain, Northrop Grumman Corp.; W. P. Roach, Air Force Research Lab.; D. J. Stolarski, J. J. Zohner, G. D. Noojin, Northrop Grumman Corp.; S. S. Kumru, Air Force Research Lab.; K. Stockton, Northrop Grumman Corp.; B. A. Rockwell, Air Force Research Lab.; B. Chen, A. J. Welch, The Univ. of Texas/Austin . . . . . [6435-32]

4:00 pm: **Theoretical and experimental bioeffects research for high-power terahertz electromagnetic energy,** J. McQuade, S. S. Kumru, N. M. Jindra, Air Force Research Lab.; R. L. Seaman, A. Salazar, General Dynamics Advanced Information Systems; V. I. Villavicencio, C. D. Clark III, Northrop Grumman Corp.; K. M. Yaws, J. Payne, R. J. Thomas, W. P. Roach, Air Force Research Lab. . . . . [6435-47]

4:20 pm: **Microscopic observation and mechanism discussion for the changes of rat skin after irradiated by intense pulse light,** S. Wu, H. Li, Y. Fang, S. Xie, Fujian Normal Univ. (China) . . . . . [6435-33]

4:40 pm: **Nonablative collagen remodeling initiated by different laser effects: comparative study on mouse model,** H. Liu, Q. Ren, Shanghai Jiao Tong Univ. (China) . . . . . [6435-34]

5:00 pm: **Aneurysm disorder in bio-nanomechanics,** T. C. Fan, Univ. of Washington . . . . . [6435-35]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **A blue-violet laser irradiation stimulates bone nodule formation of mesenchymal stromal cells by the control of the circadian clock protein,** T. Kushibiki, K. Awazu, Osaka Univ. (Japan) . . . . . [6435-37]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 9

Room: Conv. Ctr. C3 . . . . . Wed. 8:20 to 10:10 am

Cellular Effects I

Chair: **Jessica C. Ramella-Roman**, The Catholic Univ. of America

8:20 am: **Functional and cellular responses to laser injury in the rat snake retina** *(Invited Paper)***,** R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; W. R. Elliott III, Naval Health Research Ctr. Detachment; N. Kumar, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6435-36]

8:50 am: **Live cell opto-injection by femtosecond laser pulses,** J. Baumgart, A. Heisterkamp, Laser Zentrum Hannover e.V. (Germany); A. Ngezahayo, Univ. Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany); W. A. Ertmer, Univ. Hannover (Germany) . . . . . [6435-38]

9:10 am: **Enhanced angiogenesis in grafted skin by gene transfer of human Hepatocyte Growth Factor using laser-induced stress waves,** M. Terakawa, Keio Univ. (Japan); S. Sato, D. Saitoh, H. Ashida, National Defense Medical College (Japan); H. Okano, M. Obara, Keio Univ. (Japan) . . . . . [6435-39]

9:30 am: **Influence of NIR and red fluorescent wavelengths on animal imaging and biological effects of targeting molecules on cancer cells,** K. E. Adams, S. Ke, S. Kwon, F. Liang, Baylor College of Medicine; Z. Fan, Y. Lu, The Univ. of Texas M.D. Anderson Cancer Ctr.; K. Hirshi, M. E. Mawad, M. Barry, E. M. Sevick-Muraca, Baylor College of Medicine . . . . . [6435-40]

9:50 am: **In-vitro models for retinal laser damage,** M. L. Denton, K. J. Schuster, M. S. Foltz, Northrop Grumman Corp.; L. E. Estlack, Conceptual MindWorks, Inc.; G. D. Noojin, Northrop Grumman Corp.; R. J. Thomas, Air Force Research Lab. . . . . [6435-41]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 10

Room: Conv. Ctr. C3 . . . . . Wed. 10:40 am to 12:30 pm

Cellular Effects II

Chair: **Randolph D. Glickman**, The Univ. of Texas Health Science Ctr. at San Antonio

10:40 am: **Principles of laser microdissection and catapulting of histologic specimens** *(Invited Paper)***,** A. Vogel, V. Horneffer, K. Lorenz, G. Hüttmann, A. Gebert, Univ. zu Lübeck (Germany) . . . . . [6435-43]

11:10 am: **Principles of laser catapulting of living cells,** A. Vogel, N. Linz, V. Horneffer, Univ. zu Lübeck (Germany) . . . . . [6435-42]

11:30 am: **Laser-induced stress wave-assisted gene transfection: improved transfection efficiency with cationic liposome-modified plasmid DNA,** R. Otsuka, M. Terakawa, Keio Univ. (Japan); S. Sato, Y. Satoh, K. Takishima, H. Ashida, National Defense Medical College (Japan); H. Okano, Keio Univ. School of Medicine (Japan); M. Obara, Keio Univ. (Japan) . . . . . [6435-44]

11:50 am: **Dosimetry in cellular optoperforation by real-time monitoring of bubble formation,** N. Linz, V. Horneffer, S. Freidank, A. Vogel, Univ. zu Lübeck (Germany) . . . . . [6435-45]

12:10 pm: **Analysis of pulsed laser microbeam-induced cell lysis and membrane permeabilization using pulse durations ranging from 180ps to 6ns,** A. N. Hellman, Univ. of California/Irvine and Univ. of California/San Diego; K. R. Rau, Tata Institute of Fundamental Research (India) and Univ. of California/Irvine; P. A. Quinto-Su, V. Venugopalan, Univ. of California/Irvine and Beckman Laser Institute and Medical Clinic . . . . . [6435-46]

Saturday 20 January 2007 • Proceedings of SPIE Vol. 6436

Complex Dynamics and Fluctuations in Biomedical Photonics IV

Conference Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

Program Committee: **Vadim S. Anischenko**, Saratov State Univ. (Russia); **Wei R. Chen**, Univ. of Central Oklahoma; **Bernard Choi**, Univ. of California/Irvine; **Omar S. Khalil**, Abbott Labs.; **Sean J. Kirkpatrick**, Oregon Health and Science Univ.; **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany); **Hong Liu**, Univ. of Oklahoma; **Qingming Luo**, Huazhong Univ. of Science and Technology (China); **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia); **Vladislav Y. Toronov**, Ryerson Univ. (Canada); **Ruikang K. Wang**, Oregon Health and Science Univ.; **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences; **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

Saturday 20 January

SESSION 1

Room: Conv. Ctr. D . . . . . Sat. 8:30 to 10:00 am

Coherent-Domain Methods for Monitoring of Tissue Complex Structure

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

8:30 am: **Studies of dynamical processes in biomedicine by high-speed spectral coherence tomography** *(Invited Paper)***,** M. Wojtkowski, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland) . . . . . [6436-01]

9:00 am: **Speckle tracking-based elastography for skin monitoring,** S. J. Kirkpatrick, Oregon Health and Science Univ. . . . . [6436-02]

9:20 am: **On the information capacity of coherence-gated imaging through turbid media,** A. Bilenca, A. Ozcan, A. Desjardins, B. E. Bouma, G. Tearney, Wellman Ctr. for Photomedicine . . . . . [6436-03]

9:40 am: **Penetration depth of low-coherence enhanced backscattering photons in the subdiffusion regime,** H. Subramanian, P. Pradhan, Y. L. Kim, V. Backman, Northwestern Univ. . . . . [6436-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. D . . . . . Sat. 10:30 am to 12:20 pm

Biophotonic Imaging, Spectroscopy, and Microscopy

Chair: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

10:30 am: **Analyzing cell structure and dynamics with confocal light scattering and absorption spectroscopic microscopy** *(Invited Paper)***,** L. T. Perelman, L. Qiu, E. Vitkin, H. Fang, M. M. Zaman, C. Andersson, S. Salahuddin, M. D. Modell, E. B. Hanlon, S. D. Freedman, I. Itzkan, Harvard Medical School . . . . . [6436-05]

11:00 am: **New Monte Carlo-based diffuse optical imaging technique,** V. Y. Toronov, Ryerson Univ. (Canada) . . . . . [6436-06]

11:20 am: **The characterization of computed radiography x-ray phase contrast imaging system,** Y. Li, D. Zhang, Univ. of Oklahoma; W. R. Chen, Univ. of Central Oklahoma; H. Liu, Univ. of Oklahoma . . . . . [6436-07]

11:40 am: **Influence of nutrition and stress factors on the antioxidative potential of the skin,** J. Lademann, Charité-Univ. Medizin Berlin (Germany); K. Hesterberg, Humboldt-Univ. zu Berlin (Germany); I. H. Gersonde, Charité-Univ. Medizin Berlin (Germany); H. Albrecht, Laser-und Medizin-Technologie GmbH (Germany); W. Sterry, Charité-Univ. Medizin Berlin (Germany); M. E. Darvin, Humboldt-Univ. zu Berlin . . . . . [6436-08]

12:00 pm: **Evaluation the development of focal cerebral ischemia in rats by optical imaging based on the spreading depression signals,** S. Chen, P. Li, S. Zeng, Q. Luo, Huazhong Univ. of Science and Technology (China) . [6436-22]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 3

Room: Conv. Ctr. D . . . . . Sat. 1:20 to 3:00 pm

Blood and Lymph Flow Complex Dynamics

Chair: **Qingming Luo**, Huazhong Univ. of Science and Technology (China)

1:20 pm: **Effect of erythrocyte aggregation on optical transmission of blood** *(Invited Paper)***,** L. D. Shvartsman, The Hebrew Univ. of Jerusalem (Israel); I. Fine, Elfi-Tech Ltd. (Israel) . . . . . [6436-09]

1:50 pm: **In-vivo blood aggregation measurements by using DLS,** I. Fine, A. Kaminsky, Elfi-Tech Ltd. (Israel) . . . . . [6436-10]

2:10 pm: **Advanced vital microscopy for monitoring cell flow dynamics in vivo** *(Invited Paper)***,** V. Kalchenko, A. Harmelin, The Weizmann Institute of Science (Israel); I. Fine, ELFI-TECH Ltd (Israel); V. P. Zharov, E. I. Galanzha, University of Arkansas for Medical Sciences; V. V. Tuchin, Saratov State University (Russia) . . . . . [6436-11]

2:40 pm: **In vivo integrated lymph and blood flow cytometry for real-time monitoring of cell blood_lymph traffic** *(Invited Paper)***,** E. I. Galanzha, E. Shashkov, Univ. of Arkansas for Medical Sciences; V. V. Tuchin, Saratov State University (Russia); V. P. Zharov, Univ. of Arkansas for Medical Sciences . . . . . [6436-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. D . . . . . Sat. 3:30 to 4:40 pm

Adaptive Systems and Nonlinear Dynamic Processes

Chair: **Vladislav Y. Toronov**, Ryerson Univ. (Canada)

3:30 pm: **Adaptive optics in ophthalmology: current techniques and new methods of increasing field-of view of fundus cameras** *(Invited Paper)***,** A. V. Kudryashov, Night N (opt) Ltd. (Russia); T. Cherezova, A. I. Belyakov, A. V. Dubinin, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6436-13]

4:00 pm: **Mitochondrial dysfunction modulates nonlinear dynamics in liver cell metabolism,** V. K. Ramanujan, B. A. Herman, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6436-14]

4:20 pm: **NIR-fluorescence dynamic optical imaging of lymphatic vasculature,** R. Sharma, J. C. Rasmussen, J. Houston, K. Adama, S. Ke, S. Kwon, E. M. Sevick-Muraca, Baylor College of Medicine; C. Nycz, R. Pettis, D. Sutter, BD Technologies . . . . . [6436-15]

SESSION 5

Room: Conv. Ctr. D . . . . . **Sat. 4:40 to 5:30 pm**

Dynamics of Laser Induced Nanoparticle Photothermolysis

Chair: **Wei R. Chen**, Univ. of Central Oklahoma

4:40 pm: **Laser induced thermal explosion mode for selective nano-photothermolysis of cancer cells** *(Invited Paper)***,** R. R. Letfullin, C. Joenathan, Rose-Hulman Institute of Technology; T. F. George, Univ. of Missouri/St. Louis; V. P. Zharov, Univ. of Arkansas for Medical Sciences . . . . . [6436-16]

5:10 pm: **Analyzing chaos in the pressure generated by laser absorption by microparticles,** B. S. Gerstman, E. Faraggi, Florida International Univ. [6436-17]

BiOS Hot Topics

7:00 to 9:30 pm

See page 14 for more information.

Tuesday 23 January

✔ Posters-Tuesday

Chair: **Valery V. Tuchin**, Saratov State Univ. (Russia)

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Mining and learning latent dynamics in biological manifolds,** E. Capobianco, Questlab (Italy) . . . . . [6436-18]

✔ **Variations of piece-wise liner 1D map modeling neuron activity,** V. M. Anikin, A. S. Remizov, Saratov State Univ. (Russia) . . . . . [6436-19]

✔ **Light scattering application for bacterial cell monitoring during cultivation process,** I. Y. Kotsiumbas, Scientific-Research Control Institute of Veterinary Preparations and Fodder Additives (Ukraine); I. M. Kushnir, State Scientific-Research Control Institute of Veterinary Preparations and Fodder Additives (Ukraine); R. O. Bilyy, Institute of Cell Biology (Ukraine); I. G. Yarynovska, V. B. Getman, A. I. Bilyi, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6436-20]

✔ **A signal-to-noise analysis for laser speckle contrast imaging,** C. Zhou, T. Durduran, T. Szabados, G. Yu, R. Choe, X. Xing, J. H. Greenberg, D. J. Durian, A. G. Yodh, Univ. of Pennsylvania . . . . . [6436-21]

✔ **Different alcohol agents induced changes in efficiency of optical clearing of mouse skin in vivo and in vitro,** Z. Mao, Y. Zheng, Q. Luo, D. Zhu, Huazhong Univ. of Science and Technology (China) . . . . . [6436-24]

✔ **Two-photon microscopy image slices restoration using modified nonlinear anisotropic diffusion filter,** H. Zhang, Q. Luo, S. Zeng, Huazhong Univ. of Science and Technology (China) . . . . . [6436-25]

✔ **Early development of chick embryonic heart imaged by high speed spectral OCT at 766nm in vivo with high fidelity,** Z. Ma, R. K. Wang, Oregon Health and Science Univ. . . . . [6436-26]

✔ **Tactile information processing in the trigeminal complex of the rat,** A. N. Pavlov, A. N. Tupitsyn, Saratov State Univ. (Russia); V. A. Makarov, F. Panetsos, Univ. Complutense de Madrid (Spain) . . . . . [6436-27]

✔ **Near-infrared absorbance measurements of hemoglobin solutions incubated with glucose,** O. S. Zhernovaya, Saratov State Technical Univ. (Russia); V. V. Tuchin, Saratov State Univ. (Russia); I. V. Meglinski, L. J. Ritchie, Cranfield Univ. (United Kingdom) . . . . . [6436-28]

✔ **Spectral changes in skin autofluorescence under application of different clearing agents,** E. V. Migacheva, A. B. Pravdin, Saratov State Univ. (Russia) . . . . . [6436-29]

✔ **Dynamics of morphofunctional erythrocyte properties during intravenous glucose injection in patients with coronary heart disease,** L. I. Malinova, Saratov State Medical Univ. (Russia); G. V. Simonenko, Saratov State Univ. (Russia); T. P. Denisova, Saratov State Medical Univ. (Russia); V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6436-30]

✔ **Cell-cell interaction in blood flow in patients with coronary heart disease (in vitro study),** L. I. Malinova, Saratov State Medical Univ. (Russia); G. V. Simonenko, Saratov State Univ. (Russia); T. P. Denisova, Saratov State Medical Univ. (Russia); V. V. Tuchin, Saratov State Univ. (Russia) . . [6436-31]

✔ **Noise-induced firing patterns in generalized neuron model with subthreshold oscillations,** L. S. Ryazanova, R. A. Zhirin, J. Trenikhina, D. E. Postnov, Saratov State Univ. (Russia) . . . . . [6436-32]

✔ **Monitoring of hemoglobin glycation using spectral and refraction measurements,** E. Lazareva, V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6436-33]

✔ **Tapered single mode fiber tip for high-lateral resolution imaging in optical coherence tomography,** Y. Verma, K. D. Rao, S. K. Mohanty, P. K. Gupta, Raja Ramanna Ctr. for Advanced Technology (India) . . [6436-34]

✔ **Monte Carlo study of skin optical clearing to enhance light penetration in the tissue,** A. N. Bashkatov, V. V. Tuchin, E. A. Genina, M. M. Stolnitz, D. M. Zhestkov, Saratov State Univ. (Russia); G. B. Altshuler, I. V. Yaroslavsky, Palomar Medical Products . . . . . [6436-35]

✔ **Extracting information from light multiply scattered through macroscopic random media,** S. H. Tseng, National Taiwan Univ. (Taiwan) . . . . . [6436-36]

✔ **Optical properties reconstruction of layered tissue and experimental demonstration,** T. Guan, H. Zhao, D. Yu, F. Gao, Tianjin Univ. (China) . . . . . [6436-37]

✔ **Accommodative eyeglasses,** S. A. Dimakov, S.I. Vavilov State Optical Institute (Russia) . . . . . [6436-38]

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Photons Plus Ultrasound: Imaging and Sensing 2007: The Eighth Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics

SPIE and the organizers gratefully acknowledge the following sponsors of the conference on Photons Plus Ultrasound: Imaging and Sensing:

National Institutes of Health
Fairway Medical Technologies

Sunday 21 January

SESSION 1

Room: Marriott San Jose Ballroom Salon IV . . . . . Sun. 8:30 to 10:10 am

Clinical and Preclinical Studies

Chair: **Alexander A. Oraevsky**, Fairway Medical Technologies, Inc.

8:30 am: **Region-of-interest breast images with the Twente Photoacoustic Mammoscope (PAM),** S. Manohar, S. Vaartjes, J. G. C. van Hespen, W. Steenbergen, T. G. van Leeuwen, J. Klaase, F. van den Engh, A. The, E. Volker, Univ. Twente (Netherlands) . . . . . [6437-01]

8:50 am: **Detection and noninvasive diagnostics of breast cancer with 2-color laser optoacoustic imaging system,** A. Stein, D. Herzog, Seno Medical Instruments, Inc.; P. Otto, B. M. McCorvey, The Univ. of Texas Health Science Ctr. at Houston; T. Khamapirad, M. H. Leonard, The Univ. of Texas Medical Branch at Galveston; S. Ermilov, A. Conjusteau, T. Miller, A. A. Oraevsky, Fairway Medical Technologies, Inc. . . . . [6437-02]

9:10 am: **Scanning system for noninvasive optoacoustic monitoring of blood oxygenation in the internal jugular vein,** H. F. Q. Brecht, D. S. Prough, Y. Y. Petrov, I. Patrikeev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6437-03]

9:30 am: **Noninvasive cerebral blood oxygenation monitoring: Clinical test of multiwavelength optoacoustic system,** Y. Y. Petrov, The Univ. of Texas Medical Branch at Galveston; D. S. Prough, The University of Texas Medical Branch; I. Petrova, I. A. Patrikeev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6437-04]

9:50 am: **Investigational detection of pharmacological agents in the eye using photoacoustic spectroscopy,** S. M. Maswadi, R. D. Glickman, The Univ. of Texas Health Science Ctr. at San Antonio; N. Barslou, W. R. Elliott III, Naval Health Research Ctr. Detachment . . . . . [6437-05]

Coffee Break . . . . . 10:10 to 10:50 am

SESSION 2

Room: Marriott San Jose Ballroom Salon IV . . . . . Sun. 10:30 to 11:50 am

Preclinical Studies

Chair: **Richard J. Dewhurst**, The Univ. of Manchester (United Kingdom)

10:30 am: **Measurement of blood perfusion using photoacoustic, ultrasound, and strain imaging,** S. Mallidi, A. B. Karpiouk, S. Y. Emelianov, The Univ. of Texas/Austin . . . . . [6437-07]

10:50 am: **Photoacoustic detection of circulating melanoma cells in vitro,** R. M. Weight, P. S. Dale, G. Gutierrez, C. Caldwell, A. Lisle, J. A. Viator, Univ. of Missouri/Columbia . . . . . [6437-08]

11:10 am: **Photoacoustic determination of burn depth in a dermal phantom,** R. J. Talbert, J. A. Viator, Univ. of Missouri/Columbia . . . . . [6437-09]

11:30 am: **High-resolution burn imaging in pig skin by photoacoustic microscopy,** H. F. Zhang, K. Maslov, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6437-10]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Marriott San Jose Ballroom Salon IV . . . . . Sun. 1:30 to 3:10 pm

Nanoparticles

Chair: **Gerald J. Diebold**, Brown Univ.

1:30 pm: **In-vivo imaging of nanoshell extravasation from solid tumor vasculature by photoacoustic microscopy,** M. Li, Texas A&M Univ.; J. A. Schwartz, J. Wang, Nanospectra Bioscience, Inc.; G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6437-11]

1:50 pm: **Photothermal and photoacoustic mechanisms of laser activated nano-thermolysis of cells,** D. Lapotko, A.V. Lykov Heat and Mass Transfer Institute (Belarus); E. Lukianova, A.V. Luikov Heat and Mass Transfer Institute (Belarus); V. Smolnikova, P. Mitckevich, State Ctr. for Transplantology (Belarus); M. Konopleva, M. Andreeff, The Univ. of Texas M.D. Anderson Cancer Ctr.; S. Ermilov, A. A. Oraevsky, Fairway Medical Technologies, Inc. . . . . [6437-12]

2:10 pm: **Integrated photoacoustic cytometry: application for optimizating and guiding near-infrared nanophotothermolysis at the cellular level,** V. P. Zharov, Univ. of Arkansas for Medical Sciences; N. G. Khlebtsov, Institute of Biochemistry and Physiology of Plants and Microorganisms (Russia) and Saratov State Univ. (Russia); B. Y. Kogan, Organic Intermediates and Dyes Institute (Russia); E. V. Shashkov, Univ. of Arkansas for Medical Sciences and Moscow Prokhorov General Physics Institute (Russia); E. I. Galanzha, Univ. of Arkansas for Medical Sciences and Saratov State Univ. (Russia); A. Pankratov, P. A. Hertzen Moscow Research Oncological Institute (Russia); A. V. Butenin, Organic Intermediates and Dyes Institute (Russia); Y. Zolotavkina, R. I. Yakubovskaya, P. A. Hertzen Moscow Research Oncological Institute (Russia); V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6437-13]

2:30 pm: **Iron-oxide nanoparticles as a contrast agent in thermoacoustic tomography,** X. Jin, A. Keho, K. E. Meissner, L. V. Wang, Texas A&M Univ. . . . . [6437-14]

2:50 pm: **Efficient optical generation of high-frequency ultrasound using two-dimensional gold and silver nanostructures,** Y. Hou, J. Kim, S. Ashkenazi, M. O'Donnell, L. J. Guo, Univ. of Michigan . . . . . [6437-15]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Room: Marriott San Jose Ballroom Salon IV . . . . . Sun. 3:30 to 5:30 pm

Molecular Imaging and Contrast Agents

Chair: **Paul C. Beard**, Univ. College London (United Kingdom)

3:30 pm: **Functionalized gold nanorod particles for molecular optoacoustic imaging,** M. Eghtedari, The Univ. of Texas Medical Branch at Galveston; A. A. Oraevsky, A. Conjusteau, Fairway Medical Technologies, Inc.; J. A. Copland, Mayo Clinic; N. A. Kotov, Univ. of Michigan; M. Motamedi, The Univ. of Texas Medical Branch at Galveston . . . . . [6437-16]

3:50 pm: **Cancer targeting and imaging using gold nanorods,** S. Ashkenazi, A. Agarwal, K. C. Day, S. Huang, M. S. Day, N. A. Kotov, Univ. of Michigan . . . . . [6437-17]

4:10 pm: **Photoacoustic contrast enhancement using selective subband imaging: experimental results,** C. Wei, Y. Sheu, National Taiwan Univ. (Taiwan); C. J. Chen, National Taiwan Normal Univ. (Taiwan); P. Li, National Taiwan Univ. (Taiwan) . . . . . [6437-18]

4:30 pm: **Contrast-enhanced photoacoustic imaging of live lobster nerve cord,** R. S. Witte, S. Huang, K. Kim, M. O'Donnell, Univ. of Michigan . [6437-19]

4:50 pm: **Development of a protease-sensitive molecular imaging agent for optoacoustic tomography,** P. J. La Rivière, A. Green, J. R. Norris, The Univ. of Chicago . . . . . [6437-20]

5:10 pm: **Smart oscillating contrast agents for photoacoustic imaging using CMUT arrays,** M. A. McDonald, S. Guccione, Stanford Univ. Medical Ctr.; O. Oralkan, B. P. T. Khuri-Yakub, Stanford Univ. . . . . [6437-21]

Monday 22 January

SESSION 5

Room: Marriott San Jose Ballroom Salon IV . . . . . Mon. 8:30 to 10:10 am

Novel Methods

Chair: **Matthew O'Donnell**, Univ. of Michigan

8:30 am: **Vibration potential and x-ray phase contrast imaging,** G. J. Diebold, C. G. Rose-Petruck, Brown Univ. . . . . [6437-22]

8:50 am: **Three-dimensional photoacoustic tomography using acoustic line detectors,** G. Paltauf, R. Nuster, Karl-Franzens-Univ. Graz (Austria); M. Haltmeier, Leopold-Franzens-Univ. Innsbruck (Austria); P. Burgholzer, Upper Austrian Research GmbH (Austria) . . . . . [6437-23]

9:10 am: **Imaging of optically diffusive media by use of opto-elastography,** E. Bossy, École Supérieure de Physique et de Chimie Industrielles (France); A. R. Funke, K. Daoudi, M. Tanter, M. Fink, C. Boccara, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6437-24]

9:30 am: **Continuous-wave photoacoustic microscopy,** K. Maslov, Z. Huang, C. Chang, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6437-25]

9:50 am: **Real-time, noninvasive optoacoustic monitoring of nanoparticle-mediated photothermal therapy of tumors,** R. O. Esenaliev, Y. Y. Petrov, I. Cicenaite, O. Chumakova, I. Y. H. Petrova, I. Patrikeev, The Univ. of Texas Medical Branch at Galveston . . . . . [6437-26]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Room: Marriott San Jose Ballroom Salon IV . . . . . Mon. 10:30 am to 12:10 pm

Small Animal Imaging

Chair: **Robert A. Kruger**, OptoSonics, Inc.

10:30 am: **Speed-of-sound imaging in a photoacoustic small animal imager,** S. Manohar, J. G. C. van Hespen, W. Steenbergen, T. G. van Leeuwen, Univ. of Twente (Netherlands) . . . . . [6437-27]

10:50 am: **Three-dimensional photoacoustic imaging of vascular anatomy in small animals using an optical detection system,** E. Z. Y. Zhang, J. G. Laufer, P. C. Beard, Univ. College London (United Kingdom) . . . [6437-28]

11:10 am: **Photoacoustic in-vivo imaging on neovascularized tumor of nude mice,** B. Chiu, S. Huang, H. K. Chiang, National Yang-Ming Univ. (Taiwan) . . . . . [6437-29]

11:30 am: **Photoacoustic technology for detection and imaging of inflammatory arthritis: an animal study,** X. Wang, D. L. Chamberland, Univ. of Michigan; J. D. Taurog, The Univ. of Texas Southwestern Medical Ctr. at Dallas; P. L. Carson, J. B. Fowlkes, R. O. Bude, B. J. Roessler, D. A. Jamadar, Univ. of Michigan . . . . . [6437-30]

11:50 am: **A curved array photoacoustic tomography system for small animal imaging,** A. S. Aguirre, J. K. Gamelin, A. Maurudis, F. Huang, D. Castillo, P. Guo, Univ. of Connecticut; L. V. Wang, Texas A&M Univ.; Q. Zhu, Univ. of Connecticut . . . . . [6437-31]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 7

Room: Marriott San Jose Ballroom Salon IV . . . . . Mon. 1:30 to 3:10 pm

Computer Modeling

Chair: **Steven L. Jacques**, Oregon Health and Science Univ.

1:30 pm: **Boundary effects on image reconstruction in photoacoustic tomography,** X. Yang, L. V. Wang, Texas A&M Univ. . . . . [6437-32]

1:50 pm: **Transcranial ultrasonic wave propagation simulation: skull insertion loss and recovery,** L. Liu, Univ. of Connecticut . . . . . [6437-33]

2:10 pm: **Statistical properties of photoacoustic tomography,** J. Zhang, M. A. Anastasio, Illinois Institute of Technology; P. J. La Rivière, The Univ. of Chicago . . . . . [6437-34]

2:30 pm: **Influence of photon propagation on photoacoustic spectroscopic imaging of tumor heterogeneity,** K. M. Stantz, B. Liu, Purdue Univ.; R. A. Kruger, OptoSonics, Inc. . . . . [6437-35]

2:50 pm: **Effects of absorption properties on photoacoustic spectral characteristics: numerical analysis,** Y. Sheu, C. Wei, P. Li, National Taiwan Univ. (Taiwan) . . . . . [6437-36]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

Room: Marriott San Jose Ballroom Salon IV . . . . . Mon. 3:30 to 5:30 pm

Photons Plus Ultrasound

Chair: **Charles A. DiMarzio**, Northeastern Univ.

3:30 pm: **Combined optoacoustic and ultrasound imaging: synergy and autonomy** *(Invited Paper)***,** S. Y. Emelianov, The Univ. of Texas/Austin [6437-37]

3:50 pm: **Pulsed laser-induced fluorescence and photoacoustic spectroscopy studies of flavine adenine dinucleotide (FAD) in water,** K. K. Mahato, Manipal Academy of Higher Education (India) . . . . . [6437-38]

4:10 pm: **Co-registered 3-D ultrasound and photoacoustic imaging using a 1.75D 1280-channel ultrasound system,** P. Guo, J. K. Gamelin, Univ. of Connecticut; S. Yan, Siemens Molecular Imaging; A. S. Aguirre, Q. Zhu, Univ. of Connecticut . . . . . [6437-39]

4:30 pm: **Photoacoustic imaging using array transducer,** S. Park, S. Mallidi, A. B. Karpiouk, S. R. Aglyamov, S. Y. Emelianov, Univ. of Texas/Austin [6437-40]

4:50 pm: **Robust and adaptive techniques for thermoacoustic tomography,** Y. Xie, B. Guo, J. Li, Univ. of Florida; G. Ku, L. V. Wang, Texas A&M Univ. . . . . [6437-41]

5:10 pm: **On the applicability of passive thermoacoustic method for localization of optical inhomogeneities in laser-heated biological tissue,** P. V. Subochev, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russia); E. V. Krotov, A. M. Reyman, Institute of Applied Physics (Russia) . . . . . [6437-42]

Tuesday 23 January

SESSION 9

Room: Marriott San Jose Ballroom Salon IV . . . . . Tues. 8:30 to 10:10 am

Signal Processing

Chair: **Günther Paltauf**, Karl-Franzens-Univ. Graz (Austria)

8:30 am: **Signal processing of optoacoustic transients for monitoring of total hemoglobin concentration and oxygenation in blood vessels,** I. Patrikeev, H. Brecht, I. Y. Petrova, Y. Y. Petrov, D. S. Prough, R. O. Esenaliev, University of Texas Medical Branch at Galveston . . . . . [6437-43]

8:50 am: **Photoacoustic tomography with a virtual point detector,** X. Yang, M. Li, L. V. Wang, Texas A&M Univ. . . . . [6437-44]

9:10 am: **Automated wavelet denoising of photoacoustic signals for burn-depth image reconstruction,** S. Holan, J. A. Viator, Univ. of Missouri/Columbia . . . . . [6437-45]

9:30 am: **Three-dimensional finite element-based photoacoustic tomography: initial results,** Z. Yuan, H. Jiang, Univ. of Florida . . . . . [6437-46]

9:50 am: **Implementation of exact backprojection for TCT image reconstruction,** G. Ambartsoumian, Univ. of Texas/Arlington; S. K. Patch, Univ. of Wisconsin/Milwaukee . . . . . [6437-47]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 10

Room: Marriott San Jose Ballroom Salon IV . . . . . Tues. 10:30 am to 12:30 pm

Image Reconstruction

Chair: **Igor Patrikeev**, The Univ. of Texas Medical Branch at Galveston

10:30 am: **Robust multiresolution techniques for image reconstruction** *(Invited Paper),* M. Liebling, California Institute of Technology . . . . . [6437-48]

10:50 am: **Perspectives in Fourier-based image reconstruction in photoacoustic tomography,** M. A. Anastasio, J. Zhang, D. Shi, Illinois Institute of Technology; X. M. Pan, The Univ. of Chicago . . . . . [6437-49]

11:10 am: **A study of reconstruction in photoacoustic tomography with a focused transducer,** M. Li, L. V. Wang, Texas A&M Univ. . . . . [6437-50]

11:30 am: **Investigation of transducer and measurement aperture effects on image reconstruction in three-dimensional photoacoustic tomography,** J. K. Gamelin, A. S. Aguirre, P. Guo, F. Huang, A. Maurudis, D. Castillo, Univ. of Connecticut; L. V. Wang, Texas A&M Univ.; Q. Zhu, Univ. of Connecticut . . . . . [6437-51]

11:50 am: **An image reconstruction algorithm for photoacoustic tomography with arbitrary detection geometry,** C. Li, L. V. Wang, Washington Univ. in St. Louis . . . . . [6437-52]

12:10 pm: **Exact photoacoustic image reconstruction using a planar sensor and image sources,** B. T. Cox, S. R. Arridge, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6437-53]

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

SESSION 11

Room: Marriott San Jose Ballroom Salon IV . . . . . Tues. 1:50 to 3:10 pm

Ultrasound Modulated Optical Imaging

Chair: **Lihong V. Wang**, Washington Univ. in St. Louis

1:50 pm: **Pulsed ultrasound-modulated light technique for the assessment of osteoporosis,** A. Lev, B. G. Sfez, E. Rubanov, Soreq Nuclear Research Ctr. (Israel); J. Foldes, Y. Tsiplevich, Hadassah Univ. Hospital (Israel) . . . . . [6437-54]

2:10 pm: **Optical imaging by unipolar ultrasonic pulse tagging,** J. Monchalin, A. Blouin, National Research Council Canada (Canada) . . . . . [6437-55]

2:30 pm: **Correlation transfer equation for multiply scattered light modulated by ultrasonic pulses: an analytical model and Monte Carlo simulation,** S. Sakadzic, L. V. Wang, Texas A&M Univ. . . . . [6437-56]

2:50 pm: **Laser speckle statistics in ultrasound-modulated optical tomography,** R. J. Zemp, S. Sakadzic, L. V. Wang, Texas A&M Univ. . [6437-57]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 12

Room: Marriott San Jose Ballroom Salon IV . . . . . Tues. 3:30 to 5:10 pm

Acousto-Optical Imaging

Chair: **Claude Boccara**, École Supérieure de Physique et de Chimie Industrielles (France)

3:30 pm: **Acousto-optic imaging, from ex vivo to in vivo,** P. Santos, B. C. Forget, Univ. Pierre et Marie Curie (France); M. Gross, Ecole Normale Supérieure (France) . . . . . [6437-58]

3:50 pm: **A comparison of AO detection schemes for quantitative measurements in tissue,** R. E. Molenaar, A. Bratchenia, R. P. H. Kooyman, Univ. Twente (Netherlands) . . . . . [6437-59]

4:10 pm: **Application of ultrasound-tagged photons for measurement of local absorbances in tissue mimicking phantoms,** A. Bratchenia, R. E. Molenaar, R. P. H. Kooyman, Univ. Twente (Netherlands) . . . . . [6437-60]

4:30 pm: **Ultrasound-modulated optical phenomena in scattering media driven by a pulsed transducer and its application in monitoring of the glucose concentration,** H. Li, J. Cai, L. Zhu, Fujian Normal Univ. (China) . . . . . [6437-61]

4:50 pm: **Theoretical and experimental studies of the propagation of modulation depth of the detected optical signal from an ultrasound zone,** L. Zhu, H. Li, Fujian Normal Univ. (China) . . . . . [6437-62]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Pulse laser integrated photodynamic therapy and photoacoustic imaging,** L. Xiang, South China Normal Univ. (China); X. Da, South China Normal Univ. (China) and Institute of Laser Life Science (China); H. Gu, D. Yang, South China Normal Univ. (China); S. Yang, South China Normal Univ. (China) and Institute of Laser Life Science (China); L. Zeng, W. R. Chen, South China Normal Univ. (China) . . . . . [6437-06]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 13

Room: Marriott San Jose Ballroom Salon IV . . . . . Wed. 8:30 to 10:10 am

Quantitative Tomography

Chair: **Wiendelt Steenbergen**, Univ. Twente (Netherlands)

8:30 am: **Quantitative photoacoustic tomography: recovery of optical absorption coefficient maps of heterogeneous media** *(Invited Paper)*, H. Jiang, Z. Yuan, Q. Zhang, Univ. of Florida . . . . . [6437-63]

8:50 am: **Quantitative photoacoustic imaging: experimental considerations,** B. T. Cox, J. G. Laufer, E. Z. Y. Zhang, S. R. Arridge, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6437-64]

9:10 am: **Two-dimensional photoacoustic imaging using a multiwavelength laser diode excitation source: SNR and spatial resolution considerations,** T. J. Allen, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6437-65]

9:30 am: **Simultaneous reconstruction of acoustic and optical properties of in-vivo tissues by quantitative photoacoustic tomography,** Z. Yuan, Q. Zhang, Y. Sun, H. Jiang, Univ. of Florida . . . . . [6437-66]

9:50 am: **Quantitative reconstruction of optical absorption coefficient in backward mode photoacoustic imaging,** C. Liao, P. Li, National Taiwan Univ. (Taiwan) . . . . . [6437-67]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 14

Room: Marriott San Jose Ballroom Salon IV . . . . . Wed. 10:30 am to 12:10 pm

Quantitative Detection

Chair: **Rinat O. Esenaliev**, The Univ. of Texas Medical Branch at Galveston

10:30 am: **Phantom and in-vivo measurements of hemoglobin concentration and oxygen saturation using PCT-S small animal scanner,** B. Liu, Purdue Univ.; D. R. Reinecke, R. A. Kruger, OptoSonics, Inc.; K. M. Stantz, Purdue Univ. . . . . [6437-68]

10:50 am: **Broadband optoacoustic system for noninvasive measurement of total blood hemoglobin concentration in radial artery,** I. Y. H. Petrova, D. S. Prough, Y. Y. Petrov, I. Patrikeev, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6437-69]

11:10 am: **Quantitative in-vivo measurements of blood oxygen saturation using multiwavelength photoacoustic imaging,** J. G. Laufer, E. Z. Y. Zhang, P. C. Beard, Univ. College London (United Kingdom) . . . . . [6437-70]

11:30 am: **A novel approach to extract absorption coefficient in photoacoustic spectroscopy,** Y. Wang, R. K. Wang, Oregon Health and Science Univ. . . . . [6437-71]

11:50 am: **Photoacoustic molecular imaging,** W. L. Kiser, Jr., The Pennsylvania State Univ.; R. A. Kruger, D. R. Reinecke, OptoSonics, Inc.; T. Degrado, Indiana Univ. . . . . [6437-72]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 15

Room: Marriott San Jose Ballroom Salon IV . . . . . Wed. 1:30 to 3:10 pm

Image and Signal Parameters

Chair: **Martin Frenz**, Univ. Bern (Switzerland)

1:30 pm: **A planar reflection-mode photoacoustic deep imaging system and scalability between imaging depth and spatial resolution,** K. H. Song, L. V. Wang, Texas A&M Univ. . . . . [6437-73]

1:50 pm: **Amplitude decay of photoacoustic signals generated in biological tissue when irradiated by nanosecond laser pulses,** R. J. Dewhurst, T. Li, The Univ. of Manchester (United Kingdom); G. Gondek, The Univ. of Manchester (United Kingdom) and Univ. of Gdansk (Poland); R. Lynch, Unilever Research & Development (United Kingdom) . . . . . [6437-74]

2:10 pm: **Compensation of acoustic attenuation for high-resolution photoacoustic imaging with line detectors,** P. Burgholzer, G. Matt, C. Hofer, Upper Austrian Research GmbH (Austria); M. Haltmeier, Leopold-Franzens-Univ. Innsbruck (Austria); G. Paltauf, Karl-Franzens-Univ. Graz (Austria) . . . [6437-75]

2:30 pm: **Thermoacoustic tomography-ultrasound attenuation artifacts,** S. K. Patch, Univ. of Wisconsin/Milwaukee; M. Haltmeier, Leopold-Franzens-Univ. Innsbruck (Austria) . . . . . [6437-76]

2:50 pm: **Attenuation and dispersion of outgoing TCT pressure pulses,** S. K. Patch, Univ. of Wisconsin/Milwaukee; A. Greenleaf, Univ. of Rochester . . . . . [6437-77]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 16

Room: Marriott San Jose Ballroom Salon IV . . . . . Wed. 3:30 to 4:50 pm

High Resolution Imaging

Chair: **Stanislav Y. Emelianov**, The Univ. of Texas/Austin

3:30 pm: **Portable real-time high-resolution photoacoustic microscopy,** K. Maslov, C. Chang, G. Stoica, L. V. Wang, Texas A&M Univ. . . . . [6437-78]

3:50 pm: **Toward fiber-based high-frequency 3D ultrasound imaging,** S. Huang, S. Ashkenazi, Y. Hou, M. O'Donnell, Univ. of Michigan . . . . [6437-79]

4:10 pm: **Intravascular photoacoustic imaging of atherosclerotic plaques: ex-vivo study,** S. Sethuraman, S. Mallidi, S. R. Aglyamov, The Univ. of Texas/Austin; J. H. Amirian, R. W. Smalling, The Univ. of Texas Health Science Ctr. at Houston; S. Y. Emelianov, The Univ. of Texas/Austin . . . . . [6437-80]

4:30 pm: **Imaging living cells with a combined high-resolution multi-photon-acoustic microscope,** S. Schenkl, Saarland Univ. (Germany) and Fraunhofer-Institut für Biomedizinische Technik (Germany); E. Weiss, M. Stark, F. Stracke, I. Riemann, R. M. Lemor, Fraunhofer-Institut für Biomedizinische Technik (Germany); K. König, Saarland Univ. (Germany) and Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6437-81]

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Biophotonics and Immune Responses II

Conference Chair: **Wei R. Chen**, Univ. of Central Oklahoma

Program Committee: **Samuel Achilefu**, Washington Univ. in St. Louis; **Gianfranco L. Canti**, Univ. degli Studi di Milano (Italy); **Yuncheng Ge**, Beijing Glass Research Institute (China); **Sandra O. Gollnick**, Roswell Park Cancer Institute; **Michael R. Hamblin**, Harvard Medical School; **Zheng Huang**, Univ. of Colorado at Denver; **Mladen Korbelik**, The BC Cancer Research Ctr. (Canada); **Karl-Goran Tranberg**, Lunds Univ. (Sweden); **Xunbin Wei**, Harvard Medical School; **Vladimir P. Zharov**, Univ. of Arkansas for Medical Sciences

Monday 22 January

SESSION 1

Room: Conv. Ctr. D . . . . . Mon. 8:30 to 10:00 am

PDT and Immune Activities

Chairs: **Mladen Korbelik**, The BC Cancer Research Ctr. (Canada); **Sandra O. Gollnick**, Roswell Park Cancer Institute

8:30 am: **Advances in the understanding of host response associated with tumor PDT** *(Invited Paper)***,** M. Korbelik, The BC Cancer Research Ctr. (Canada) . . . . . [6438-01]

9:00 am: **Photodynamic therapy stimulates antitumor immunity in murine models** *(Invited Paper)***,** M. R. Hamblin, P. Mroz, A. P. Castano, Harvard Medical School . . . . . [6438-02]

9:30 am: **Control of PDT enhanced antitumor immunity by innate immune cells** *(Invited Paper)***,** S. O. Gollnick, Roswell Park Cancer Institute . . . [6438-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. D . . . . . Mon. 10:30 am to 12:00 pm

Clinical Studies I

Chairs: **Feng Wu**, Churchill Hospital (United Kingdom); **Mark F. Naylor**, Oklahoma Medical Research Foundation

10:30 am: **Specific antitumor immunity of peripheral blood cytotoxic T lymphocytes in mice bearing H22 tumor treated with high-intensity focused ultrasound** *(Invited Paper)***,** F. Wu, Churchill Hospital (United Kingdom) and Chongqing Univ. of Medical Sciences (China); L. Ran, X. Xie, F. Xie, L. Zhou, Y. Fan, Chongqing Univ. of Medical Sciences (China) . . . . . [6438-04]

11:00 am: **Secondary changes in antitumor immunity of tumor draining lymph nodes after high-intensity focused ultrasound ablation for breast cancer,** L. Zhou, Chongqing Univ. of Medical Sciences (China) . . . . . [6438-05]

11:20 am: **In situ photoimunotherapy (ISPI) for advanced cutaneous melanoma,** M. F. Naylor, Oklahoma Medical Research Foundation; K. Teague, Univ. of Oklahoma; W. R. Chen, Univ. of Central Oklahoma . . . . . [6438-06]

11:40 am: **Cellular immune response: accurate method for monitoring the effectiveness of Nd:YAG laser therapy in orthodontic gingivitis,** C. C. Todea, M. Miron, M. Drugarin, L. M. Filip, C. I. Balabuc, D. Drugarin, Univ. de Medicina si Farmacie Victor Babes, Timisoara (Romania) . . . . . [6438-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

Room: Conv. Ctr. D . . . . . Mon. 1:30 to 2:20 pm

Clinical Studies II

Chairs: **Xiu-li Wang**, Fudan Univ. (China); **Wei R. Chen**, Univ. of Central Oklahoma

1:30 pm: **Combination of immunotherapy and photodynamic therapy for the treatment of bowenoid papulosis** *(Invited Paper)***,** X. Wang, Fudan Univ. (China); H. Wang, M. Guo, Shanghai Skin Diseases and STD Hospital (China); Z. Huang, Univ. of Colorado at Denver . . . . . [6438-08]

2:00 pm: **Pharmacokinetics of protoporphyrin IX synthesis after topical application of 5-aminolevulinic ccid in urethral condylomata acuminata,** Z. Huang, Univ. of Colorado at Denver; X. Wang, Fudan Univ. (China); H. Wang, M. Guo, Shanghai Skin Diseases and STD Hospital (China); H. G. Stepp, R. Baumgartner, Ludwig-Maximilians-Univ. München (Germany) . . . . [6438-09]

SESSION 4

Room: Conv. Ctr. D . . . . . Mon. 2:20 to 3:30 pm

Photothermal Interactions and Immune Activities

Chairs: **Xiu-li Wang**, Fudan Univ. (China); **Wei R. Chen**, Univ. of Central Oklahoma

2:20 pm: **Cellular immunological effect of laser irradiation and immuno-adjuvant application** *(Invited Paper)***,** W. R. Chen, Univ. of Central Oklahoma; K. E. Bartels, J. W. Ritchey, S. D. Martin, Oklahoma State Univ. . . . . [6438-10]

2:50 pm: **Tissue temperature distribution measurement by MRI and laser immunotherapy for cancer treatment,** Y. Chen, Univ. of Central Oklahoma; S. C. Gnyawali, Oklahoma State Univ.; H. Liu, Univ. of Oklahoma; R. E. Nordquist, Wound Healing of Oklahoma, Inc.; W. R. Chen, Univ. of Central Oklahoma . . . . . [6438-11]

3:10 pm: **Surface-temperature distribution of biological tissues during laser irradiation for cancer treatment,** S. C. Gnyawali, Oklahoma State Univ.; Y. Chen, Univ. of Central Oklahoma; K. E. Bartels, J. P. Wicksted, Oklahoma State Univ.; R. E. Nordquist, Wound Healing of Oklahoma, Inc.; W. R. Chen, Univ. of Central Oklahoma . . . . . [6438-12]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 5

Room: Conv. Ctr. D . . . . . Mon. 4:00 to 6:00 pm

Laser-Induced Cellular Activities

Chairs: **Xing Da**, South China Normal Univ. (China); **Yuncheng Ge**, Beijing Glass Research Institute (China)

4:00 pm: **Single cell analysis of low-power laser irradiation-induced activation of signaling pathway in cell proliferation** *(Invited Paper)***,** D. Xing, X. Gao, South China Normal Univ. (China) . . . . . [6438-13]

4:30 pm: **Monitoring circulating apoptotic cells by in vivo flow cytometry** *(Invited Paper)***,** X. Wei, Palomar Medical Technologies, Inc.; C. P. Lin, Massachusetts General Hospital . . . . . [6438-14]

5:00 pm: **Real-time single cell analysis of bid cleavage and translocation,** L. Liu, South China Normal Univ. (China) and Institute of Laser Life Science (China); D. Xing, Y. Pei, X. Gao, T. Chen, South China Normal Univ. (China); W. R. Chen, Univ. of Central Oklahoma and Univ. of Central Oklahoma [6438-15]

5:20 pm: **In vivo flow cytometry as a new tool to study immune responses and apoptosis,** E. I. Galanzha, Univ. of Arkansas for Medical Sciences; V. V. Tuchin, Saratov State Univ. (Russia); E. V. Shashkov, V. P. Zharov, Univ. of Arkansas for Medical Sciences . . . . . [6438-16]

5:40 pm: **Study of sonodynamic effect of hematoporphyrin monomethyl ether in glioma tumor model,** D. Song, W. Yue, Z. Zhao, D. Wang, X. Meng, X. Zhang, S. Chao, Harbin Medical Univ. (China); Z. Huang, Univ. of Colorado at Denver . . . . . [6438-17]

Tuesday 23 January

✔ Posters-Tuesday

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✔ **Fluorescence spectroscopy and imaging to assess apoptosis in myocardium,** M. Ranji, S. Kanemoto, M. A. Grosso, J. H. Gorman, D. L. Jaggard, B. Chance, Univ. of Pennsylvania . . . . . [6438-18]

✔ **Caspase-3 activation during heat-induced apoptosis detected by genetically encoded fluorescent probe and CE technique,** Z. Zhang, T. Su, J. Lin, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6438-19]

✔ **Monitoring concentration and oxygen saturation of hemoglobin using photoacoustic technique,** Y. Su, T. Lu, Z. Song, J. Jiang, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ. . . . . [6438-20]

✔ **Photodynamic therapy induced production of cytokines by latent Epstein Barr virus infected nasopharyngeal carcinoma cells,** H. K. K. Koon, Hong Kong Baptist Univ. (Hong Kong China); K. W. Lo, The Chinese Univ. of Hong Kong (Hong Kong China); M. L. Lung, C. K. C. Chang, Hong Kong Univ. of Science and Technology (Hong Kong China); N. S. R. Wong, N. K. Mak, Hong Kong Baptist Univ. (Hong Kong China) . . . [6438-21]

✔ **Lasting monitoring of immune state in patients with coronary atherosclerosis,** L. I. Malinova, T. P. Denisova, Saratov State Medical Univ. (Russia); V. V. Tuchin, Saratov State Univ. (Russia) . . . . . [6438-22]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Sunday 21 January 2007 • Proceedings of SPIE Vol. 6439

Optics in Tissue Engineering & Regenerative Medicine

Conference Chairs: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.; **Ruikang K. Wang**, Oregon Health and Science Univ.

Program Committee: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Sergio Fantini**, Tufts Univ.; **Jeremy C. Hebden**, Univ. College London (United Kingdom); **Miya Ishihara**, National Defense Medical College (Japan); **Ying Yang**, Keele Univ. (United Kingdom)

Sunday 21 January

SESSION 1

Room: Conv. Ctr. D . . . . . Sun. 8:30 to 10:20 am

Imaging

Chair: **Sean J. Kirkpatrick**, Oregon Health and Science Univ.

8:30 am: **Progress in imaging methods related to tissue engineering** *(Invited Paper)***,** I. Georgakoudi, W. Rice, Tufts Univ.; C. Canizzarro, Massachusetts Institute of Technology; M. Lovett, Tufts Univ.; G. Vunjak-Novakovic, Columbia Univ.; D. L. Kaplan, Tufts Univ. . . . . [6439-01]

9:00 am: **Continuous and on-line monitoring of tissue growth inside a perfusion bioreactor by optical coherent tomography,** P. O. Bagnaninchi, A. J. El Haj, Y. Yang, Keele Univ. (United Kingdom) . . . . . [6439-02]

9:20 am: **Structural analysis of blended materials using multiphoton autofluorescence and second-harmonic generation microscopy,** H. Tan, Chang Gung Memorial Hospital (Taiwan) and Chang Gung Univ. (Taiwan); L. Wen, W. Hsiao, W. Chen, National Taiwan Univ. (Taiwan); S. Lin, National Taiwan Univ. Hospital (Taiwan); T. Young, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6439-03]

9:40 am: **A tissue-engineered 3D model of light scattering in atherosclerotic plaques,** D. Levitz, M. T. Hinds, R. K. Wang, Z. H. Ma, K. Ishii, N. Tran, O. J. T. McCarty, S. R. Hanson, S. L. Jacques, Oregon Health and Science Univ. . . . . [6439-04]

10:00 am: **Noninvasive monitoring and characterization of internal architectures of growing engineered tissue constructs with optical coherence tomography in real time,** M. T. Hinds, Z. H. Ma, Oregon Health and Science Univ.; K. Ishii, Osaka Univ. (Japan); N. Tran, R. K. Wang, Oregon Health and Science Univ. . . . . [6439-05]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 2

Room: Conv. Ctr. D . . . . . Sun. 10:50 am to 12:30 pm

Mechanical Properties

Chair: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign

10:50 am: **A novel OCT-based micro-indentation technique for mechanical characterization of soft engineered tissues,** Y. Yang, P. O. Bagnaninchi, M. Ahearne, Keele Univ. (United Kingdom); R. Wang, Oregon Health and Science Univ.; I. Liu, Keele Univ. (United Kingdom) . . . . . [6439-06]

11:10 am: **Ultrasound, photoacoustic, and elasticity microscope,** S. Y. Emelianov, S. Mallidi, A. B. Karpiouk, S. R. Aglyamov, The Univ. of Texas/ Austin . . . . . [6439-07]

11:30 am: **Usefulness and limitation of measurement methods for evaluation of tissue-engineered cartilage function and characterization using nanosecond pulsed laser,** M. Ishihara, National Defense Medical College (Japan); M. Sato, G. Mitani, N. Kaneshiro, T. Nagai, T. Kutsuna, Tokai Univ. (Japan); S. Sato, M. Ishihara, National Defense Medical College (Japan); J. Mochida, Tokai Univ. (Japan); M. Kikuchi, National Defense Medical College (Japan) . . . . . [6439-08]

11:50 am: **Optical elastography for bulk mechanical measurements of engineered tissues,** S. J. Kirkpatrick, Oregon Health and Science Univ. . . . . [6439-09]

12:10 pm: **Real-time mapping of strain and strain rate using ultra-fast optical coherence tomography,** R. K. Wang, Oregon Health and Science Univ. . . . . [6439-10]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 3

Room: Conv. Ctr. D . . . . . Sun. 1:30 to 2:50 pm

Healing and Regeneration

Chair: **Ruikang K. Wang**, Oregon Health and Science Univ.

1:30 pm: **Stem cell therapy and tissue engineering: challenges for growth control and delivery** *(Invited Paper)***,** A. J. El Haj, Keele Univ. (United Kingdom) . . . . . [6439-11]

2:00 pm: **Control of guided hard-tissue regeneration using phosphorylated gelatin and OCT imaging of calcification,** K. Ishii, Osaka Univ. (Japan); Z. h. Ma, Oregon Health and Science Univ.; Y. Ninomiya, Osaka Univ. (Japan); M. Takegoshi, Kyoto Univ. (Japan); T. Kushibiki, Osaka Univ. (Japan); M. Yamamoto, Kyoto Univ. (Japan); M. T. Hinds, Oregon Health & Science Univ.; Y. Tabata, Kyoto Univ. (Japan); R. K. Wang, Oregon Health and Science Univ.; K. Awazu, Osaka Univ. (Japan) . . . . . [6439-13]

2:20 pm: **Technologies for articular cartilage regeneration** *(Invited Paper)***,** M. Sato, Tokai Univ. (Japan); M. Ishihara, M. Kikuchi, National Defense Medical College (Japan); J. Mochida, Tokai Univ. (Japan) . . . . . [6439-14]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Controlling optical properties of biotissue by use of biocompatible hyperosmotic agents,** J. Jiang, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ.; K. Xu, Tianjin Univ. (China) . . . . . [6439-15]

✔ **Characterization of scaffold architecture by optical coherence tomography,** Y. Yang, P. O. Bagnaninchi, C. Reis, H. Aydin, A. J. El Haj, Keele Univ. (United Kingdom) . . . . . [6439-16]

✔ **Characterization of local fluid flow in 3D porous constructs by Fourier domain,** P. O. Bagnaninchi, Y. Yang, A. J. El Haj, Keele Univ. (United Kingdom); Z. H. Ma, R. Wang, Oregon Health and Science Univ. . . [6439-17]

✔ **Fourier transform infrared spectroscopic analysis of cell differentiation,** K. Ishii, T. Kushibiki, K. Awazu, Osaka Univ. (Japan) . . . . . [6439-18]

✔ **Birefringent imaging of biological tissues by spectral domain polarization sensitive optical coherence tomography,** Z. Jing, C. Fan, J. Jiang, Q. Gong, Tianjin Univ. (China); Z. H. Ma, Oregon Health and Science Univ.; F. Zhang, J. Yao, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ. . . . . [6439-19]

✔ **Spectral domain polarization sensitive optical coherence tomography based on two-phase method,** C. Fan, Z. Jing, J. Jiang, Q. Gong, Tianjin Univ. (China); Z. H. Ma, Oregon Health and Science Univ.; F. Zhang, J. Yao, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ. [6439-20]

✔ **Signal processing using wavelet transform in photo-acoustic tomography,** T. Lu, Y. Su, Z. Song, J. Jiang, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ. . . . . [6439-21]

✔ **Regularized processing of signal deconvolution in photo-acoustic signal recovery,** Z. Song, T. Lu, Y. Su, J. Jiang, F. Zhang, Tianjin Univ. (China); R. K. Wang, Oregon Health and Science Univ. . . . . [6439-22]

✔ **MRI 3D tissue temperature distribution measurement in laser tissue interaction,** Y. Chen, Univ. of Central Oklahoma; S. C. Gnyawali, Oklahoma State Univ.; H. Liu, Univ. of Oklahoma; W. R. Chen, Univ. of Central Oklahoma . . . . . [6439-23]

✔ **Optical noninvasive monitoring of stem cell differentiation into adipogenic and osteogenic pathways,** W. Rice, S. Firdous, J. Mauney, V. Volloch, D. L. Kaplan, I. Georgakoudi, Tufts Univ. . . . . [6439-25]

✔ **Live imaging of angiogenic sprout/collagen interactions,** U. Utzinger, N. D. Kirkpatrick, J. B. Hoying, The Univ. of Arizona . . . . . [6439-24]

Saturday-Sunday 20-21 January 2007 • Proceedings of SPIE Vol. 6440

Thermal Treatment of Tissue: Energy Delivery and Assessment IV

Conference Chair: **Thomas P. Ryan**, Actuality Systems, Inc.

Program Committee: **Chris J. Diederich**, Univ. of California/San Francisco; **P. Jack Hoopes**, Dartmouth College; **Boris Rubinsky**, Univ. of California/Berkeley; **Paul R. Stauffer**, Duke Univ.

Saturday 20 January

SESSION 1

Room: Conv. Ctr. B4 ..... Sat. 8:30 to 10:30 am

Tissue Response and Thermal Damage from Energy Applications

Chair: **P. Jack Hoopes**, Dartmouth Hitchcock Medical Ctr.

8:30 am: **Developing clinically successful biomedical devices by understanding the pathophysiology of the target tissue: insights from over 25 years at the microscope** *(Invited Paper)*, S. L. Thomsen, The Univ. of Texas/Austin; J. E. Coad, West Virginia Univ. ..... [6440-01]

9:30 am: **Wavelength-dependent dynamics of heat shock protein 70 expression in free electron laser wounds,** G. J. Wilmink, J. M. Davidson, E. D. Jansen, Vanderbilt Univ. ..... [6440-02]

10:00 am: **Histological study of skin damage by 2000-nm laser irradiation,** B. Chen, S. L. Thomsen, D. C. O'Dell, A. J. Welch, The Univ. of Texas/Austin ..... [6440-03]

Coffee Break ..... 10:30 to 11:00 am

SESSION 2

Room: Conv. Ctr. B4 ..... Sat. 11:00 am to 12:30 pm

Imaging Techniques for Tissue Assessment during Thermal Ablation

Chair: **Thomas P. Ryan**, Actuality Systems, Inc.

11:00 am: **Mapping and monitoring of ablative therapy for improved results** *(Invited Paper)*, D. E. Gustafson, Abla-Tx Inc.; D. Nadadur, Abla-Tx Inc; G. W. Dalmadge, Jr., M. W. Nields, Abla-Tx Inc. ..... [6440-04]

11:25 am: **Correlation of contrast-enhanced MR images with the histopathology of minimally invasive thermal and cryoablation cancer treatments in normal dog prostates,** D. M. Bouley, B. L. Daniel, K. Butts-Pauly, E. Liu, Stanford Univ.; C. J. Diederich, W. H. Nau, Jr., Univ. of California/San Francisco; G. Sommer, Stanford Univ. ..... [6440-05]

11:45 am: **Evaluation of thermal and cryo lesions by diffusion-weighted MRI,** J. Chen, B. L. Daniel, D. M. Bouley, G. Sommer, K. Butts-Pauly, Stanford Univ. ..... [6440-06]

12:05 pm: **Microwave thermometry for focused ultrasound-induced hyperthermia: phantom experience** *(Invited Paper)*, P. M. Meaney, L. A. Potwin, M. W. Fanning, S. D. Geimer, K. D. Paulsen, Dartmouth College ..... [6440-07]

Lunch/Exhibition Break ..... 12:30 to 2:00 pm

SESSION 3

Room: Conv. Ctr. B4 ..... Sat. 2:00 to 3:15 pm

Thermal Therapy I: Systems Comparison

Chair: **Chris J. Diederich**, Univ. of California/San Francisco

2:00 pm: **A tutorial on recent advances in thermal therapy systems** *(Invited Paper)*, T. P. Ryan, Actuality Systems, Inc. ..... [6440-08]

2:25 pm: **Comparison of three thermotherapy modalities for the ablation of mammary carcinoma in situ using thermal imaging and mapping,** J. H. G. M. Klaessens, R. M. Verdaasdonk, S. van Esser, A. Shmatukha, T. de Boorder, R. van Hillegersberg, Univ. Medisch Ctr. Utrecht (Netherlands) ..... [6440-09]

2:45 pm: **The heat sink effect on ablation morphology: a study comparing microwave, radio-frequency, and cryotherapy** *(Invited Paper)*, N. Bhardwaj, A. D. Strickland, F. Ahmad, L. Atanesyan, D. M. Lloyd, Leicester Royal Infirmary (United Kingdom) ..... [6440-10]

Coffee Break ..... 3:15 to 3:40 pm

SESSION 4

Room: Conv. Ctr. B4 ..... Sat. 3:40 to 5:40 pm

Thermal Therapy II: Clinical Applications

Chair: **Sharon L. Thomsen**, The Univ. of Texas/Austin

3:40 pm: **Successful use of microwave ablation to treat patients with unresectable liver tumours** *(Invited Paper)*, N. Bhardwaj, A. D. Strickland, F. Ahmad, M. Elabassy, D. M. Lloyd, Leicester Royal Infirmary (United K ingdom) ..... [6440-11]

4:10 pm: **Prostate thermal therapy with catheter-based ultrasound devices and MR thermal monitoring** *(Invited Paper)*, C. J. Diederich, W. H. Nau, Jr., A. M. Kinsey, A. Ross, Univ. of California/San Francisco; D. M. Bouley, V. Rieke, K. Butts-Pauly, G. Sommer, Stanford Univ. ..... [6440-12]

4:40 pm: **Progress on conformal microwave array applicators for heating chestwall disease** *(Invited Paper)*, P. R. Stauffer, P. Maccarini, Duke Univ.; T. Juang, D. G. Neuman, Univ. of California/San Francisco ..... [6440-13]

5:10 pm: **Ultrasound interstitial thermal therapy (USITT) for the treatment of uterine myomas,** W. H. Nau, Jr., C. J. Diederich, T. Juang, A. Jacoby, Univ. of California/San Francisco ..... [6440-14]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 5

Room: Conv. Ctr. B4 ..... Sun. 8:30 to 10:35 am

Microshells and Nanoparticles for Thermal Therapy Enhancement

Chair: **James E. Coad**, West Virginia Univ.

8:30 am: **Characterization of laser-induced thermal response of microshells for cancer treatment using magnetic-resonance temperature imaging,** A. M. Elliott, J. Stafford, A. Shetty, The Univ. of Texas M.D. Anderson Cancer Ctr.; J. A. Schwartz, Nanospectra Biosciences Inc.; J. Wang, Nanospectra Biosciences, Inc.; C. Bourgoyne, Nanospectra Biosciences Inc.; P. D. O'Neal, Louisiana Tech Univ.; J. D. Hazle, The Univ. of Texas M.D. Anderson Cancer Ctr. ..... [6440-15]

8:55 am: **Synthesis and heating effect of iron/iron oxide composite and iron oxide nanoparticles,** Q. Zeng, I. Baker, J. A. Loudis, Dartmouth College; P. J. Hoopes, Dartmouth Hitchcock Medical Ctr. ..... [6440-16]

9:20 am: **Development of antibody directed nanoparticles for cancer therapy,** R. Ivkov, Triton Systems, Inc.; S. J. DeNardo, G. L. DeNardo, Univ. of California/Davis; C. Gruettner, micromod Partikeltechnologie GmbH; A. R. Foreman, Triton Systems, Inc. ..... [6440-17]

9:45 am: **In-vitro assessment of iron oxide nanoparticle hyperthermia alone and with radiation** *(Invited Paper)*, P. J. Hoopes, R. R. Strawbridge, Z. Pierce, C. Gaito, L. Dulatas, Dartmouth Hitchcock Medical Ctr.; K. Connolly, M. D. Savellano, Dartmouth College; A. R. Foreman, R. Ivkov, Triton Systems, Inc. ..... [6440-18]

10:10 am: **Iron oxide nanoparticle hyperthermia and radiation treatment of breast cancer** *(Invited Paper)*, P. J. Hoopes, R. R. Strawbridge, Dartmouth Hitchcock Medical Ctr.; I. Baker, Q. Zeng, Dartmouth College; Z. Pierce, Dartmouth Hitchcock Medical Ctr.; C. Gaito, L. Dulatas, U. J. Gibson, Dartmouth College; A. R. Foreman, R. Ivkov, Triton Systems, Inc. ..... [6440-19]

Coffee ..... 10:35 to 11:05 am

SESSION 6

Room: Conv. Ctr. B4 . . . . . Sun. 11:05 am to 12:20 pm

Thermal Therapy: Modeling and Advanced Techniques I

Chair: **Paul R. Stauffer**, Duke Univ.

11:05 am: **Increasing corneal curvature by rf current: numerical model studies of governing physical processes,** J. A. Pearce, The Univ. of Texas/Austin; C. Ikei, Refractec, Inc. . . . . [6440-20]

11:30 am: **The decoupling of coupled computer simulations of radio-frequency thermal therapy in tissue,** B. Elizeh, R. J. Podhajsky, Tyco Healthcare . . . . . [6440-21]

11:55 am: **Investigation of temperature elevation and saline-injection-induced electrical conductivity change of hepatic tissue by using a microprobe,** M. Yi, R. L. Mahajan, Univ. of Colorado/Boulder; R. J. Podhajsky, Tyco Healthcare . . . . . [6440-22]

Lunch/Exhibition Break . . . . . 12:20 to 1:50 pm

SESSION 7

Room: Conv. Ctr. B4 . . . . . Sun. 1:50 to 3:15 pm

Thermal Therapy: Modeling and Advanced Techniques II

Chair: **John A. Pearce**, The Univ. of Texas/Austin

1:50 pm: **Development of micro thin-film thermal-conductivity probe for biomedical applications,** M. Yi, H. V. Panchawagh, Univ. of Colorado/Boulder; R. J. Podhajsky, Tyco Healthcare; R. L. Mahajan, Univ. of Colorado/Boulder . . . . . [6440-23]

2:15 pm: **Advances and historical developments of MW hyperthermia and the relevance to thermal ablation,** P. F. Turner, BSD Medical Corp. . [6440-32]

2:45 pm: **Image-guided liver ablation by unfocused ultrasound using passive cavitation detection,** V. A. Salgaonkar, C. Karunakaran, J. A. Besse, G. E. Heinlein, S. Datta, C. K. Holland, T. D. Mast, Univ. of Cincinnati . [6440-25]

Coffee Break . . . . . 3:15 to 3:45 pm

SESSION 8

Room: Conv. Ctr. B4 . . . . . Sun. 3:45 to 5:05 pm

Laser Biophysics and Tissue Effects

Chair: **Rudolf M. Verdaasdonk**, Univ. Medisch Ctr. Utrecht (Netherlands)

3:45 pm: **The visualization of surgical smoke produced by energy delivery devices: significance and effectiveness of evacuation systems,** R. M. Verdaasdonk, T. de Boorder, J. H. G. M. Klaessens, Univ. Medisch Ctr. Utrecht (Netherlands) . . . . . [6440-26]

4:05 pm: **Simulation of laser induced thermo-mechanical changes in tissue using RF heating method,** D. E. Protsenko, B. J. Wong, Univ. of California/Irvine . . . . . [6440-27]

4:25 pm: **Method and installation used for testing of the absorbed dose of radiation during low-level laser therapy,** A. V. Dunaev, Oryol State Technical Univ. (Russia) . . . . . [6440-28]

4:45 pm: **Registration of hydraulic pressure and matrix conductivity alteration in laser reshaping of cartilaginous tissues,** A. I. Omelchenko, E. N. Sobol, Institute of Laser and Information Technologies (Russia) . [6440-29]

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6441

Imaging, Manipulation and Analysis of Biomolecules, Cells, and Tissues V

Conference Chairs: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.; **Robert C. Leif**, Newport Instruments; **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

Cochairs: **J. Paul Robinson**, Purdue Univ.; **Attila Tarnok**, Univ. Leipzig (Germany); **Ramesh Raghavachari**, U.S. Food and Drug Administration

Program Committee: **Christopher H. Contag**, Stanford Univ.; **Paul Dan A. Cristea**, Univ. Politehnica Bucharest (Romania); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Erik G. Fällman**, Umeå Univ. (Sweden); **Jesper Glückstad**, Risø National Lab. (Denmark); **Ewa M. Goldys**, Macquarie Univ. (Australia); **James F. Leary**, Purdue Univ.; **Charles P. Lin**, Massachusetts General Hospital; **Andreas Nowatzyk**, Cedars-Sinai Medical Center; **Markus Sauer**, Institut für Neue Materialien GmbH (Germany)

Monday 22 January

SESSION 1

Room: Conv. Ctr. C1 . . . . . Mon. 8:30 am to 12:30 pm

Tissue and Cellular Imaging I

Chair: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

8:30 am: **Ionic contrast terahertz near-field imaging of axonal water fluxes** *(Invited Paper)*, J. Masson, École Polytechnique (France) and CNRS UMR7645 (France) and INSERM U696 (Finland); M. Sauviat, J. Martin, École Polytechnique (France); G. Gallot, École Polytechnique (France) and CNRS UMR7645 (France) and INSERM U696 (France) . . . . . [6441-01]

9:00 am: **Diffuse reflectance hyperspectral imaging in skin diagnostics,** M. A. Ilias, E. Häggblad, G. E. Salerud, Linköping Univ. (Sweden) . . . . [6441-02]

9:20 am: **Three-dimensional microscopic evaluation of cervicovaginal epithelial microstructure change due to topical microbicides,** G. Vargas, T. Shilagard, B. A. Bell, M. Motamedi, L. Stanberry, N. Bourne, The Univ. of Texas Medical Branch at Galveston . . . . . [6441-03]

9:40 am: **Multimodal optical imaging of small animals: development and applications for in vivo drug delivery,** J. Y. Hwang, D. L. Farkas, J. Jeong, J. Ljubimova, M. Fujita, N. Khazenzon, S. Wachsmann-Hogiu, Cedars-Sinai Medical Ctr. . . . . [6441-04]

10:00 am: **Radiofrequency time-domain EPR imaging: instrumentation development and recent results in functional physiological imaging,** S. Subramanian, N. Devasahayam, M. C. Krishna, National Institutes of Health . . . . . [6441-05]

Coffee Break . . . . . 10:20 to 10:50 am

10:50 am: **Confocal Raman microscopy of the protein, lipid, and nucleic acid distribution in the mitotic HeLa cells,** L. Tay, M. Noestheden, J. P. Pezacki, National Research Council Canada (Canada) . . . . . [6441-06]

11:10 am: **Raman spectroscopy and Raman chemical imaging of apoptotic cells,** J. Panza, J. S. Maier, S. D. Stewart, ChemImage Corp. . . . . [6441-07]

11:30 am: **Examining cardiomyocyte development with spectral domain phase microscopy,** A. K. Ellerbee, A. L. Creazzo, J. A. Izatt, Duke Univ. . . . . [6441-08]

11:50 am: **Hyperspectral imaging of H&E stained tissue sections using a spectrally programmable light engine,** N. B. MacKinnon, P. M. Lane, C. E. MacAulay, M. Guillaud, BC Cancer Agency (Canada); U. Stange, Tidal Photonics Inc. (Canada) . . . . . [6441-09]

12:10 pm: **Protein profile study of the pap smear and biopsy tissue of the cervix by using high-performance liquid chromatography-laser-induced fuorescence (HPLC-LIF),** S. Chidangil, Manipal Academy of Higher Education (India) . . . . . [6441-10]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 2

Room: Conv. Ctr. C1 . . . . . Mon. 1:30 to 3:20 pm

Tissue and Cellular Imaging II

Chair: **Daniel L. Farkas**, Cedars-Sinai Medical Ctr.

1:30 pm: **Protein cluster size imaging by time resolved fluorescence anisotropy microscopy** *(Invited Paper)*, H. C. Gerritsen, A. Bader, E. Hofman, P. van Bergen en Henegouwen, Univ. Utrecht (Netherlands) . . . . . [6441-11]

2:00 pm: **TIRET microscopy: monitoring protein (amyloid precursor protein and beta-secretase) interaction on the surface of living cells,** H. Schneckenburger, M. Wagner, P. Weber, Fachhochschule Aalen (Germany); C. von Arnim, Univ. Ulm (Germany) . . . . . [6441-12]

2:20 pm: **Epidermal growth factor signaling studied using multidimensional single molecule fluorescence microscopy,** S. Webb, S. Roberts, S. Needham, D. J. Rolfe, C. Tynan, M. Martin-Fernandez, Council for the Central Lab. of the Research Councils (United Kingdom) . . . . . [6441-13]

2:40 pm: **Novel methods for the detection of TAG lipase and phospholipase A2 activities in plant protoplasts by fluorescence and confocal laser scanning microscopy,** S. C. Bhatla, Univ. of Delhi (India) . . . . . [6441-14]

3:00 pm: **Ultra-short pulses to signal neuronal growth cone machinery,** M. V. Mathew, I. A. Roldan, Institut de Ciències Fotòniques (Spain); R. Andres, Parc Cientific de Barcelona (Spain); I. G. Cormack, Institut de Ciències Fotòniques (Spain); D. Artigas, Univ. Politècnica de Catalunya (Spain); E. Soriano, Parc Cientific de Barcelona (Spain); P. L. Alvarez, Institut de Ciències Fotòniques (Spain) . . . . . [6441-15]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 3

Room: Conv. Ctr. C1 . . . . . Mon. 3:50 to 5:40 pm

Cytomics I

Chair: **Robert C. Leif**, Newport Instruments

3:50 pm: **Quantitative tissue cytometry (Tissomics): multimodal slide-based cytometry, confocal imaging, and volume rendering is the key** *(Invited Paper)*, A. Tarnok, A. Mittag, J. Kuska, U. Braumann, B. Mosch, T. Arendt, Univ. Leipzig (Germany) . . . . . [6441-16]

4:20 pm: **In-vivo imaging flow cytometer,** C. Alt, Tufts Univ. and Massachusetts General Hospital; H. Lee, Kyongpook National Univ.; C. M. Pitsillides, Massachusetts General Hospital and Boston Univ.; M. Puoris'haag, C. P. Lin, Massachusetts General Hospital . . . . . [6441-17]

4:40 pm: **In-vivo quantification of autofluorescence dynamics during renal ischemia and reperfusion under dual-UV excitation,** R. N. Raman, Univ. of California/Davis; C. D. Pivetti, Univ. of California/Davis Medical Ctr.; D. L. Matthews, Univ. of California/Davis; C. Troppmann, Univ. of California/Davis Medical Ctr.; S. G. Demos, Lawrence Livermore National Lab. . [6441-18]

5:00 pm: **Sub-cellular quantitative optical diffraction tomography with digital holographic microscopy,** F. Charrière, École Polytechnique Fédérale de Lausanne (Switzerland); E. Cuche, Lyncée Tec SA (Switzerland); P. P. Marquet, Ctr. Hospitalier Univ. Vaudois (Switzerland); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6441-19]

5:20 pm: **Application of quantitative morphological cytometry for evaluation of shear stress: potential for HCS systems,** B. P. Rajwa, D. Lenz, B. Bayraktar, S. J. Leavesley, J. P. Robinson, Purdue Univ. . . . . [6441-20]

Tuesday 23 January

SESSION 4

Room: Conv. Ctr. C1 . . . . . Tues. 8:30 to 10:10 am

Cytomics II

Chair: **Attila Tarnok**, Univ. Leipzig (Germany)

8:30 am: **Comparison of multidimensional flow and image cytometric data by a novel data mining technique,** J. F. Leary, Purdue Univ. . . . . [6441-21]

8:50 am: **Automated classification and recognition of bacterial particles in flow by multi-angle scatter measurement and support vector machine classifier,** B. P. Rajwa, M. Venkatapathi, P. P. Banada, K. Ragheb, Purdue Univ.; T. Lary, Beckman-Coulter, Inc.; E. D. Hirleman, Jr., J. P. Robinson, Purdue Univ. . . . . [6441-22]

9:10 am: **CytometryML: a data standard which has been designed to interface with other standards,** R. C. Leif, Newport Instruments . . . [6441-23]

9:30 am: **A system and methodology for high-content visual screening of individual intact living cells in suspension,** O. Renaud, A. Saez-Cirion, S. L. Shorte, Institut Pasteur (France) . . . . . [6441-24]

9:50 am: **Real-time quantitative fluorescence measurement of microscale cell culture analog systems,** T. Oh, D. Kim, Yonsei Univ. (South Korea); D. A. Tatosian, J. H. Sung, M. L. Shuler, Cornell Univ. . . . . [6441-25]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 5

Room: Conv. Ctr. C1 . . . . . Tues. 10:40 am to 12:30 pm

Microscale Devices and Microarrays I

Chair: **James F. Leary**, Purdue Univ.

10:40 am: **Biological applications of an LCoS-based programmable array microscope (PAM)** *(Invited Paper)***,** D. J. Arndt-Jovin, G. M. Hagen, Max-Planck-Institut für biophysikalische Chemie (Germany); W. Caarls, Technische Univ. Delft (Netherlands); A. Hill, Cairn Research Ltd. (United Kingdom); K. A. Lidke, Sandia National Labs.; M. Thomas, Cairn Research Ltd. (United Kingdom); T. M. Jovin, Max-Planck-Institut für biophysikalische Chemie (Germany) . . . . . [6441-26]

11:10 am: **Label-free biomolecule affinity sensing,** D. A. Bergstein, R. J. Irani, M. F. Ruane, C. DeLisi, M. S. Unlu, Boston Univ. . . . . [6441-27]

11:30 am: **Novel microfluidic platform for the analysis of T cell signaling pathways,** S. L. Faley, K. T. Seale, J. Hughey, Vanderbilt Univ.; B. McKinney, D. Unutmaz, Vanderbilt Univ. School of Medicine; F. J. Baudenbacher, J. P. Wikswo, Jr., Vanderbilt Univ. . . . . [6441-28]

11:50 am: **Development of an optical biochip for the analysis of cell environment sensitivity,** D. J. Morris, A. D. Goater, J. P. H. Burt, N. H. Rizvi, Prifysgol Cymru Bangor (United Kingdom); D. Matthews, H. D. Summers, Cardiff Univ. (United Kingdom); I. A. Pope, S. Ameer-Beg, B. Vojnovic, Gray Cancer Institute (United Kingdom); K. L. Njoh, S. Chappell, R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom) . . . . . [6441-29]

12:10 pm: **Improved signal/noise ratio of protein fluorescent spots via collapsed micro-contact printing,** L. Filipponi, Swinburne Univ. of Technology (Australia); D. V. Nicolau, The Univ. of Liverpool (United Kingdom) . . . [6441-46]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 6

Room: Conv. Ctr. C1 . . . . . Tues. 1:30 to 2:40 pm

Microscale Devices and Microarrays II

Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

1:30 pm: **Live cell tracking on an optical biochip platform** *(Invited Paper)***,** K. L. Njoh, Cardiff Univ. (United Kingdom); A. D. Goater, D. J. Morris, J. P. H. Burt, Prifysgol Cymru Bangor (United Kingdom); S. M. Ameer-Beg, King's College London (United Kingdom); S. Chappell, D. Matthews, H. D. Summers, Cardiff Univ. (United Kingdom); I. A. Pope, B. Vojnovic, Gray Cancer Institute (United Kingdom); R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom) . . . . . [6441-31]

2:00 pm: **Semiconductor light-emitting devices with in-built bioreaction chambers,** A. D. Goater, Prifysgol Cymru Bangor (United Kingdom); D. R. Matthews, Cardiff Univ. (United Kingdom); J. P. H. Burt, N. H. Rizvi, D. J. Morris, Prifysgol Cymru Bangor (United Kingdom); H. D. Summers, K. L. Njoh, R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom) . . [6441-32]

2:20 pm: **Precise microinjection into living cells by aummation of fluorescence intensity,** K. Taninaka, A. Yabuki, Fujitsu Labs., Ltd. (Japan); A. Ito, T. Harada, Fujitsu Ltd. (Japan) . . . . . [6441-33]

SESSION 7

Room: Conv. Ctr. C1 . . . . . Tues. 2:40 to 5:30 pm

Optical Manipulation

Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

2:40 pm: **Single-SLM 3D interactive micromanipulation based on the generalized phase contrast (GPC) approach,** P. J. J. L. Rodrigo, I. R. Perch-Nielsen, C. A. C. Alonzo, J. Glückstad, Risø National Lab. (Denmark) . [6441-34]

3:00 pm: **Rotational behavior of erythrocytes in optical trap: revisited by confocal fluorescence microscopy,** K. Mohanty, Univ. of California/Irvine; S. K. Mohanty, Indian Institute of Science (India); S. Monajembashi, K. O. Greulich, Fritz Lipmann Institute (Germany) . . . . . [6441-35]

Coffee Break . . . . . 3:20 to 3:50 pm

3:50 pm: **Optical and rheometrical imaging of mechanotransduction in living cells,** H. D. Ou-Yang, J. Wang, A. Kumar, A. Lengel, Lehigh Univ.; S. Chien, Univ. of California/San Diego . . . . . [6441-36]

4:10 pm: **High-resolution optofluidic microscope with a stable optical trap,** X. Heng, X. Cui, E. Hsiao, D. Psaltis, C. Yang, California Institute of Technology . . . . . [6441-37]

4:30 pm: **Optical tweezers force calibration using a fast shuttering camera,** J. P. Sharpe, California Polytechnic State Univ.; C. Palomares Iniguez, Ctr. de Investigación en Alimentación y Desarrollo, A.C. (Mexico); R. Jimenez-Flores, California Polytechnic State Univ. . . . . [6441-38]

4:50 pm: **On chip optical tweezers for large scale trapping of microparticles,** Y. Sun, L. S. Ong, X. Yuan, Nanyang Technological Univ. (Singapore) . . . . . [6441-39]

5:10 pm: **Single fiber optical tweezers for manipulation of microscopic objects,** S. K. Mohanty, Raja Ramanna Ctr. for Advanced Technology (India); K. Mohanty, Univ. of California/Irvine . . . . . [6441-40]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Development of near-infrared fluorescent probes for nitric oxide and zinc ion,** H. Kojima, K. Kiyose, T. Nagano, The Univ. of Tokyo (Japan) . . . . . [6441-59]

✔ **Ratiometric pH measurements in living nephrocytes using confocal scanning microscopy,** O. Lilje, E. S. Lilje, The Univ. of Sydney (Australia) . . . . . [6441-61]

✔ **Leishmania amazonensis chemotaxis under glucose gradient studied by the strength and directionality of forces measured with optical tweezers,** L. Y. Pozzo, A. Fontes, A. A. de Thomaz, L. C. Barbosa, D. C. Ayres, C. C. Lima, S. Giorgio, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6441-62]

✔ **Diagnosis of cervix using PS-OCT: a statistical analysis,** J. Yoo, S. Lee, M. Kang, J. Kang, Yonsei Univ. (South Korea); S. Jung, Y. Chong, D. Cha, K. Han, Wonju College of Medicine (South Korea); B. Kim, Yonsei Univ. (South Korea) . . . . . [6441-63]

✔ **Biocompatible nanoparticle site-specific probes in pancreatic cell lines: improving sensing, imaging, and therapeutics,** C. C. Perry, D. N. Patel, A. Randriamahefa, N. King, Oakwood College . . . . . [6441-64]

✔ **A study of various effects on SHG in biotissue,** L. Nenrong, Y. Qiu, Fujian Normal Univ. (China) and Key Lab. of OptoElectronic Science and Technology for Medicine of Ministry of Education (China) . . . . . [6441-65]

✔ **Spatial and polarization filtering for trans-illumination tomography,** J. Y. Hwang, A. G. Nowatzyk, D. L. Farkas, S. Wachsmann-Hogiu, Cedars-Sinai Medical Ctr. . . . . [6441-66]

✔ **The monitoring of oscillation of protein state in living cells using tomographic itrference microscope,** G. G. Levin, T. V. Bulygin, G. N. Vishnyakov, All-Russian Research Institute for Optical and Physical Measurement (Russia) . . . . . [6441-67]

✔ **Study on the stability of AflatoxinB1 to several solutions through fluorescence spectral experiment,** W. L. Chen, South China Normal Univ. (China) . . . . . [6441-68]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. C1 . . . . . Wed. 8:00 am to 12:00 pm

Advances in Bioimaging I

Chair: **J. Paul Robinson**, Purdue Univ.

8:00 am: **High-speed, wide-field optically sectioned, live cell fluorescence lifetime imaging** *(Invited Paper)***,** D. M. Grant, S. Kumar, D. M. Owen, P. M. P. Lanigan, C. B. Talbot, J. A. McGinty, J. Requejo-Isidro, I. H. Munro, D. S. Elson, C. W. Dunsby, T. I. Magee, Imperial College London (United Kingdom); T. Bunney, M. Katan, The Institute of Cancer Research (United Kingdom); P. Courtney, PerkinElmer, Inc. (United Kingdom); M. A. A. Neil, P. M. W. French, Imperial College London (United Kingdom) . . . . . [6441-41]

8:30 am: **New analytical method to derive Forster resonant energy transfer (FRET) efficiency and FRET population from time-domain fluorescence lifetime imaging microscopy (FLIM) data,** F. Festy, T. C. Ng, King's College London (United Kingdom) . . . . . [6441-42]

8:50 am: **HiFILO: a high-throughput system for spatial analysis of FISH loci in interphase nuclei,** P. R. Gudla, J. Collins, SAIC-Frederick, Inc.; K. J. Meaburn, T. Misteli, National Cancer Institute; S. J. Lockett, SAIC-Frederick, Inc. . . . . [6441-43]

9:10 am: **Diffraction phase and fluorescence microscopy,** G. Popescu, Y. Park, K. Badizadegan, R. R. Dasari, M. S. Feld, Massachusetts Institute of Technology . . . . . [6441-44]

9:30 am: **Wide-field two-photon microscopy: features and advantages for biomedical applications,** S. Wachsmann-Hogiu, J. Y. Hwang, E. H. Lindsley, D. L. Farkas, Cedars-Sinai Medical Ctr. . . . . [6441-45]

9:50 am: **Biomimetic algorithms to improve the detection of features for microarrays**, D. V. Nicolau, Jr., Univ. of Oxford (United Kingdom); D. J. Bakewell, Univ. of Liverpool (United Kingdom); D. V. Nicolau, The Univ. of Liverpool (United Kingdom) . . . . . [6441-70]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Living organism imaging with the adaptive scanning optical microscope (ASOM),** B. M. Potsaid, F. Finger, J. T. Wen, Rensselaer Polytechnic Institute . . . . . [6441-47]

11:00 am: **Axially resolved cell imaging by intensity modulated total internal reflection fluorescence microscopy (IM-TIRFM),** H. Schneckenburger, H. Bamann, M. Wagner, Fachhochschule Aalen (Germany); W. S. L. Strauss, Univ. Ulm (Germany) . . . . . [6441-48]

11:20 am: **Differential interference contrast microscopy based on Young's interference,** X. Cui, M. Lew, X. Heng, C. Yang, California Institute of Technology . . . . . [6441-49]

11:40 am: **Advances in lasers for multiphoton microscopy,** D. P. Armstrong, Coherent Scotland Ltd. (United Kingdom) . . . . . [6441-50]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 9

Room: Conv. Ctr. C1 . . . . . Wed. 1:20 to 4:30 pm

Advances in Bioimaging II

Chair: **Sebastian Wachsmann-Hogiu**, Cedars-Sinai Medical Ctr.

1:20 pm: **Time-gated confocal Raman microscopy: system design and its applications,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6441-51]

1:40 pm: **Contrast enhancement in biomedical optical imaging,** R. Zelikowsky, D. Shandling, E. H. Lindsley, K. Burton, D. L. Farkas, Cedars-Sinai Medical Ctr. . . . . [6441-52]

2:00 pm: **Automatic image analysis of in-vivo protein localization in wide-field microscopy: a quantitative study of GFP-tagged proteins in budding yeast,** K. I. Logg, M. Kvarnström, A. Diez, M. Käll, Chalmers Tekniska Högskola (Sweden) . . . . . [6441-53]

2:20 pm: **Rapid hyperspectral fluorescence lifetime imaging,** D. M. Owen, H. B. Manning, P. de Beule, C. B. Talbot, J. Requejo-Isidro, C. W. Dunsby, J. A. McGinty, R. K. P. Benninger, D. S. Elson, I. H. Munro, N. P. Galletly, J. Lever, G. W. Stamp, P. Anand, M. A. A. Neil, P. M. W. French, Imperial College London (United Kingdom) . . . . . [6441-54]

2:40 pm: **Quantitative orientation-independent differential interference contrast (DIC) microscopy,** M. I. Shribak, Marine Biological Lab.; J. LaFountain, Univ. at Buffalo; D. S. C. Biggs, AutoQuant Imaging Inc.; S. Inoue, Marine Biological Lab. . . . . [6441-55]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Gamma-H2AX foci counting: image processing and control software for high-content screening,** P. R. Barber, R. J. Locke, G. P. Pierce, K. Rothkamm, B. Vojnovic, Gray Cancer Institute (United Kingdom) . . [6441-56]

3:50 pm: **Intelligent multispectral signature bioimaging for surgical applications,** J. Jeong, M. Gaon, P. Frykman, A. Chung, E. H. Lindsley, J. Y. Hwang, S. Wachsmann-Hogiu, D. L. Farkas, Cedars-Sinai Medical Ctr. . . . . [6441-57]

4:10 pm: **Aberrated optical tweezers for manipulation of microscopic objects,** S. K. Mohanty, P. K. Gupta, Raja Ramanna Ctr. for Advanced Technology (India) . . . . . [6441-58]

Sunday-Tuesday 21-23 January 2007 • Proceedings of SPIE Vol. 6442

Multiphoton Microscopy in the Biomedical Sciences VII

Conference Chairs: **Ammasi Periasamy**, Univ. of Virginia; **Peter T. C. So**, Massachusetts Institute of Technology

Program Committee: **Guy C. Cox**, The Univ. of Sydney (Australia); **Alberto Diaspro**, Univ. degli Studi di Genova (Italy); **Scott E. Fraser**, California Institute of Technology; **Hans C. Gerritsen**, Univ. Utrecht (Netherlands); **Min Gu**, Swinburne Univ. of Technology (Australia); **Stefan W. Hell**, Deutsches Krebsforschungszentrum (Germany); **Brian A. Herman**, The Univ. of Texas Health Science Ctr. at San Antonio; **Satoshi Kawata**, Osaka Univ. (Japan); **Karsten König**, Fraunhofer-Institut für Biomedizinische Technik (Germany); **Arnd K. Krueger**, Spectra-Physics Lasers; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Stephen M. McDonald**, Coherent, Inc.; **Jerome Mertz**, Boston Univ.; **Simon C. Watkins**, Univ. of Pittsburgh; **Paul W. Wiseman**, McGill Univ. (Canada); **David L. Wokosin**, Northwestern Univ.; **Sunney Xie**, Harvard Univ.; **Bernhard Zimmermann**, Carl Zeiss Jena GmbH (Germany); **Warren R. Zipfel**, Cornell Univ.

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Sunday 21 January

Welcome Remarks . . . . . **Sun. 8:10 am**

Chair: **Ammasi Periasamy**, Univ. of Virginia

SESSION 1

Room: Conv. Ctr. A4 . . . . . **Sun. 8:20 to 9:00 am**

Opening Lecture

Chair: **Ammasi Periasamy**, Univ. of Virginia

8:20 am: **CARS propelling biomedicine** *(Invited Paper)*, S. Xie, Harvard Univ. . . . . [6442-01]

SESSION 2

Room: Conv. Ctr. A4 . . . . . **Sun. 9:00 am to 12:00 pm**

CARS and Raman Microscopy I

Chair: **Sunney Xie**, Harvard Univ.

9:00 am: **Tip-applied pressure: a step forward in near-field Raman microscopy** *(Invited Paper)*, S. Kawata, Osaka Univ. (Japan) and RIKEN (Japan); P. Verma, T. Yano, Osaka Univ. (Japan) . . . . . [6442-02]

9:30 am: **Imaging of demyelination in a mouse model of multiple sclerosis by video rate coherent anti-Stokes Raman microscopy,** D. Cote, Massachusetts General Hospital; J. Imitola, S. Rasmussen, Harvard Medical School; S. Xie, Harvard Univ.; S. Khoury, Harvard Medical School; C. P. Lin, Massachusetts General Hospital . . . . . [6442-03]

9:50 am: **Single pulse interferometric coherent anti-Stokes Raman scattering (CARS) microscopy,** S. Lim, Univ. of California/Berkeley; A. G. Caster, Lawrence Berkeley National Lab.; S. R. Leone, Univ. of California/Berkeley . . . . . [6442-04]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Quantitative multiplex CARS spectroscopy in congested spectral regions** *(Invited Paper)*, M. Mueller, H. Rinia, Univ. van Amsterdam (Netherlands); M. Bonn, Leiden Univ. (Netherlands); E. E. M. Vartiainen, Lappeenrannan Teknillinen Yliopisto (Finland) . . . . . [6442-05]

11:00 am: **CARS endoscopy,** C. L. Evans, F. Legare, S. Xie, Harvard Univ. . . . . [6442-06]

11:20 am: **Coherent anti-Stokes Raman scattering microscope of a high-signal to noise ratio, high-stability, and high-speed imaging for live cell observation,** S. Hayashi, S. Takimoto, T. Hashimoto, Olympus Corp. (Japan) . . . . . [6442-07]

11:40 am: **Raman versus CARS microscopy: when one is better than another,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6442-08]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 3

Room: Conv. Ctr. A4 . . . . . **Sun. 1:00 to 5:20 pm**

CARS and Raman Microscopy II

Chair: **Michiel Mueller**, Univ. van Amsterdam (Netherlands)

1:00 pm: **Driving CARS into the biological field** *(Invited Paper)*, J. Cheng, Purdue Univ. . . . . [6442-09]

1:30 pm: **Broadband CARS microscopy for noninvasive characterization of cells** *(Invited Paper)*, M. T. Cicerone, J. Zhao, Y. J. Lee, National Institute of Standards and Technology; T. Kee, The Univ. of Adelaide (Australia) . [6442-10]

2:00 pm: **CARS imaging with a new 532-nm synchronously pumped picosecond OPO,** E. Büttner, APE GmbH (Germany); S. Carrasco, C. L. Evans, F. S. Ganikhanov, Harvard Univ.; J. G. Herbst, APE GmbH (Germany); D. Kopf, High Q Laser Production GmbH (Austria); I. Rimke, APE GmbH (Germany); S. Xie, Harvard Univ. . . . . [6442-11]

2:20 pm: **Full-frame (non-scanning) CARS microscopy,** I. Toytman, K. Cohn, D. M. Simanovskii, T. I. Smith, Stanford Univ.; D. V. Palanker, Stanford Univ. Medical Ctr. . . . . [6442-12]

2:40 pm: **In-vivo coherent anti-Stokes Raman scattering imaging of sciatic nerve,** T. B. Huff, J. Cheng, Purdue Univ. . . . . [6442-13]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **CARS microscopy of anthrax spores** *(Invited Paper)*, M. O. Scully, Texas A&M Univ. and Princeton Univ.; V. A. Sautenkov, A. Sokolov, G. R. Welch, Texas A&M Univ.; V. V. Yakovlev, Univ. of Wisconsin/Milwaukee . . . . . [6442-14]

4:00 pm: **Dual-CARS microscopy** *(Invited Paper)*, A. M. K. Enejder, C. Brackmann, Chalmers Tekniska Högskola (Sweden); O. Burkacky, Ludwig-Maximilians-Univ. Muenchen (Germany); S. Edberg, Chalmers Tekniska Högskola (Sweden) . . . . . [6442-15]

4:30 pm: **Spatial beam shaping in CARS microscopy** *(Invited Paper)*, E. O. Potma, V. V. Krishnamachari, Univ. of California/Irvine . . . . . [6442-16]

5:00 pm: **Interferometric Fourier transform coherent anti-Stokes Raman microscopy,** J. P. Ogilvie, M. Cui, J. Skodack, Univ. of Michigan; M. Joffre, Ecole Polytechnique (France) . . . . . [6442-17]

✔ Posters-Sunday

Chairs: **Keith M. Berland**, Emory Univ.; **Angelika C. Rueck**, Univ. Ulm (Germany); **Paul J. Campagnola**, Univ. of Connecticut Health Ctr.

Posters will be on display from 5:30 pm Sunday afternoon in the hallway near the conference room. A poster session, with authors present at their posters, will be held on Sunday from 6:00 to 7:30 pm.

Poster presenters may post their poster papers Sunday afternoon starting at 5:30 pm and will need to remove their papers immediately following the poster session. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees. Attendees are requested to wear their conference registration badges.

***Presentations included in the Student Poster Competition**

✔ **Multiphoton fluorescence imaging of NADH to quantify metabolic changes in epileptic tissue in vitro,** T. H. Chia, J. P. Zinter, A. Williamson, D. D. Spencer, M. J. Levene, Yale Univ. . . . . [6442-60]*

✔ **Interleaved dual-wavelength multiphoton imaging system for heterologous FRET and versatile fluorescent protein excitation,** T. Zal, M. A. Zal, M. Nelson, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6442-61]*

✔ **Intravital multiphoton microscopy for imaging hepatobiliary function,** Y. Liu, F. Li, T. Sun, National Taiwan Univ. (Taiwan); H. Chen, L. Chiou, S. Yang, H. Lee, National Taiwan Univ. Hospital (Taiwan); C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6442-62]*

✔ **Backward second-harmonic generation from starch for in-situ, real-time pulse characterization in nonlinear microscopy,** A. Thayil Karunakaran Nair, E. J. Gualda, I. G. Cormack, S. Soria, P. Loza-Alvarez, Institut de Ciències Fotòniques (Spain) . . . . . [6442-63]*

✔ **Using nonlinear microscopy to study articular cartilage,** J. C. Mansfield, C. P. Winlove, K. M. Knapp, S. J. Matcher, The Univ. of Exeter (United Kingdom) . . . . . [6442-64]*

✔ **Myosin rods are a source of second-harmonic generation signals in skeletal muscle,** S. Schuermann, C. Weber, R. H. A. Fink, M. Vogel, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6442-65]*

✔ **Investigation of signaling in 3D breast cancer models with spectral lifetime multiphoton microscopy,** S. M. Trier, S. Ponik, J. Yan, P. Provenzano, K. Kumfer, K. W. Eliceiri, J. G. White, P. J. Keely, Univ. of Wisconsin/Madison . . . . . [6442-66]*

✔ **Pushing the sensitivity limit of coherent anti-Stokes Raman scattering microscopy,** B. G. Saar, F. S. Ganikhanov, C. L. Evans, S. Carrasco, S. Xie, Harvard Univ. . . . . [6442-67]*

✔ **Two-photon luminescence imaging using gold nanorods to increase depth of imaging for cancer detection,** N. J. Durr, D. K. Smith, The Univ. of Texas/Austin; K. Sokolov, The Univ. of Texas M.D. Anderson Cancer Ctr.; B. A. Korgel, A. Ben-Yakar, The Univ. of Texas/Austin . . . . . [6442-68]*

✔ **In-vivo multiphoton-endoscopy of endogenous skin fluorophores,** A. Ehlers, S. Schenkl, Fraunhofer-Institut für Biomedizinische Technik (Germany) and Saarland Univ. (Germany); I. Riemann, Fraunhofer-Institut für Biomedizinische Technik (Germany); B. Messerschmidt, GrinTech GmbH (Germany); M. Kaatz, Friedrich-Schiller-Univ. Jena (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) and Saarland Univ. (Germany) . . . . . [6442-69]*

✔ **The influence of NIR femtosecond laser radiation on the viability of 3D stem cell clusters and tumor spheroids,** I. Riemann, A. A. Uchugonova, F. Stracke, Fraunhofer-Institut für Biomedizinische Technik (Germany); S. Martin, JenLab GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6442-70]*

✔ **In-vivo mucosal tissue imaging using fiber-based two-photon microscopy,** X. Xiao, The Univ. of Texas Medical Branch at Galveston . . . . . [6442-71]*

✔ **Optical effects of the cranium in transcranial in-vivo two-photon laser scanning microscopy in mice,** P. J. Helm, Univ. of Oslo (Norway) and Ctr. for Molecular Biology and Neuroscience (Norway); O. Ottersen, G. Nase, Univ. of Oslo (Norway) . . . . . [6442-72]

✔ **Characterization of the nonlinear optical properties of silk as a novel biomaterial for tissue engineering,** I. Georgakoudi, S. Firdous, W. Rice, H. J. Kim, D. L. Kaplan, Tufts Univ. . . . . [6442-73]

✔ **Development of an algorithm to remove acceptor spectral bleedthrough in spectral FRET imaging microscopy,** Y. Chen, A. Periasamy, Univ. of Virginia . . . . . [6442-74]

✔ **SIPcharts using uniform ultra-thin and thin fluorescent layers for Z-response measurements in two-photon excitation fluorescence microscopy,** G. Vicidomini, Univ. degli Studi di Genova (Italy); J. M. Zwier, Univ. van Amsterdam (Netherlands); P. Bianchini, F. Cella, E. Ronzitti, S. Krol, Univ. degli Studi di Genova (Italy); T. Szellas, Leica Microsystems Heidelberg GmbH (Germany); F. Brakenhoff, Univ. van Amsterdam (Netherlands); A. Diaspro, Univ. degli Studi di Genova (Italy) and IFOM/LAMBS (Italy) . . . . . [6442-75]

✔ **FT-Raman spectra of platymonas subcordiformis,** R. Chen, Y. Li, L. Wang, L. Ou, L. Xie, H. Zhuang, Fujian Normal Univ. (China) . . . . . [6442-77]

✔ **Multiphoton tomography of wound healing and scar forming in vivo,** I. Riemann, A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany); R. LeHarzic, S. Martin, JenLab GmbH (Germany); A. Reif, Friedrich-Schiller-Univ. Jena (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6442-78]

✔ **Multiphoton and magnetic resonance imaging of Barley embryos: comparing micro-imaging techniques across scale and parameter barriers,** M. Stark, B. Manz, I. Riemann, F. Volke, Fraunhofer-Institut für Biomedizinische Technik (Germany); W. Weschke, Leibniz Institute of Plant Genetics and Crop Plant Research (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6442-79]

✔ **Single and two-photon conversion of photoactivatable fluorescent proteins,** G. C. Cox, A. Salih, The Univ. of Sydney (Australia) . . . . [6442-81]

Monday 22 January

SESSION 4

Room: Conv. Ctr. A4 . . . . . Mon. 8:10 am to 12:10 pm

Technology Development and Applications I

Chair: **Peter T. C. So**, Massachusetts Institute of Technology

8:10 am: **New developments in ultra-fast laser sources for biological applications,** V. David, Spectra-Physics Lasers . . . . . [6442-18]

8:30 am: **Toward portable two-photon fluorescence micro-endoscopy using a two-dimensional microelectromechanical systems (MEMS) scanning mirror,** W. Piyawattanametha, B. A. Flusberg, R. P. J. Baretto, J. C. Jung, T. H. Ko, E. D. Cocker, H. Ra, D. Lee, O. D. Solgaard, M. J. Schnitzer, Stanford Univ. . . . . [6442-19]

8:50 am: **Miniature endoscopic microscopy for in-vivo cellular imaging,** P. Kim, Massachusetts General Hospital; C. Rim, Hannam Univ. (South Korea); M. Puoris'haag, J. Spencer, D. Cote, I. Veilleux, P. Zamiri, C. P. Lin, S. Yun, Massachusetts General Hospital . . . . . [6442-20]

9:10 am: **Combined spectrally-resolved multiphoton microscopy and transmission microscopy employing a high-sensitivity electron-multiplying CCD camera,** V. Raicu, M. Melnichuk, R. Fung, D. Gillman, Univ. of Wisconsin/Milwaukee . . . . . [6442-21]

9:30 am: **A compact 15-mm wide two-photon Microscope for imaging and femtosecond laser microsurgery,** C. L. Hoy, N. J. Durr, S. Douglass, The Univ. of Texas/Austin; S. Mallick, O. D. Solgaard, Stanford Univ.; A. Ben-Yakar, The Univ. of Texas/Austin . . . . . [6442-22]

9:50 am: **Infrared multiphoton microscopy beyond 1 micron: a substantial improvement for biomedical applications,** I. Rimke, E. Büttner, APE GmbH (Germany); V. Andresen, LaVision BioTec GmbH (Germany); P. Friedl, Univ. Würzburg (Germany) . . . . . [6442-23]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Undistorted delivery of sub-15-fs pulses via high-numerical-aperture microscope objectives,** G. Tempea, Femtolasers Produktions GmbH (Austria); B. Považay, Cardiff Univ. (United Kingdom); A. Assion, FemtoLasers, Inc.; A. Isemann, Femtolasers Produktions GmbH (Austria); V. J. Pervak, Max-Planck-Institut für Quantenoptik (Germany); M. Kempe, Carl Zeiss Jena GmbH (Germany); A. Stingl, FemtoLasers, Inc.; W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6442-24]

10:50 am: **Fiber coupling of an infrared femtosecond laser to a multiphoton microscope,** E. P. Mottay, S. Gueguen, A. Courjaud, Amplitude Systemes (France); D. Choquet, P. Legros, Univ. Victor Segalen Bordeaux 2 (France) . . . . . [6442-25]

11:10 am: **Comparative study of two-photon fluorescent bio-markers at nanosecond and femtosecond pulsed excitation,** B. H. Peterson, Alabama A&M Univ.; S. S. Sarkisov, SSS Optical Technologies, LLC; V. N. Nesterov, New Mexico Highlands Univ.; A. M. Urbas, Air Force Research Lab.; M. J. Curley, J. Wang, Alabama A&M Univ. . . . . [6442-26]

11:30 am: **Two-photon fluorescence imaging with a practical picosecond (< 5ps) pulse-source based on a gain-switched laser diode at 980 nm,** K. Taira, T. Hashimoto, Olympus Corp. (Japan); H. Yokoyama, Tohoku Univ. (Japan) . . . . . [6442-27]

11:50 am: **Adaptive optics in confocal and two-photon microscopy of rat brain: a single correction per optical section,** J. M. Girkin, J. Vijverberg, M. Orazio, S. Poland, A. J. Wright, Univ. of Strathclyde (United Kingdom) . . . . . [6442-28]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 5

Room: Conv. Ctr. A4 . . . . . Mon. 1:10 to 5:30 pm

FRET, FLIM, and FCS

Chairs: **Keith M. Berland**, Emory Univ.; **Karsten König**, Fraunhofer-Institut für Biomedizinische Technik (Germany)

1:10 pm: **New features of TCSPC FLIM,** W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6442-29]

1:30 pm: **Multidimensional fluorescence lifetime measurements,** C. U. Biskup, T. Zimmer, B. Hoffmann, Friedrich-Schiller-Univ. Jena (Germany); L. Kelbauskas, Arizona State Univ.; S. Dietrich, Friedrich-Schiller-Univ. Jena (Germany); N. Klöcker, Albert-Ludwigs-Univ. Freiburg (Germany); W. Becker, A. Bergmann, Becker & Hickl GmbH (Germany); K. Benndorf, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6442-30]

1:50 pm: **Refractive index sensing using fluorescence lifetime imaging (FLIM),** C. L. Tregidgo, K. Suhling, King's College London (United Kingdom) . . . . . [6442-31]

2:10 pm: **Combined spectral lifetime microscopy for in-vivo cell biology and cancer studies,** L. Yan, K. W. Eliceiri, P. J. Keely, J. G. White, Univ. of Wisconsin/Madison . . . . . [6442-32]

2:30 pm: **SLIM: A sophisticated method for molecular imaging** *(Invited Paper)***,** A. C. Rueck, Univ. Ulm (Germany); F. Dolp, C. von Arnim, O. Fugger, R. Steiner, ... [6442-33]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Investigating the self-assembly of amyloid peptides using two-photon microscopy,** Y. Liang, D. G. Lynn, K. M. Berland, Emory Univ. [6442-34]

3:50 pm: **Spatiotemporal image correlation spectroscopy with wide-field multiphoton excitation microscopy,** D. Kim, P. T. C. So, Massachusetts Institute of Technology . . . . . [6442-35]

4:10 pm: **Full photon information data structure applied to laser scanning microscopes enabling FLIM, FRET, and FCS data analysis,** U. Ortmann, B. Kramer, V. Buschmann, F. Koberlin, M. Wahl, M. Patting, R. Erdmann, PicoQuant GmbH (Germany) . . . . . [6442-36]

4:30 pm: **Imaging protein interaction at the cellular membrane: total internal reflection fluorescence lifetime imaging,** S. M. Ameer-Beg, King's College London (United Kingdom); A. M. Quirke, Gray Cancer Institute (United Kingdom) and King's College London (United Kingdom); T. C. Ng, King's College London (United Kingdom); B. Vojnovic, Gray Cancer Institute (United Kingdom) [6442-37]

4:50 pm: **In-vivo multiphoton microscopy of metabolic oxidation-reduction states and NADH fluorescence lifetimes in normal and pre-cancerous epithelia** *(Presentation Only)***,** M. C. Skala, Duke Univ.; K. M. Riching, A. Gendron-Fitzpatrick, J. Eickhoff, K. W. Eliceiri, Univ. of Wisconsin/Madison; N. Ramanujam, Duke Univ. . . . . [6442-38]

5:10 pm: **Annihilation microscopy: a new contrast mechanism obtained with spectrally resolved fluorescence lifetime imaging,** R. Cisek, S. Musikhin, A. Tuer, A. Major, V. Barzda, Univ. of Toronto at Mississauga (Canada) . . . . . [6442-39]

Tuesday 23 January

SESSION 6

Room: Conv. Ctr. A4 . . . . . Tues. 8:00 am to 12:00 pm

Second-Harmonic Generation Microscopy

Chairs: **Paul J. Campagnola**, Univ. of Connecticut Health Ctr.; **Chen-Yuan Dong**, National Taiwan Univ. (Taiwan)

8:00 am: **In-vivo two-photon microendoscopy for intradermal high-resolution imaging** *(Invited Paper)***,** K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany); A. Ehlers, Fraunhofer-Institut für Biomedizinische Technik (Germany) and Saarland Univ. (Germany); B. Messerschmidt, GrinTech GmbH (Germany); S. Schenkl, Fraunhofer-Institut für Biomedizinische Technik (Germany) and Saarland Univ. (Germany); I. Riemann, Fraunhofer-Institut für Biomedizinische Technik (Germany); M. Kaatz, Friedrich-Schiller-Univ. Jena (Germany); R. LeHarzic, A. V. Tchernook, JenLab GmbH (Germany) . . . . . [6442-40]

8:30 am: **Second-harmonic generation imaging microscopy of normal and diseased tissues,** P. J. Campagnola, O. Nadiarnykh, S. Plotnikov, R. LaComb, W. A. Mohler, Univ. of Connecticut Health Ctr. . . . . [6442-41]

8:50 am: **Third-harmonic generation microscopy of tissues and embryos: nonlinear susceptibility measurements and sources of contrast,** D. Debarre, W. Supatto, N. Olivier, J. Martin, Ecole Polytechnique (France); E. Farge, Institut Curie (France); E. Beaurepaire, Ecole Polytechnique (France) . . . . . [6442-42]

9:10 am: **Multiphoton microscopy and second-harmonic generation for evaluating extracellular changes in aortic aneurysm,** G. Vargas, A. Recinos III, T. Shilagard, C. Lee, H. Sun, A. Brasier, The Univ. of Texas Medical Branch at Galveston . . . . . [6442-43]

9:30 am: **Study of skeletal muscle cross-bridge population dynamics by second-harmonic generation,** C. Stringari, L. Sacconi, F. Vanzi, C. Tesi, N. Pirrodi, C. Poggesi, Univ. degli Studi di Firenze (Italy); A. Milani, Univ. degli Studi di Milano (Italy); V. Nucciotti, M. Linari, G. Piazzesi, V. Lombardi, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6442-44]

9:50 am: **THG microscopy: applications and an anomalous behavior in Z-response,** R. S. Pillai, F. Brakenhoff, M. Mueller, Univ. van Amsterdam (Netherlands) . . . . . [6442-45]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Spectrally resolved multiphoton imaging of post-mortem biopsy and in-vivo mouse skin tissues** *(Invited Paper)***,** H. C. Gerritsen, J. A. Palero, Univ. Utrecht (Netherlands); H. S. de Bruijn, A. van der Ploeg van den Heuvel, H. J. C. M. Sterenborg, Univ. Medisch Ctr. Rotterdam (Netherlands) . [6442-46]

11:00 am: **Second-harmonic generation polarization microscopy by rotation of excitation light,** P. T. Fwu, W. Chen, C. Chou, C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6442-47]

11:20 am: **Second-harmonic generation investigation of collagen thermal denaturation,** Y. Sun, W. Chen, National Taiwan Univ. (Taiwan); S. Lin, S. Jee, National Taiwan Univ. Hospital (Taiwan); Y. Chen, L. Lin, National Taiwan Univ. (Taiwan); P. T. C. So, Massachusetts Institute of Technology; C. Dong, National Taiwan Univ. (Taiwan) . . . . . [6442-48]

11:40 am: **Multiphoton imaging of extracellular matrix remodeling: quantitative scoring and three-dimensional architecture of collagenous fibrosis,** M. Strupler, École Polytechnique (France) and INSERM (France) and CNRS (France); A. Pena, École Polytechnique (France) and CNRS (France) and INSERM (France); A. Fabre, INSERM (France) and AP-HP, Hôpital Bichat-Claude Bernard (France) and Univ. Paris 7 (France); M. Hernest, École Polytechnique (France) and INSERM (France) and Hôpital Tenon (France); D. Debarre, École Polytechnique (France) and CNRS (France) and INSERM (France); P. Tharaux, INSERM (France) and Univ. Paris 7 (France) and Hôpital Tenon (France); J. Marchal-Somme, INSERM (France) and AP-HP, Hôpital Bichat-Claude Bernard (France); B. Crestani, INSERM (France) and AP-HP, Hôpital Bichat-Claude Bernard (France) and Univ. Paris 7 (France); J. Martin, École Polytechnique (France) and INSERM (France) and CNRS (France); E. Beaurepaire, M. Schanne-Klein, École Polytechnique (France) and CNRS (France) and INSERM (France) . . . . . [6442-49]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 7

Room: Conv. Ctr. A4 . . . . . Tues. 1:30 to 5:20 pm

Technology Development and Applications II

Chair: **Alberto Diaspro**, Univ. degli Studi di Genova (Italy)

1:30 pm: **Optical nano-injection into cells and 3D stem cell clusters via a NIR femtosecond laser,** I. Riemann, F. Stracke, A. A. Uchugonova, Fraunhofer-Institut für Biomedizinische Technik (Germany); S. Martin, JenLab GmbH (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6442-50]

1:50 pm: **Background subtraction by aberration modulation in two-photon fluorescence imaging of thick tissue,** A. A. Leray, J. Mertz, Boston Univ. . . . . [6442-51]

2:10 pm: **Three-dimensional mophology study in muscle tissue using two-photon microscopy,** H. Kwon, P. T. C. So, Massachusetts Institute of Technology . . . . . [6442-52]

2:30 pm: **Multispectral time-resolved multiphoton imaging of basal cell carcinoma,** R. Cicchi, S. Sestini, P. Carli, V. De Giorgi, D. Massi, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . . . . [6442-53]

2:50 pm: **Self-phase modulation and two-photon absorption imaging of cells and active neurons,** M. C. Fischer, H. Liu, R. Yasuda, W. S. Warren, Duke Univ. . . . . [6442-54]

3:10 pm: **In-vivo high-resolution two-photon time lapse microscopy of zebra-fish embryo development,** N. Peyrieras, Institut Federatif de Neurobiologie Alfred Fessard (France); S. Gueguen, E. P. Mottay, Amplitude Systemes (France) . . . . . [6442-55]

Coffee Break . . . . . 3:30 to 4:00 pm

4:00 pm: **Time-resolved two-photon fluorescence microscopy of porphyrin photosensitizers,** D. K. Bird, S. Mathai, S. S. Stylli, T. A. Smith, K. P. Ghiggino, The Univ. of Melbourne (Australia) . . . . . [6442-56]

4:20 pm: **Two-photon deep imaging through skin and skull of Zebra finches: preliminary studies for in-vivo brain metabolism monitoring,** D. Abi Haidar, T. Olivier, S. Mottin, Univ. Jean Monnet Saint-Etienne (France) . . . . . [6442-57]

4:40 pm: **Spectral unmixing in two-photon microscopy for simultaneous imaging of multiple fluorophores in turbid media,** M. Ducros, L. Moreaux, J. Bradley, S. Charpak, Univ. Paris 5 (France) . . . . . [6442-58]

5:00 pm: **Laser-induced microlesion of single dendrites in living mice,** L. Sacconi, A. Masi, F. S. Pavone, Univ. degli Studi di Firenze (Italy) . . [6442-59]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday-Thursday 24-25 January 2007 • Proceedings of SPIE Vol. 6443

Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XIV

Conference Chairs: **Jose-Angel Conchello,** Oklahoma Medical Research Foundation; **Carol J. Cogswell,** Univ. of Colorado/Boulder; **Tony Wilson,** Univ. of Oxford (United Kingdom)

Program Committee: **Fred Brakenhoff,** Univ. van Amsterdam (Netherlands); **Thomas G. Brown,** Univ. of Rochester; **Charles A. DiMarzio,** Northeastern Univ.; **Mats G. Gustafsson,** Univ. of California/San Francisco; **Gordon S. Kino,** Stanford Univ.; **Raimund J. Ober,** The Univ. of Texas at Dallas; **Rudolf Oldenbourg,** Marine Biological Lab.

Tuesday 23 January

✔ Posters-Tuesday

Room: Conv. Ctr. A6 . . . . . Tues. 6:00 to 7:30 pm

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **An optical tomographic microscope for use in histology**, S. Vertu, E. Maeda, I. Yamada, J. Delaunay, The Univ. of Tokyo (Japan); O. Haeberle, Univ. de Haute-Alsace (France); Y. Okamoto, Chiba Univ. (Japan) . [6443-41]

✔ **Measurement of relative phase distribution of onion epidermal cells by using the polarization microscope**, I. H. Shin, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6443-42]

✔ **High-speed line-scanning confocal microscope for biological imaging**, S. Jung, S. Ju, C. Kim, Y. Cho, H. Jeong, B. Kim, Yonsei Univ. (South Korea) . . . . . [6443-43]

✔ **Soft computing approach to confocal and two-photon excitation microscopy**, G. Vicidomini, Univ. degli Studi di Genova (Italy); P. P. Mondal, Abdus Salam International Ctr. for Theoretical Physics (Italy); A. Diaspro, Univ. degli Studi di Genova (Italy) . . . . . [6443-44]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.; **Jennifer Kehlet Barton,** The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. A6 . . . . . Wed. 8:20 to 10:00 am

Chair: **Raimund J. Ober**, The Univ. of Texas at Dallas

Room: Conv. Ctr. A6 . . . . . Wed. 8:20 to 10:00 am

8:20 am: **Volumetric time-encoded frequency domain OCT**, B. Považay, A. Unterhuber, B. M. Hermann, B. Hofer, Cardiff Univ. (United Kingdom); H. Sattmann, Medizinische Univ. Wien (Austria); S. D. Yakubovich, V. R. Shidlovski, Superlum Diodes Ltd. (Russia); H. Arthaber, Technische Univ. Wien (Austria); W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6443-01]

8:40 am: **Fluorescence coherence tomography**, A. Bilenca, A. Ozcan, B. E. Bouma, G. Tearney, Massachusetts General Hospital . . . . . [6443-02]

9:00 am: **Optical projection tomography with exact parallel integral approach**, Y. Wang, R. K. Wang, Oregon Health and Science Univ. . . [6443-03]

9:20 am: **3D cell imaging with extended depth of field Fourier domain optical coherence microscopy**, R. A. Leitgeb, M. L. Villiger, A. H. Bachmann, W. Pralong, École Polytechnique Fédérale de Lausanne (Switzerland); P. Meda, Univ. de Genève (Switzerland); T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6443-04]

9:40 am: **Optical coherence microscopy with a high-speed frequency swept Fourier domain modelocked laser**, S. Huang, A. D. Aguirre, R. A. Huber, D. C. Adler, J. G. Fujimoto, Massachusetts Institute of Technology . . . [6443-05]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 2

Room: Conv. Ctr. A6 . . . . . Wed. 10:20 am to 12:00 pm

Methods for Improved Spatial and Temporal Resolution

Chair: **Mats G. Gustafsson**, Univ. of California/San Francisco

10:20 am: **Investigation of image properties in super-resolution microscopy using two-color fluorescence dip spectroscopy**, Y. Iketaki, T. Watanabe, Olympus Corp. (Japan); N. Bokor, Budapest Univ. of Technology and Economics (Hungary); M. Fujii, Tokyo Institute of Technology (Japan) . . . . . [6443-06]

10:40 am: **Mirror tunnel microscopy for wide-field imaging**, A. Ozcan, A. Bilenca, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6443-07]

11:00 am: **Modulation techniques for three-dimensional microscopy with CCD camera**, F. Chasles, Univ. Pierre et Marie Curie (France); B. Dubertret, V. Loriette, C. Boccara, École Supérieure de Physique et de Chimie Industrielles (France) . . . . . [6443-08]

11:20 am: **Large-area subpixel resolution imaging using a spatial light modulator**, A. Ballestad, B. McFadden, P. M. Lane, C. E. MacAulay, The BC Cancer Research Ctr. (Canada) . . . . . [6443-09]

11:40 am: **True-color nanosecond fluorescence imaging for multiplexed detection of biological labels**, C. G. Morgan, Univ. of Salford (United Kingdom) and Photonic Research Systems Ltd. (Venezuela); A. C. Mitchell, Univ. of Salford (United Kingdom) . . . . . [6443-10]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 3

Room: Conv. Ctr. A6 . . . . . Wed. 1:00 to 3:00 pm

New Methods and Instruments I: Fluorescence

Chair: **Fred Brakenhoff**, Univ. van Amsterdam (Netherlands)

1:00 pm: **Absolute and relative quantification and calibration for sectioning fluorescence microscopy using standardized uniform fluorescent layers and SIPchart-based correction procedures**, F. Brakenhoff, Univ. van Amsterdam (Netherlands) . . . . . [6443-26]

1:20 pm: **A novel approach to determining the three-dimensional location of microscopic objects with applications to 3D particle tracking**, S. Ram, The Univ. of Texas Southwestern Medical Ctr. at Dallas; J. Chao, P. Prabhat, The Univ. of Texas at Dallas and The Univ. of Texas Southwestern Medical Ctr. at Dallas; E. S. Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; R. J. Ober, The Univ. of Texas at Dallas . . . . . [6443-11]

1:40 pm: **Compact optical design for a dual-axes confocal endoscopic microscope**, M. J. Mandella, J. T. C. Liu, W. Piyawattanametha, H. Ra, P. Hsiung, L. K. Wong, O. D. Solgaard, T. D. Wang, C. H. Contag, G. S. Kino, Stanford Univ. . . . . [6443-12]

2:00 pm: **A hyperspectral three-dimensional wide-field microscope with structured illumination**, J. Gong, X. Li, Northwestern Univ. . . . . [6443-13]

2:20 pm: **Spectral imaging of microscopic samples with high-performance CCD array-based spectrometer**, O. Pawluczyk, R. Pawluczyk, P&P Optica Inc. (Canada) . . . . . [6443-14]

2:40 pm: **An optical technique for fast focusing applied to high-aperture microscopy**, E. J. Botcherby, R. Juskaitis, M. J. Booth, T. Wilson, Univ. of Oxford (United Kingdom) . . . . . [6443-15]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. A6 . . . . . Wed. 3:30 to 5:10 pm

New Methods and Instruments II: Phase and Reflected Light

Chair: **Thomas G. Brown**, Univ. of Rochester

3:30 pm: **Lensless differential microscopy for high-resolution imaging**, A. Ozcan, A. Bilenca, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital . . . . . [6443-16]

3:50 pm: **Three-dimensional imaging using grating-based quadrature phase interferometer**, J. Wu, Z. Yaqoob, X. Cui, X. Heng, C. Yang, California Institute of Technology . . . . . [6443-17]

4:10 pm: **Multiwavelength digital holographic microscopy for submicron topography of reflecting specimens**, F. Montfort, F. Charrière, École Polytechnique Fédérale de Lausanne (Switzerland); E. Cuche, Lyncee Tec SA (Switzerland); P. P. Marquet, Ctr. Hospitalier Univ. Vaudois (Switzerland); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6443-18]

4:30 pm: **A compact polarization converter to observe molecular orientation**, M. Hashimoto, R. Kanamaru, K. Yoshiki, T. Araki, Osaka Univ. (Japan); N. Hashimoto, Citizen Active Co., Ltd. (Japan) . . . . . [6443-19]

4:50 pm: **Calibration of a phase-shifting DIC microscope for quantitative phase imaging**, S. V. King, A. R. Libertun, Univ. of Colorado/Boulder; C. Preza, The Univ. of Memphis; R. Piestun, C. J. Cogswell, Univ. of Colorado/Boulder . . . . . [6443-45]

Thursday 25 January

SESSION 5

Room: Conv. Ctr. A6 . . . . . Thurs. 8:40 to 9:40 am

Recent Advances in Computational Microscopy

Chair: **Gordon S. Kino**, Stanford Univ.

8:40 am: **Extension of multidimensional microscopy to ultrasensitive applications with maximum-likelihood analysis**, L. M. Davis, G. Shen, The Univ. of Tennessee Space Institute . . . . . [6443-21]

9:00 am: **Signal post processing in frequency domain OCT and OCM using a filter bank approach**, B. Hofer, Cardiff Univ. (United Kingdom) and Technische Univ. Wien (Austria); B. Pova~ay, B. M. Hermann, A. Unterhuber, Cardiff Univ. (United Kingdom); G. Matz, F. Hlawatsch, Technische Univ. Wien (Austria); W. Drexler, Cardiff Univ. (United Kingdom) . . . . . [6443-22]

9:20 am: **Image estimation for structured illumination microscopy II: a better way to make a good thing better**, J. Conchello, Oklahoma Medical Research Foundation . . . . . [6443-46]

SESSION 6

Room: Conv. Ctr. A6 . . . . . Thurs. 9:40 to 11:00 am

Analysis and Characterization of Microscopes

Chair: **Gordon S. Kino**, Stanford Univ.

9:40 am: **Comparison of three-dimensional transfer function analysis of alternative phase imaging methods**, S. S. Kou, C. J. R. Sheppard, National Univ. of Singapore (Singapore) and Consultant (Singapore) . . . . . [6443-23]

10:00 am: **Mie scattering model for dual-axes confocal architecture**, L. K. Wong, Stanford Univ.; P. Holcomb, Breault Research Organization; M. J. Mandella, G. S. Kino, T. D. Wang, Stanford Univ. . . . . [6443-24]

10:20 am: **Effects of specimen morphology on adaptive confocal and multiphoton microscopy**, M. J. Booth, M. Schwertner, T. Wilson, Univ. of Oxford (United Kingdom) . . . . . [6443-25]

Coffee Break . . . . . 10:40 to 11:00 am

SESSION 7

Room: Conv. Ctr. A6 . . . . . Thurs. 11:00 am to 12:00 pm

Recent Advances in Multiphoton and Confocal Microscopy I

Chair: **Charles A. DiMarzio**, Northeastern Univ.

11:00 am: **Simultaneous multidepth imaging multiphoton microscope**, W. Amir, R. Carriles, E. E. Hoover, T. A. Planchon, C. G. Durfee III, J. A. Squier, Colorado School of Mines . . . . . [6443-27]

11:20 am: **Development of a random access multiphoton microscope for fast three-dimensional functional recording of neuronal activity**, D. Reddy, Rice Univ.; P. Saggau, Baylor College of Medicine . . . . . [6443-28]

11:40 am: **Random-access two-photon excitation microscopy with dual-axis acousto-optical deflector**, S. Zeng, S. Xue, Q. Luo, W. Chen, Huazhong Univ. of Science and Technology (China) . . . . . [6443-29]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 8

Room: Conv. Ctr. A6 . . . . . Thurs. 1:00 to 3:20 pm

Recent Advances in Multiphoton and Confocal Microscopy II

Chair: **Charles A. DiMarzio**, Northeastern Univ.

1:00 pm: **Confocal fluorescence lifetime imaging microscopy based on a real-time sampling method**, Y. S. Bae, D. Lee, S. Moon, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6443-30]

1:20 pm: **Full-pupil versus divided-pupil confocal line-scanners for reflectance imaging of human skin in vivo**, D. S. Gareau, S. Abeytunge, M. Rajadhyaksha, Memorial Sloan Kettering Cancer Ctr. . . . . [6443-31]

1:40 pm: **High-resolution laser scanning microscopy with saturated excitation of fluorescence**, K. Fujita, S. Kawano, Osaka Univ. (Japan); M. Kobayashi, Nanophoton Corp. (Japan); S. Kawata, Osaka Univ. (Japan) . . . . . [6443-32]

2:00 pm: **Observation of cell dynamics by laser scanning Raman microscope**, K. Hamada, K. Fujita, Osaka Univ. (Japan); M. Kobayashi, Nanophoton Corp. (Japan); S. Kawata, Osaka Univ. (Japan) . . . . . [6443-33]

2:20 pm: **Programmable diffractive optics for laser scanning confocal fluorescence microscopy**, B. R. Boruah, M. A. A. Neil, Imperial College London (United Kingdom) . . . . . [6443-34]

2:40 pm: **Toward a compact dual-wedge point-scanning confocal reflectance microscope**, W. C. Warger II, S. A. Guerrera, C. A. DiMarzio, Northeastern Univ. . . . . [6443-35]

Coffee Break . . . . . 3:00 to 3:20 pm

SESSION 9

Room: Conv. Ctr. A6 . . . . . Thurs. 3:20 to 4:40 pm

Novel Illumination Sources

Chair: **Thomas G. Brown**, Univ. of Rochester

3:20 pm: **Application of tunable continuum sources to fluorescence imaging and metrology**, E. Auksorius, D. M. Owen, H. B. Manning, P. De Beule, D. M. Grant, S. Kumar, P. M. P. Lanigan, C. B. Talbot, J. A. McGinty, C. W. Dunsby, M. A. A. Neil, P. M. W. French, Imperial College London (United Kingdom) . . . . . [6443-36]

3:40 pm: **Microscopy using micropixellated light emitting diodes**, V. Poher, G. Kennedy, D. S. Elson, P. M. W. French, M. A. A. Neil, Imperial College London (United Kingdom); H. Zhang, E. Gu, Z. Gong, C. Griffin, J. M. Girkin, M. D. Dawson, Univ. of Strathclyde (United Kingdom) . . . . . [6443-37]

4:00 pm: **Improved optical sectioning with dynamic speckle illumination**, C. Ventalon, J. Mertz, Boston Univ. . . . . [6443-38]

4:20 pm: **Fluorescence lifetime imaging using light-emitting diodes**, G. T. Kennedy, D. S. Elson, I. H. Munro, V. Poher, P. M. W. French, M. A. A. Neil, Imperial College London (United Kingdom) . . . . . [6443-39]

Saturday 20 January 2007 • Proceedings of SPIE Vol. 6444

Ultrasensitive and Single-Molecule Detection Technologies II

Conference Chairs: **Jorg Enderlein**, Forschungszentrum Jülich (Germany); **Zygmunt K. Gryczynski**, Univ. of North Texas

Program Committee: **Maxime Dahan**, École Normale Supérieure (France); **Sabato D'Auria**, Consiglio Nazionale delle Ricerche (Italy); **Ewa M. Goldys**, Macquarie Univ. (Australia); **Johan Hofkens**, Katholieke Univ. Leuven (Belgium); **Borys Kierdaszuk**, Univ. Warszawski (Poland); **Gabor Laczko**, Univ. of Szeged (Hungary); **Joseph A. Miragliotta**, Johns Hopkins Univ.; **Teresa N. Petersen**, Univ. of Aalborg (Denmark); **Markus Sauer**, Institut für Neue Materialien GmbH (Germany); **Andong Xia**, Institute of Chemistry (China)

SPIE and the organizers gratefully acknowledge PicoQuant GmbH for their generous sponsorship of the Young Investigator Award given as a part of the conference on Ultrasensitive and Single-Molecule Detection Technologies.

Saturday 20 January

SESSION 1

Room: Conv. Ctr. B2 . . . . . Sat. 8:30 am to 12:10 pm

Novel Methods in Ultrasensitive Detection

Chair: **Jorg Enderlein**, Forschungszentrum Jülich (Germany)

8:30 am: **Single fluorescent nanodiamonds: a potential cellular biomarker,** T. Lim, C. Fu, Institute of Atomic and Molecular Sciences (Taiwan); H. Lee, National Taiwan Univ. (Taiwan); K. Chen, Institute of Atomic and Molecular Sciences (Taiwan); P. Lin, National Taiwan Univ. (Taiwan); H. Wu, Institute of Atomic and Molecular Sciences (Taiwan); P. Wei, Academia Sinica (Taiwan); P. Tsao, National Taiwan Univ. (Taiwan); H. Chang, W. S. Fann, Institute of Atomic and Molecular Sciences (Taiwan) . . . . . [6444-01]

8:50 am: **A new optical method for characterizing single molecule interactions,** H. R. C. Dietrich, B. Vermolen, B. Rieger, I. T. Young, Y. Garini, Technische Univ. Delft (Netherlands) . . . . . [6444-02]

9:10 am: **Naphthalene diimides as tuneable fluorophores suitable for single-molecule applications,** T. D. M. Bell, S. Yap, The Univ. of Melbourne (Australia); S. J. Langford, Monash Univ. (Australia); K. P. Ghiggino, The Univ. of Melbourne (Australia) . . . . . [6444-25]

9:30 am: **Direct writing of a protein micro-array: lab-on-a-chip for multipurpose sensing,** M. Rocchia, S. Borini, A. M. Rossi, Istituto Nazionale di Ricerca Metrologica (Italy); M. Rossi, S. D'Auria, Consiglio Nazionale delle Ricerche (Italy) . . . . . [6444-04]

9:50 am: **Impact of metal-modified AFM tips on the fluorescence of single nanocrystals,** R. Ros, V. Walhorn, R. Eckel, H. Frey, C. Pelargus, Bielefeld Univ. (Germany); J. Enderlein, Forschungszentrum Jülich (Germany); T. Nann, Albert-Ludwigs-Univ. Freiburg (Germany); D. Anselmetti, Univ. Bielefeld (Germany) . . . . . [6444-05]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Intracavity infrared absorption spectroscopy for real-time on-line trace chemical detection and analysis,** U. Elejalde, J. M. Girkin, Univ. of Strathclyde (United Kingdom) . . . . . [6444-06]

11:00 am: **Enhancement of fluorescence signal with 1D PBG structure,** Q. Zhan, Univ. of Dayton . . . . . [6444-07]

11:20 am: **Novel approach for detection of low-energy molecules with a delta-doped CCD at the focal plane of a miniature mass spectrometer,** T. J. Jones, S. Nikzad, A. D. Jewell, M. P. Sinha, Jet Propulsion Lab. . [6444-08]

11:40 am: **Recent advances in time-resolved confocal fluorescence microscopy,** F. Koberling, B. Krämer, V. Buschmann, U. Ortmann, M. Patting, M. Wahl, R. Erdmann, PicoQuant GmbH (Germany) . . . . . [6444-15]

Lunch Break . . . . . 12:10 to 2:00 pm

SESSION 2

Room: Conv. Ctr. B2 . . . . . Sat. 2:00 to 3:40 pm

Advances in Single Molecule Detection

Chair: **Zygmunt K. Gryczynski**, Univ. of North Texas

2:00 pm: **Single molecule biological PIE-FRET experiments inside zero-order mode waveguides at 1000-times higher concentration,** S. Fore, T. Huser, Univ. of California/Davis; Y. Yuen, L. Hesselink, Stanford Univ. . . . . [6444-10]

2:20 pm: **Single molecule studies on individual metal complexes,** A. Kiel, A. Mokhir, R. Kraemer, D. Herten, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [6444-11]

2:40 pm: **A novel 3D resolution measure for optical microscopes with applications to single molecule imaging,** S. Ram, S. Ward, The Univ. of Texas Southwestern Medical Ctr. at Dallas; R. J. Ober, The Univ. of Texas at Dallas and The Univ. of Texas Southwestern Medical Ctr. at Dallas . . . . . [6444-12]

3:00 pm: **Detecting substeps in the rotary motors of FoF1-ATP synthase by hidden Markov models,** N. Zarrabi, M. G. Dueser, R. Reuter, J. Wrachtrup, M. Borsch, Univ. of Stuttgart (Germany) . . . . . [6444-13]

3:20 pm: **Single-molecule fluorescence microscopy for ultra-sensitive RNA expression profiling,** J. Hesse, Upper Austrian Research GmbH (Austria); J. Jacak, Johannes Kepler Univ. Linz (Austria); M. Kasper, G. Regl, T. Eichberger, M. Winklmayr, F. Aberger, Univ. Salzburg (Austria); M. Sonnleitner, R. Schlapak, S. Howorka, Upper Austrian Research GmbH (Austria); L. A. Muresan, Johannes Kepler Univ. Linz (Austria); A. Frischauf, Univ. Salzburg (Austria); G. J. Schütz, Johannes Kepler Univ. Linz (Austria) . . . . . [6444-14]

Coffee Break . . . . . 3:40 to 4:10 pm

SESSION 3

Room: Conv. Ctr. B2 . . . . . Sat. 4:10 to 5:30 pm

Advances in Fluorescence Correlation Spectroscopy

Chair: **Zygmunt K. Gryczynski**, Univ. of North Texas

4:10 pm: **New surface plasmons approaches to single molecule detection (SMD) and fluorescence correlation spectroscopy(FCS),** Z. K. Gryczynski, P. Muthu, K. Jain, I. Akopova, S. Bharill, E. G. Matveeva, S. Klidgard, J. Borejdo, Univ. of North Texas . . . . . [6444-09]

4:30 pm: **Monitoring of small conformational changes by high-precision measurements of hydrodynamic radius with 2-focus fluorescence correlation spectroscopy,** J. Enderlein, T. Dertinger, I. von der Hocht, I. Gregor, Forschungszentrum Jülich (Germany); K. E. Komolov, K. Koch, Univ. of Oldenburg (Germany) . . . . . [6444-16]

4:50 pm: **Cross-talk free fluorescence cross correlation spectroscopy by switching method,** J. Nishimura, Y. Takahashi, Olympus Corp. (Japan); M. Kinjo, Hokkaido Univ. (Japan); A. Miyawaki, The Institute of Physical and Chemical Research (Japan) . . . . . [6444-17]

5:10 pm: **Influence of the surface hydrophobicity on fluorescence correlation spectroscopy measurments,** C. C. B. Boutin, R. Jaffiol, J. Plain, P. Royer, Univ. de Technologie de Troyes (France) . . . . . [6444-18]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 4

Room: Conv. Ctr. B2 . . . . . Sun. 8:30 to 10:10 am

Sensing Devices and Microarrays

Chair: **Jorg Enderlein**, Forschungszentrum Jülich (Germany)

8:30 am: **Lab-on-a-chip platform for highly sensitive fluorescence-based bioassays,** T. Ruckstuhl, R. Blue, S. Laib, H. M. McEvoy, B. D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6444-19]

8:50 am: **Integration and characterization of SiN nanopores for single-molecule detection in liquid-core ARROW waveguides,** M. I. Rudenko, D. Yin, Univ. of California/Santa Cruz; M. Holmes, A. R. Hawkins, Brigham Young Univ.; H. Schmidt, Univ. of California/Santa Cruz . . . . . [6444-20]

9:10 am: **Ultra-sensitive single nucleotide polymorphism analysis using self-quenching hairpin-structured probes and single-molecule detection techniques,** J. P. Knemeyer, A. Friedrich, Deutsches Krebsforschungszentrum (Germany); G. Habl, Univ. Heidelberg (Germany); O. Nolte, AiCuris GmbH & Co. KG (Germany); R. Hakenbeck, Univ. of Kaiserslautern (Germany); M. Sauer, Univ. of Bielefeld (Germany); J. Hoheisel, Deutsches Krebsforschungszentrum (Germany); J. M. Wolfrum, N. Marmé, Univ. Heidelberg (Germany) . . . [6444-21]

9:30 am: **Low-loss integrated planar chalcogenide waveguides for chemical sensing,** J. Hu, R. Sun, Massachusetts Institute of Technology; N. Carlie, Clemson Univ.; V. Tarasov, A. M. Agarwal, Massachusetts Institute of Technology; L. C. Petit, K. A. Richardson, Clemson Univ.; L. C. Kimerling, Massachusetts Institute of Technology . . . . . [6444-22]

9:50 am: **Shape-specific detection based on fluorescence resonance energy transfer using a flexible water-soluble conjugated polymer,** A. Xia, Institute of Chemistry (China) . . . . . [6444-24]

PicoQuant Young Investigator Award Presentation

Room: Conv. Ctr. B2 . . . . . Sun. 10:10 am

Chair: **Zygmunt K. Gryczynski**, Univ. of North Texas

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Nanofluidic channel-based biosensor using surface-enhanced Raman spectroscopy(SERS),** I. Chou, H. T. Beier, N. Jing, M. Wang, K. Jun, G. L. Coté, Texas A&M Univ. . . . . [6444-23]

Wednesday 24 January 2007 • Proceedings of SPIE Vol. 6445

Optical Diagnostics and Sensing VII

Conference Chairs: **Gerard L. Coté**, Texas A&M Univ.; **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

Program Committee: **Rafat R. Ansari**, NASA Glenn Research Ctr.; **Werner Gellermann**, The Univ. of Utah; **Yuri I. Gurfinkel**, Central Clinical Hospital (Russia); **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany); **Michael J. McShane**, Louisiana Tech Univ.; **Kenith E. Meissner**, Texas A&M Univ.; **Risto A. Myllylä**, Oulun Yliopisto (Finland); **Gert E. Nilsson**, Linköping Univ. (Sweden); **Jeffery S. Reynolds**, Bayer Healthcare; **Wiendelt Steenbergen**, Univ. Twente (Netherlands); **Kexin Xu**, Tianjin Univ. (China); **Shaoqun Zeng**, Huazhong Univ. of Science and Technology (China); **Dmitry A. Zimnyakov**, Saratov State Univ. (Russia)

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **A novel invasive method to detect glucose concentration without blood Eetraction,** D. Li, Tianjin Univ. (China) . . . . . [6445-05]

✔ **Implantable fluorescent analyte sensors for detection of Alzheimer's disease: Monte Carlo modeling and phantom study,** Q. Wan, H. T. Beier, B. L. Ibey, Texas A&M Univ.; T. Good, Univ. of Maryland/Baltimore; G. L. Coté, Texas A&M Univ. . . . . [6445-17]

✔ **Noninvasive blood glucose measurement using multiple laser diodes,** E. T. Ooi, X. Zhang, J. Chen, P. H. Soh, K. Ng, J. H. Yeo, Glucostats System Pte Ltd. (Singapore) . . . . . [6445-18]

✔ **Methodology of effective glucose-specific signal abstraction in complicated scattering sample,** W. Chen, D. Bing, R. Liu, X. Gu, K. Xu, Tianjin Univ. (China) . . . . . [6445-19]

✔ **Applying the floating-reference method to improve the precision of noninvasive blood glucose measurement,** W. Chen, Z. Ma, L. An, K. Xu, Tianjin Univ. (China) . . . . . [6445-20]

✔ **High-resolution surface plasmon resonance biosensing system for glucose concentration detecting,** X. Huang, D. Li, H. Yu, X. Hu, K. Xu, Tianjin Univ. (China) . . . . . [6445-21]

✔ **Optical spectroscopy of inorganic connections of urine,** I. H. Yarynovska, A. I. Bilyi, O. Bordun, R. O. Bilyy, Ivan Franko National Univ. of L'viv (Ukraine) . . . . . [6445-22]

✔ **Influence of external factors on blood glucose sensing with optical coherence tomography,** R. V. Kuranov, V. V. Sapozhnikova, D. S. Prough, I. Cicenaite, T. Wegeng, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6445-23]

✔ **Characterization of changes in cerebral blood flow induced by the local hypothermia in rat cortex using laser speckle flowmetry,** W. Wang, Q. Li, S. Zeng, Q. Luo, P. Li, Huazhong Univ. of Science and Technology (China) . . . . . [6445-24]

✔ **Time-varying spreading depression waves in rat cortex revealed by optical intrinsic signal imaging,** S. Chen, P. Li, W. Luo, Q. Luo, S. Zeng, Huazhong Univ. of Science and Technology (China) . . . . . [6445-25]

✔ **Classification of degenerative grading of lesions of supraspinatus rotator cuff tendons by FT-Raman spectroscopy,** S. G. Penteado, W. A. A. Jara, E. Rezende, Univ. do Vale do Paraíba (Brazil); C. J. Meneses, CIPAX (Brazil); A. A. Martin, H. d. S. Martinho, Univ. do Vale do Paraíba (Brazil) . . . . . [6445-26]

✔ **Analysis of biomedical time signals for characterization of cutaneous diabetic micro-angiopathy,** J. Kraitl, H. Ewald, Univ. Rostock (Germany) . . . . . [6445-27]

✔ **Optical glucose sensing in biotissue phantom by diffuse reflectance technique,** A. V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); M. Y. Kirillin, Oulun Yliopisto (Finland) and M.V. Lomonosov Moscow State Univ. (Russia); A. V. Bykov, M.V. Lomonosov Moscow State Univ. (Russia) and Oulun Yliopisto (Finland); R. A. Myllylä, Oulun Yliopisto (Finland) . . [6445-29]

✔ **Refractive index detection with self-mixing interferometry for biosensing applications,** M. E. Määttälä, M. Wang, L. Krehut, Univ. of Oulu (Finland); J. T. Hast, VTT Technical Research Ctr. (Finland); R. A. Myllylä, Univ. of Oulu (Finland) . . . . . [6445-30]

✔ **PDMS based optical biosensor array for on-site monitoring of cell culture in micro-channels,** L. Zhang, K. Y. Cheung, Y. R. Chua, D. Trau, National Univ. of Singapore (Singapore) . . . . . [6445-31]

✔ **High speed in vivo optical biopsy probe,** A. Rizwan, The Univ. of Texas/ Arlington . . . . . [6445-32]

✔ **Hydrogel micro-arrays for multi-analyte detection,** R. M. Rounds, S. Lee, B. L. Ibey, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . . . [6445-33]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. K . . . . . Wed. 8:50 to 10:10 am

Optical Monitoring of Glucose

Chairs: **Gerard L. Coté**, Texas A&M Univ.;
Michael J. McShane, Texas A&M Univ.

8:50 am: **Bedside monitoring of subcutaneous interstitial glucose in type 1 diabetic subjects using microdialysis and infrared spectrometry with optimal correlation to blood glucose concentrations,** H. M. Heise, U. Damm, V. R. Kondepati, Univ. Dortmund (Germany); J. Mader, M. Ellmerer, Medizinischen Univ. Graz (Austria) . . . . . [6445-01]

9:10 am: **In-vivo temperature-controlled blood glucose monitoring with optical coherence tomography,** V. V. Sapozhnikova, D. S. Prough, R. V. Kuranov, I. Cicenaite, T. Wegeng, R. O. Esenaliev, The Univ. of Texas Medical Branch at Galveston . . . . . [6445-03]

9:30 am: **Use of glycosylated dendrimer macromolecules to fluorescently monitor glucose concentration,** H. T. Beier, B. L. Ibey, Texas A&M Univ.; M. V. Pishko, The Pennsylvania State Univ.; G. L. Coté, Texas A&M Univ. . . . . [6445-04]

9:50 am: **Enzymatic smart tattoos: influence of coating thickness and ambient oxygen on sensitivity and range,** E. W. Stein, Louisiana Tech Univ.; M. J. McShane, Texas A&M Univ. . . . . [6445-35]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Room: Conv. Ctr. K . . . . . Wed. 10:40 am to 12:40 pm

Optical Assessment of Blood Components: Whole Blood and Blood Flow

Chair: **Alexander V. Priezzhev**, M.V. Lomonosov Moscow State Univ. (Russia)

10:40 am: **Depth sensitivity of laser Doppler perfusion imager: quantification based on experiments and Monte Carlo simulations on static and dynamic scattering phantoms,** V. Rajan, B. Varghese, T. G. van Leeuwen, W. Steenbergen, Univ. Twente (Netherlands) . . . . . [6445-06]

11:00 am: **Real-time measurement of human blood flow with high-temporal and spatial resolution,** I. Menn, W. Wild, Univ. Rostock (Germany) . . [6445-07]

11:20 am: **An optical approach for noninvasive blood clotting tests,** V. Kalchenko, A. Brill, Weizmann Institute of Science (Israel); I. Fine, ELFI-Tech Ltd. (Israel); A. Harmelin, Weizmann Institute of Science (Israel) . . . . . [6445-08]

11:40 am: **Erythrocytes analysis with a digital holographic microscope,** B. Rappaz, École Polytechnique Fédérale de Lausanne (Switzerland); A. Barbul, Tel-Aviv Univ. (Israel); F. Charrière, J. G. Kühn, P. P. Marquet, École Polytechnique Fédérale de Lausanne (Switzerland); R. Korenstein, Tel-Aviv Univ. (Israel); C. D. Depeursinge, P. J. Magistretti, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6445-09]

12:00 pm: **Optical sensor technology for a noninvasive medical blood diagnosis,** H. Ewald, J. Kraitl, Rostock Univ. (Germany) . . . . . [6445-10]

12:20 pm: **A method for the prevention of high-risk medication errors,** D. Allgeyer, Consultant . . . . . [6445-11]

Lunch/Exhibition Break . . . . . 12:40 to 2:00 pm

SESSION 3

Room: Conv. Ctr. K . . . . . Wed. 2:00 to 4:30 pm

Tissue Diagnostics and Molecular Sensing

Chair: **Jürgen Lademann**, Charité-Univ. Medizin Berlin (Germany)

2:00 pm: **Optical spectroscopy for the detection of oral cancer,** D. Daye, R. Schwarz, R. R. Richards-Kortum, Rice Univ.; A. Gillenwater, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6445-12]

2:20 pm: **The impact of blood content in skin tissue on skin spectra,** R. Chen, Y. Li, B. Huang, S. Xie, Fujian Normal Univ. (China) . . . . . [6445-13]

2:40 pm: **Inverse model for the extraction of biochemical parameters from fluorescence spectra,** B. Appiah, Rice Univ.; U. Utzinger, M. A. Brewer, The Univ. of Arizona; R. A. Drezek, Rice Univ. . . . . [6445-14]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **In-vivo determination of the antioxidative potential of human skin: influence of ultraviolet and infrared irradiation,** M. E. Darvin, S. Schanzer, I. H. Gersonde, Charité-Univ. Medizin Berlin (Germany); H. Albrecht, Laser-und Medizin-Technologie GmbH (Germany); W. Sterry, J. Lademann, Charité-Univ. Medizin Berlin (Germany) . . . . . [6445-34]

3:50 pm: **Spectral-domain optical coherence reflectometry for highly sensitive detection of biological and chemical species,** C. Joo, Massachusetts Institute of Technology and Massachusetts General Hospital; J. F. DeBoer, Massachusetts General Hospital . . . . . [6445-15]

4:10 pm: **A new surface plasmon resonance sensing and imaging technique,** Y. He, L. Liu, Y. Zhu, Y. Zhang, Z. Sun, J. Guo, Tsinghua Univ. (China) . . . . . [6445-16]

Saturday-Sunday 20-21 January 2007 • Proceedings of SPIE Vol. 6446

Biomedical Applications of Light Scattering

Conference Chairs: **Adam Wax**, Duke Univ.; **Vadim Backman**, Northwestern Univ.

Program Committee: **Irving J. Bigio**, Boston Univ.; **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign; **Thomas H. Foster**, Univ. of Rochester; **Steven L. Jacques**, Oregon Health and Science Univ.; **Lev T. Perelman**, Harvard Medical School; **Brian W. Pogue**, Dartmouth College; **Bruce J. Tromberg**, Univ. of California/Irvine

Saturday 20 January

SESSION 1

Room: Conv. Ctr. L . . . . . Sat. 1:50 to 3:10 pm

New Approaches

Chair: **Adam Wax**, Duke Univ.

1:50 pm: **Live cell refractometry using quantitative phase imaging,** G. Popescu, N. Lue, K. Badizadegan, R. R. Dasari, M. S. Feld, Massachusetts Institute of Technology . . . . . [6446-02]

2:10 pm: **Quantification of Doppler broadening in path length resolved diffusive light scattering using phase modulated low-coherence interferometry,** B. Varghese, V. Rajan, T. G. van Leeuwen, W. Steenbergen, Univ. Twente (Netherlands) . . . . . [6446-03]

2:30 pm: **Laser speckle contrast imaging of flow in a microfluidic device,** A. B. Parthasarathy, W. G. Shin, X. J. Zhang, A. K. Dunn, The Univ. of Texas/ Austin . . . . . [6446-04]

2:50 pm: **Absorption-depth profile reconstruction in turbid media based on spectroscopy measurements,** R. Reif, I. J. Bigio, Boston Univ. . . . . [6446-05]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 2

Room: Conv. Ctr. L . . . . . Sat. 3:40 to 5:40 pm

Low-Coherence Light Scattering

Chair: **Stephen A. Boppart**, Univ. of Illinois at Urbana-Champaign

3:40 pm: **Low-coherence enhanced backscattering: characteristics and applications for colon cancer screening** *(Invited Paper)***,** Y. L. Kim, P. Pradhan, V. M. Turzhitsky, H. Subramanian, R. K. Wali, H. K. Roy, V. Backman, Northwestern Univ. . . . . [6446-06]

4:10 pm: **Detecting precancerous activity in the human esophagus with angle-resolved low-coherence interferometry** *(Invited Paper)***,** J. W. Pyhtila, A. Wax, Duke Univ. . . . . [6446-07]

4:40 pm: **Real-time inverse scattering for optical coherence tomography,** T. S. Ralston, D. L. Marks, P. S. Carney, S. A. Boppart, Univ. of Illinois at Urbana-Champaign . . . . . [6446-08]

5:00 pm: **Phase-dispersion light-scattering for quantitative size-imaging of spherical scatterers,** T. Dennis, S. D. Dyer, A. Dienstfrey, National Institute of Standards and Technology . . . . . [6446-09]

5:20 pm: **Spectroscopic contrast for microsphere diameter with angle-resolved Fourier domain OCT,** A. E. Desjardins, B. J. Vakoc, G. J. Tearney, B. E. Bouma, Wellman Ctr. for Photomedicine . . . . . [6446-10]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 3

Room: Conv. Ctr. L . . . . . Sun. 8:30 to 10:10 am

In-Vitro Cell Studies I

Chair: **Thomas H. Foster**, Univ. of Rochester

8:30 am: **Evidence for optical determination of the fast neuronal signal as a scattering change using a broad-band spectral method,** K. Tanner, R. Ma, J. Malpeli, W. W. Mantulin, Univ. of Illinois at Urbana-Champaign; E. Gratton, Beckman Laser Institute and Medical Clinic . . . . . [6446-35]

8:50 am: **Effect of BCL-2 family proteins on subcellular particle size distribution,** N. N. Boustany, J. Zheng, Rutgers Univ. . . . . [6446-11]

9:10 am: **Imaging subcellular scattering contrast in single cells with multimodal microscopy,** S. Tang, C. Sun, T. B. Krasieva, Z. Chen, B. J. Tromberg, Univ. of California/Irvine . . . . . [6446-12]

9:30 am: **Quantification of morphology of bacterial colonies using laser scatter measurements and solid element optical modeling,** S. J. Leavesley, B. Bayraktar, M. Venkatapathi, J. P. Robinson, A. K. Bhunia, P. P. Banada, E. D. Hirleman, Jr., Purdue Univ.; R. A. Hassler, L. A. Smith, Lambda Research Corp.; B. P. Rajwa, Purdue Univ. . . . . [6446-13]

9:50 am: **Fluence- and time-dependant lysosomal and mitochondrial damage induced by NPe6 PDT characterized with light scattering,** J. D. Wilson, T. H. Foster, Univ. of Rochester . . . . . [6446-14]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 4

Room: Conv. Ctr. L . . . . . Sun. 10:40 to 11:50 am

In-Vitro Cell Studies II

Chair: **Adam Wax**, Duke Univ.

10:40 am: **Light-scattering spectroscopy for probing small biological structures** *(Invited Paper)***,** M. S. Feld, Massachusetts Institute of Technology . . . . . [6446-15]

11:10 am: **Light scattering spectroscopy of cells: a study based on Mie and fractal models,** J. Y. Qu, T. T. Wu, Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6446-16]

11:30 am: **Studying cells in vivo with confocal light absorption and scattering spectroscopy (CLASS),** L. Qiu, H. Fang, E. Vitkin, M. M. Zaman, C. Andersson, S. Salahuddin, Harvard Medical School; L. M. Kimerer, P. B. Cipolloni, Medical Research Service and Geriatric Research Ed; M. D. Modell, B. S. Turner, S. E. Keates, Harvard Medical School; I. J. Bigio, Boston Univ.; I. Itzkan, S. D. Freedman, Harvard Medical School; R. Bansil, Boston Univ.; E. B. Hanlon, Medical Research Service and Geriatric Research Ed; L. T. Perelman, Harvard Medical School . . . . . [6446-17]

Lunch Break . . . . . 11:50 am to 1:00 pm

SESSION 5

Room: Conv. Ctr. L . . . . . Sun. 1:00 to 3:20 pm

Clinical and Pre-Clinical Studies

Chair: **Vadim Backman**, Northwestern Univ.

1:00 pm: **Clinical applications of elastic-scattering spectroscopy beyond proof-of-principle: what really matters** *(Invited Paper)***,** I. J. Bigio, Boston Univ. . . . . [6446-18]

1:30 pm: **Estimation of Mie scatterer size in NIR tomographic,** B. W. Pogue, X. Wang, K. D. Paulsen, Dartmouth College; W. A. Wells, Dartmouth Medical School . . . . . [6446-19]

1:50 pm: **Measuring nuclear morphology in the hamster respiratory tract using Fourier domain low-coherence interferometry,** R. N. Graf, A. Wax, Duke Univ. . . . . [6446-20]

2:10 pm: **Alteration of nanoscale cell architecture in early stages of carcinogenesis demonstrated by single cell partial wave spectroscopy: ultra-early detection of cancer,** P. Pradhan, H. Subramanian, Y. Liu, Y. L. Kim, H. K. Roy, R. Brand, V. Backman, Northwestern Univ. . . . . [6446-21]

2:30 pm: **Specifying tissue optical properties using axial dependence of confocal reflectance images: confocal scanning laser microscopy and optical coherence tomography,** S. L. Jacques, R. Samantham, D. S. Gareau, N. Choudhury, Oregon Health and Science Univ. . . . . [6446-22]

2:50 pm: **Developing clinical applications of differential pathlength spectroscopy** *(Invited Paper)***,** H. J. C. M. Sterenborg, A. Amelink, O. Kaspers, Erasmus Univ. Medical Ctr. (Netherlands) . . . . . [6446-23]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 6

Room: Conv. Ctr. L . . . . . Sun. 3:50 to 5:10 pm

Theory

Chair: **Lev T. Perelman**, Harvard Medical School

3:50 pm: **What information is contained in light multiply scattered through macroscopic random media?,** S. H. Tseng, National Taiwan University (Taiwan) . . . . . [6446-24]

4:10 pm: **Potential FDTD application in studying mitochondrial apoptosis,** C. Sui, N. N. Boustany, Rutgers Univ. . . . . [6446-25]

4:30 pm: **Inverse models of tissue reflectance spectroscopy,** J. Sun, Rice Univ.; U. Utzinger, The Univ. of Arizona; R. A. Drezek, Rice Univ. . . . . [6446-26]

4:50 pm: **Semi-analytical model of light scattering form living cells,** F. Seydou, Oulun Yliopisto (Finland); O. M. Ramahi, Univ. of Waterloo (Canada); T. Seppanen, Oulun Yliopisto (Finland); K. K. Bizheva, Univ. of Waterloo (Canada) . . . . . [6446-27]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **A Monte Carlo platform for the optical modeling of pulse oximetry,** V. Azorin Peris, S. Hu, P. R. Smith, Loughborough Univ. (United Kingdom) . . . . . [6446-28]

✔ **Imaging hemodynamic effects of ET-1 on cerebral blood flow in rats,** A. Ponticorvo, W. J. Tom, M. A. Maldonado, T. Jones, A. K. Dunn, The Univ. of Texas/Austin . . . . . [6446-29]

✔ **Characterization of cell and tissue samples from measurements of scattering phase dispersion,** S. D. Dyer, L. K. Street, S. M. Etzel, T. Dennis, A. Dienstfrey, National Institute of Standards and Technology; V. Tsvankin, W. Tan, Univ. of Colorado/Boulder . . . . . [6446-30]

✔ **Side scatter light for micro-size differentiation and cellular analysis,** X. Su, W. Rozmus, C. E. Capjack, C. J. Backhouse, Univ. of Alberta (Canada) . . . . . [6446-31]

✔ **Numerical investigation of photon trajectories and coherent backscattering sensitivity to nanoscale refractive index fluctuations in continuous random media,** A. Heifetz, Northwestern Univ. . . . . [6446-32]

✔ **Elastic cell light scattering: from Mie scattering to fractal scattering,** M. Xu, City College/CUNY . . . . . [6446-33]

✔ **Detection of subwavelength-size metal particles via super-enhanced backscattering perturbation facilitated by microwave photonic jet,** A. Heifetz, K. Huang, A. V. Sahakian, X. Li, A. Taflove, V. Backman, Northwestern Univ. . . . . [6446-34]

Tuesday-Wednesday 23-24 January 2007 • Proceedings of SPIE Vol. 6447

Nanoscale Imaging, Spectroscopy, Sensing and Actuation for Biomedical Applications IV

Conference Chairs: **Alexander N. Cartwright**, SUNY/Univ. at Buffalo; **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

Cochair: **Paul L. Gourley**, Sandia National Labs.

Program Committee: **Igal Brener**, Sandia National Labs.; **Philippe M. Fauchet**, Univ. of Rochester; **Piotr Grodzinski**, Los Alamos National Lab.; **Brian McGraith**, Dublin City Univ. (Ireland); **Igor L. Medintz**, Naval Research Lab.; **Ammasi Periasamy**, Univ. of Virginia; **Paras N. Prasad**, SUNY/Univ. at Buffalo; **Weihong Tan**, Univ. of Florida

Tuesday 23 January

SESSION 1

Room: Conv. Ctr. C4 ..... Tues. 8:20 am to 12:00 pm

Micro- and Nanosensors I

Chair: **Alexander N. Cartwright**, Univ. at Buffalo

8:20 am: **Nanoclinics and nanobiophotonics for bioimaging, sensing, and targeted delivery in nanomedicine** *(Invited Paper)*, P. N. Prasad, Univ. at Buffalo ..... [6447-01]

9:00 am: **Methods for monitoring and imaging nanoparticles in cells,** D. Lapotko, E. Lukianova, S. Chizhik, A.V. Luikov Heat and Mass Transfer Institute (Belarus) ..... [6447-02]

9:20 am: **Fluorescent silica nanoparticles: core-shell architectures for imaging and sensing toward single-particle laboratories,** A. A. Burns, E. Herz, P. Sengupta, B. A. Baird, U. Wiesner, Cornell Univ. ..... [6447-03]

9:40 am: **Nanoparticle contrast in magneto-motive optical Doppler tomography,** J. Kim, Univ. of California/Irvine; J. Oh, T. E. Milner, Univ. of Texas/Austin; J. S. Nelson, Univ. of California/Irvine ..... [6447-04]

Coffee Break ..... 10:00 to 10:30 am

10:30 am: **Photon number-resolved detectors: applications and prospective** *(Invited Paper)*, A. Verevkin, Univ. at Buffalo ..... [6447-05]

11:00 am: **From optical tweezers to optical forced oscillation: principles and potential biomedical applications,** M. Wei, S. Liu, A. V. Karmenyan, A. E. T. Chiou, Yang-Ming Univ. (Taiwan) ..... [6447-06]

11:20 am: **Optical propagating model in cone waveguide packed by metal,** Y. Qiu, Fujian Normal Univ. (China) ..... [6447-07]

11:40 am: **A full-field heterodyne surface plasmon resonance dynamic bio-imaging system,** C. H. Lin, S. Chen, National Cheng Kung Univ. (Taiwan) ..... [6447-08]

Lunch/Exhibition Break ..... 12:00 to 1:30 pm

SESSION 2

Room: Conv. Ctr. C4 ..... Tues. 1:30 to 3:10 pm

Micro- and Nanosensors II

Chair: **Alexander N. Cartwright**, Univ. at Buffalo

1:30 pm: **Toward fluorescent far-field superlens optical microscopy with sub-wavelength resolution** *(Invited Paper)*, S. P. Durant, R. F. Oulton, X. Zhang, Univ. of California/Berkeley ..... [6447-09]

2:10 pm: **High-speed high-sensitivity bioCD using in-line quadrature interferometry,** M. Zhao, D. D. Nolte, Purdue Univ. ..... [6447-10]

2:30 pm: **Genomic signal analysis of mycobacterium tuberculosis,** P. D. A. Cristea, Univ. Politehnica Bucharest (Romania); D. Banica, R. A. Tuduce, Univ. Politehnica Bucuresti (Romania) ..... [6447-27]

2:50 pm: **Imaging of cooperative motion on a simulated energy landscape,** V. V. Yakovlev, Univ. of Wisconsin/Milwaukee ..... [6447-12]

Coffee Break ..... 3:10 to 3:30 pm

SESSION 3

Room: Conv. Ctr. C4 ..... Tues. 3:30 to 5:30 pm

Nanoparticle-based Imaging I

Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

3:30 pm: **Multifunctional nanoparticles for drug/gene delivery in nanomedicine** *(Invited Paper)*, J. F. Leary, E. Haglund, M. Seale, C. Cooper, M. Zordan, L. M. Reece, J. Huang, D. W. Knapp, D. Bergstrom, Purdue Univ. ..... [6447-13]

4:10 pm: **Stable and ultrapure metal nanoparticles produced by femtosecond laser ablation,** S. Besner, A. V. Kabashin, École Polytechnique de Montréal (Canada); F. M. Winnik, Univ. de Montréal (Canada); M. Meunier, École Polytechnique de Montréal (Canada) ..... [6447-14]

4:30 pm: **Quantitative light-scattering study of gold nanoshell bioconjugate binding concentrations to SKBR3 breast cancer cells,** K. Fu, J. Sun, A. W. H. Lin, R. A. Drezek, Rice Univ. ..... [6447-15]

4:50 pm: **Enhanced gold nanoshell scattering contrast in biological environments using angularly resolved reflectance spectroscopy,** V. Nammalvar, A. M. J. Wang, R. A. Drezek, Rice Univ. ..... [6447-16]

5:10 pm: **Nanoparticle assisted optical molecular imaging (NAOMI) using biodegradable nanoparticles,** D. J. Faber, M. de Bruin, M. C. G. Aalders, F. D. Verbraak, T. G. van Leeuwen, Academisch Medisch Ctr. (Netherlands) ..... [6447-17]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **The investigation of the vibrational spectrum of monolayer biomolecules by the sub-wavelength focusing spot resulting from modifying evanescent wave,** S. Chen, National Cheng Kung Univ. (Taiwan); J. Yih, National Kaohsiung Univ. of Applied Sciences (Taiwan); S. Hong, National Cheng Kung Univ. (Taiwan) ..... [6447-11]

✔ **Localized surface plasmon couple fluorescence fiber optic biosensor,** Y. Chang, National Central Univ. (Taiwan); B. Hsieh, H. Chen, National Yang-Ming Univ. (Taiwan); W. Liu, M. Ng, National Taiwan Normal Univ. (Taiwan); H. Wu, Y. Chung, C. Chou, National Yang-Ming Univ. (Taiwan) ..... [6447-21]

✔ **Sensitivity enhancement of paired surface plasma waves biosensor with colloid-Au nanoparticle,** H. Wu, C. Chou, Y. Chen, National Yang-Ming Univ. (Taiwan) ..... [6447-26]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 4

Room: Conv. Ctr. C4 . . . . . Wed. 8:10 to 11:20 am

Nanoparticle-based Imaging II

Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

8:10 am: **In-plane photonic transduction for microcantilever sensor arrays** *(Invited Paper)***,** G. P. Nordin, J. W. Noh, S. Kim, Brigham Young Univ. [6447-18]

8:50 am: **Optical biosensor based on silicon-on-insolator microring cavities for specific protein detection,** K. De Vos, I. Bartolozzi, S. S. Scheerlinck, P. Debackere, P. Bienstman, E. Schacht, R. G. Baets, Univ. Gent (Belgium) . . . . . [6447-19]

9:10 am: **Four-channel optical detection on protein-patterned bioCD,** X. Wang, D. D. Nolte, Purdue Univ. . . . . [6447-20]

8:10 am: **Investigation into the operating mechanism of a diffraction-based biosensor,** J. J. Valiani, M. Paige, Univ. of Saskatchewan (Canada) . . [6447-22]

9:30 am: **Silicon photonic crystal structures for sensing** *(Invited Paper)***,** P. M. Fauchet, Univ. of Rochester . . . . . [6447-23]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Nanostructure porous polymeric photonic bandgap structures for sensing** *(Invited Paper)***,** A. N. Cartwright, Univ. at Buffalo . . . . . [6447-24]

11:00 am: **Sensitivity analysis of a photonic crystal structure for index-of-refraction sensing,** O. Levi, M. M. Lee, Stanford Univ.; J. Zhang, The Univ. of New Mexico; V. M. P. Lousse, S. L. Fan, Stanford Univ.; S. R. J. Brueck, The Univ. of New Mexico; J. S. Harris, Stanford Univ. . . . . [6447-25]

Saturday-Sunday 20-21 January 2007 • Proceedings of SPIE Vol. 6448

Colloidal Quantum Dots for Biomedical Applications II

Conference Chairs: **Marek Osiński**, CHTM/Univ. of New Mexico; **Thomas M. Jovin**, Max-Planck-Institut für biophysikalische Chemie (Germany); **Kenji Yamamoto**, Research Institute of the International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan)

Program Committee: **Alexandrou Antigoni**, Ecole Polytechnique (France); **Moungi G. Bawendi**, Massachusetts Institute of Technology; **Warren C. W. Chan**, Univ. of Toronto (Canada); **Maxime Dahan**, Ecole Normale Supérieure (France); **Alexander Eychmüller**, Technische Univ. Dresden (Germany); **Victor I. Klimov**, Los Alamos National Lab.; **Hedi Mattoussi**, Naval Research Lab.; **Paul Mulvaney**, Univ. of Melbourne (Australia); **Shuming Nie**, Emory Univ. and Georgia Institute of Technology; **Wolfgang J. Parak**, Ludwig-Maximilians-Univ. München (Germany); **Sandra J. Rosenthal**, Vanderbilt Univ.; **Michael S. Wong**, Rice Univ.

Saturday 20 January

Opening Remarks

Room: Conv. Ctr. C2 . . . . . Sat. 8:05 am

Chair: **Marek Osiński**, CHTM/Univ. of New Mexico

SESSION 1

Room: Conv. Ctr. C2 . . . . . Sat. 8:10 to 10:10 am

Synthesis and Characterization of Nanocrystals for Biomedical Applications I

Chair: **Hedi Mattoussi**, Naval Research Lab.

8:10 am: **Synthesis, stability, and properties of metal clusters: A new kind of materials for biomedical applications** *(Invited Paper)***,** M. A. Lopez-Quintela, J. Rivas, M. C. Blanco, M. J. Rodríguez, R. Lourido, A. Ledo, Univ. de Santiago de Compostela (Spain) . . . . . [6448-01]

8:40 am: **Modeling and experimental studies of nucleation and growth of nanocrystals from colloidal solutions** *(Invited Paper)***,** D. V. Talapin, E. V. Shevchenko, Lawrence Berkeley National Lab.; H. Weller, Univ. Hamburg (Germany) . . . . . [6448-02]

9:10 am: **Fabrication of silicon-based nanoparticles for biological imaging,** X. M. Zhang, D. Neiner, S. Z. Wang, S. M. Kauzlarich, A. Y. Louie, Univ. of California/Davis . . . . . [6448-03]

9:30 am: **Excitation dependent photoluminescence lifetime measurement of porous silicon and silicon nanocrystals,** L. L. Peng, J. T. Motz, B. E. Bouma, G. J. Tearney, Massachusetts General Hospital and Harvard Medical School . . . . . [6448-04]

9:50 am: **Synthesis and characterization of ZnO nanocrystals,** M. R. Greenberg, G. A. Smolyakov, CHTM/Univ. of New Mexico; T. J. Boyle, Sandia National Labs.; M. Osinski, CHTM/Univ. of New Mexico . . . . . [6448-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. C2 . . . . . Sat. 10:30 am to 12:20 pm

Synthesis and Characterization of Nanocrystals for Biomedical Applications II

Chair: **Alexandrou Antigoni**, Ecole Polytechnique (France)

10:30 am: **Development of dual-function microbeads embedded with quantum dots and iron oxide nanocrystals for biomedical applications** *(Invited Paper)***,** T. Sathe, Georgia Institute of Technology; S. Nie, Emory Univ. and Georgia Institute of Technology . . . . . [6448-06]

11:00 am: **Quantum dots beads** *(Invited Paper)***,** B. Dubertret, F. Drillat, B. Mahler, C. Allen, N. Lequeux, Ecole Supérieure de Physique et de Chimie Industrielles (France); C. Chassenieux, Univ. du Maine (France) . . . . . [6448-38]

11:30 am: **Novel physical behaviors in hybrid semiconductor/metal nanostructures based on nanocrystal quantum dots** *(Invited Paper)***,** V. I. Klimov, Los Alamos National Lab. . . . . [6448-07]

12:00 pm: **Novel CdSe/$Zn_{1-x}Mn_xS$ quantum dots for bimodality imaging,** S. Z. Wang, B. R. Jarrett, A. Y. Louie, S. M. Kauzlarich, Univ. of California/Davis . . . . . [6448-08]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 3

Room: Conv. Ctr. C2 . . . . . Sat. 1:20 to 3:30 pm

Novel Biomedical Nanosensors Based on Colloidal Nanocrystals

Chair: **Warren C. W. Chan**, Univ. of Toronto (Canada)

1:20 pm: **Intraband spectroscopy and dynamics of colloidal heterostructure core/shell quantum dots** *(Invited Paper)***,** P. Guyot-Sionnest, A. Pandey, Univ. of Chicago . . . . . [6448-37]

1:50 pm: **Electron and energy transfer mechanisms to switch the luminescence of semiconductor quantum dots** *(Invited Paper)***,** F. M. Raymo, M. Tomasulo, I. Yildiz, Univ. of Miami . . . . . [6448-10]

2:20 pm: **Plasmon-resonant nanorods as multimodal agents for biomedical imaging and therapy** *(Invited Paper)***,** A. Wei, L. Tong, Y. Zhao, M. N. Hansen, T. B. Huff, J. Cheng, Purdue Univ. . . . . [6448-11]

2:50 pm: **Wavelength-shift optical biosensors from nanoparticle-nanowire superstructures,** J. B. Lee, Univ. of Michigan; A. O. Govorov, Ohio Univ.; N. A. Kotov, Univ. of Michigan . . . . . [6448-12]

3:10 pm: **Photophysics and functionalization of luminescent lanthanide-ion doped oxide nanoparticles for single-molecule applications,** D. Casanova, D. Giaume, T. Gacoin, J. P. Biolot, A. Antigoni, Ecole Polytechnique (France) . . . . . [6448-13]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 4

Room: Conv. Ctr. C2 . . . . . Sat. 3:50 to 6:20 pm

FRET-Based Nanosensing

Chair: **Victor I. Klimov**, Los Alamos National Lab.

3:50 pm: **Quantum dot bioconjugates for fluorescence resonance** *(Invited Paper)***,** I. L. Medintz, Naval Research Lab.; P. E. Dawson, Scripps Research Institute; A. R. Clapp, H. Mattoussi, Naval Research Lab. . . [6448-14]

4:20 pm: **Investigation of quantum dot FRET in the far-red spectral region,** E. Z. Chong, D. R. Matthews, H. D. Summers, K. L. Njoh, R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom) . . . . . [6448-15]

4:40 pm: **Solution-phase single quantum dot fluorescence resonant energy transfer: Probing heterogeneity in macroscopic samples,** T. Pons, I. L. Medintz, H. Mattoussi, Naval Research Lab.; X. Wang, D. S. English, Univ. of Maryland/College Park . . . . . [6448-16]

5:00 pm: **Quantum dot based FRET sensors,** R. A. Sperling, C. J. Lin, Ludwig-Maximilians-Univ. München (Germany); M. T. Fernandez-Argüelles, Univ. de Oviedo (Spain) and Ludwig-Maximilians-Univ. München (Germany); M. Zanella, Ludwig-Maximilians-Univ. München (Germany); J. M. Costa-Fernandez, R. Pereiro, A. Sanz-Medel, Univ. de Oviedo (Spain); W. J. Parak, Ludwig-Maximilians-Univ. München (Germany) . . . . . [6448-17]

5:20 pm: **Homogeneous FRET immunoassay based on lanthanides to quantum dots energy transfer,** N. Hildebrandt, Univ. Potsdam (Germany); L. J. Charbonnière, R. F. Ziessel, Univ. Louis Pasteur (France); H. Löhmannsröben, Univ. Potsdam (Germany) . . . . . [6448-18]

5:40 pm: **Nanoscale intracellular searchlights for localized fluorescence excitation,** A. Yakowlev, Univ. Paris Descartes and Ecole Normale Supérieure (France); M. T. Fernandez-Argüelles, Univ. de Oviedo (Spain) and Ludwig-Maximilians-Univ. München (Germany); M. Zanella, Ludwig-Maximilians-Univ. München (Germany); S. Gaillard, Ecole Normale Supérieure (France); C. Luccardini, Univ. Paris Descartes; A. Feltz, Ecole Normale Supérieure (France); J. Mallet, Univ. de Reims Champagne-Ardenne (France); I. Burghart, Ecole Normale Supérieure (France); I. Rivals, École Supérieure de Physique et de Chimie Industrielles; W. J. Parak, Ludwig-Maximilians-Univ. München (Germany); M. Oheim, Univ. Paris Descartes (France) . . . . . [6448-40]

6:00 pm: **FRET-based quantum dot systems for specific biosensing applications,** J. L. Nadeau, McGill Univ. (Canada) . . . . . [6448-41]

BiOS Hot Topics
7:00 to 9:30 pm
See page 14 for more information.

Sunday 21 January

SESSION 5

Room: Conv. Ctr. C2 . . . . . Sun. 8:40 to 10:20 am

Molecular-Level Sensing and Imaging with Nanoparticles

Chair: **Wolfgang J. Parak**,
Ludwig-Maximilians-Univ. München (Germany)

8:40 am: **Water-soluble quantum dots: Synthesis and imaging application,** W. W. H. Yu, Rice Univ. . . . . [6448-19]

9:00 am: **A new class of nontoxic nanoparticle tags based on surface enhanced Raman scattering,** X. M. Qian, D. O. Ansari, S. Nie, Emory Univ. and Georgia Institute of Technology . . . . . [6448-20]

9:20 am: **Nanocrystal clusters in combination with spectral imaging to improve sensitivity in immunostaining applications of fluorescent nanocrystals,** J. S. Maier, ChemImage Corp.; M. K. Bootman, Crystalplex Corp.; J. Panza, ChemImage Corp. . . . . [6448-21]

9:40 am: **Nanosecond imaging of quantum dots in highly fluorescent media,** C. G. Morgan, A. C. Mitchell, Univ. of Salford (United Kingdom) and Photonic Research Systems Ltd. (United Kingdom) . . . . . [6448-22]

10:00 am: **Magnetic nanoparticles for immunoassay,** H. Horng, S. Yang, National Taiwan Normal Univ. (Taiwan); C. Y. Hong, Da-Yeh Univ. (Taiwan); H. Yang, National Taiwan Univ. (Taiwan); C. Wu, National Taiwan Univ. Hospital (Taiwan) and E-Da Hospital (Taiwan) . . . . . [6448-23]

Coffee Break . . . . . 10:20 to 10:40 am

SESSION 6

Room: Conv. Ctr. C2 . . . . . Sun. 10:40 am to 12:10 pm

Applications of Colloidal Nanocrystals in Cell Biology I

Chair: **Françisco M. Raymo**, Univ. of Miami

10:40 am: **Quantum dots as biochemical sensors and effectors in living cells** *(Invited Paper)***,** T. M. Jovin, Max-Planck-Institut für biophysikalische Chemie (Germany) . . . . . [6448-24]

11:10 am: **Quantum dots for labeling of lipoproteins in cell biology,** O. T. Bruns, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); M. Nikolic, Univ. Hamburg (Germany); N. Bigall, Technische Univ. Dresden (Germany); M. G. Kaul, A. Laatsch, J. Hereen, Univ. Medical Ctr. Hamburg-Eppendorf (Germany); H. Weller, Univ. Hamburg (Germany); A. Eychmüller, Technische Univ. Dresden (Germany); U. Beisiegel, Univ. Medical Ctr. Hamburg-Eppendorf (Germany) . . . . . [6448-25]

11:30 am: **Selective cellular delivery of self-assembled quantum dot peptide bioconjugates,** J. B. Delehanty, I. L. Medintz, T. Pons, Naval Research Lab.; F. M. Brunel, P. E. Dawson, Scripps Research Institute; H. Mattoussi, Naval Research Lab. . . . . [6448-26]

11:50 am: **Nonlinear response of quantum dot bleaching to laser excitation,** M. Jonas, Y. Yao, P. T. C. So, C. F. Dewey, Jr., Massachusetts Institute of Technology . . . . . [6448-09]

Lunch/Exhibition Break . . . . . 12:10 to 1:40 pm

SESSION 7

Room: Conv. Ctr. C2 . . . . . Sun. 1:40 to 3:10 pm

Applications of Colloidal Nanocrystals in Cell Biology II

Chair: **Thomas M. Jovin**,
Max-Planck-Institut für biophysikalische Chemie (Germany)

1:40 pm: **Uniquely functionalized quantum dots for probing interfaces, materials properties, and cellular uptake** *(Invited Paper)***,** T. Emrick, R. Tangirala, Q. L. Zhang, R. Hong, K. Sill, Univ. of Massachusetts/ Amherst . . . . . [6448-39]

2:10 pm: **Pegilation strategies to overcome non specific adsorbtion of quantum dots to cell membranes and biologically active quantum dots,** I. D. Tomlinson, D. W. Wright, E. L. Bentzen, S. J. Rosenthal, Vanderbilt Univ. . . . . [6448-27]

2:30 pm: **Exploring membrane protein dynamics by multicolor single quantum dot imaging using wide field, TIRF, and hyperspectral microscopy,** D. S. Lidke, N. L. Andrews, Univ. of New Mexico; K. A. Lidke, H. D. T. Jones, M. B. Sinclair, A. R. Burns, D. M. Haaland, Sandia National Labs.; B. S. Wilson, J. M. Oliver, Univ. of New Mexico . . . . . [6448-28]

2:50 pm: **Gold nanorods and biomolecule conjugates for remote control of localized gene expression by near-infrared irradiation,** C. J. Chen, National Taiwan Normal Univ. (Taiwan) . . . . . [6448-29]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 8

Room: Conv. Ctr. C2 . . . . . Sun. 3:40 to 4:50 pm

Applications of Colloidal Quantum Dots in Cancer Diagnostics and Therapy

Chair: **Kenji Yamamoto**,
International Medical Ctr. of Japan (Japan) and Tokyo Medical and Dental Univ. Graduate School of Medicine (Japan)

3:40 pm: **Multiplexed molecular profiling of prostate cancer specimens using semiconductor quantum dot bioconjugates** *(Invited Paper)***,** Y. Xing, Emory Univ. and Georgia Institute of Technology; T. Numora, H. Y. Zhau, L. L. Chung, Emory Univ.; S. Nie, Emory Univ. and Georgia Institute of Technology . . . . . [6448-30]

4:10 pm: **Use of quantum dot based conjugates for pre-cancer detection,** D. L. Nida, R. R. Richards-Kortum, T. Muldoon, K. V. Sokolov, Rice Univ.; A. Gillenwater, The Univ. of Texas M.D. Anderson Cancer Ctr. . . . . [6448-31]

4:30 pm: **Quantum dots as contrast agents for endoscopy: Mathematical modeling and experimental validation of the optimal excitation wavelength,** M. Roy, R. S. DaCosta, R. A. Weersink, G. Netchev, Princess Margaret Hospital (Canada); W. C. W. Chan, Univ. of Toronto (Canada); B. C. Wilson, Princess Margaret Hospital (Canada) and Univ. Health Network (Canada) . . . . . [6448-32]

SESSION 9

Room: Conv. Ctr. C2 . . . . . Sun. 4:50 to 6:00 pm

Applications of Colloidal Quantum Dots in Neuroscience, Drug Delivery, and Biomechanics

Chair: **Sandra J. Rosenthal**, Vanderbilt Univ.

4:50 pm: **Ligand-bound quantum dots for intracellular imaging of neural receptors** *(Invited Paper)***,** T. Q. Vu, Oregon Health & Science Univ. . . [6448-42]

5:20 pm: **Polymer capsules for drug delivery and sensor applications,** W. J. Parak, A. Munoz Javier, Ludwig-Maximilians-Univ. München (Germany); G. B. Sukhorukov, O. Kreft, A. Skirtach, Max-Planck-Institut für Kolloid- und Grenzflächenforschung (Germany) . . . . . [6448-33]

5:40 pm: **Nanometer tracking of single quantum dot array fluorescence: application to bone biomechanics,** K. Golcuk, T. M. Vanasse, M. D. Morris, S. A. Goldstein, Univ. of Michigan . . . . . [6448-34]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

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Molecular Probes for Biomedical Applications

Conference Chairs: **Samuel Achilefu**, Washington Univ. in St. Louis; **Darryl J. Bornhop**, Vanderbilt Univ.; **Ramesh Raghavachari**, U.S. Food and Drug Administration

Program Committee: **Richard B. Dorshow**, Tyco Healthcare; **Gabor Patonay**, Georgia State Univ.

Tuesday 23 January

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✔ **Optical characterization of gold and Er^{3+}:Y_2O_3 nanoparticles for biosensor applications,** K. L. Nash, R. M. Yow, D. M. Dee, G. Swanland, D. K. Sardar, M. Zhang, W. Gorski, The Univ. of Texas at San Antonio . . . . . [6449A-20]

✔ **A quantitative analysis of the intracellular transport of quantum dot-peptide in live cells using epifluorescence microscopy,** K. Kim, Yonsei Univ. (South Korea) and College of Medicine (South Korea); E. Cho, D. Kim, Y. Huh, Yonsei Univ. (South Korea) . . . . . [6449A-21]

✔ **Steady state spectroscopy of new biological probes,** O. K. Abou-Zied, Sultan Qaboos Univ. (Oman) . . . . . [6449A-22]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.;
Jennifer Kehlet Barton, The Univ. of Arizona

See p. 14 for more information.

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. J3 . . . . . Wed. 8:00 to 10:40 am

Advanced Strategies for Molecular Imaging and Therapy

Chairs: **Ramesh Raghavachari**, U.S. Food and Drug Administration; **Samuel Achilefu**, Washington Univ. in St. Louis

8:00 am: **Molecular imaging of photodynamic therapy efficacy** *(Invited Paper)***,** T. Hasan, S. K. Chang, I. Rizvi, N. Solban, Massachusetts General Hospital . . . . . [6449A-01]

8:30 am: **Photonic nanoparticles in cancer treatment and diagnosis: promise and barriers** *(Invited Paper)***,** B. C. Wilson, Univ. of Toronto (Canada) . . . . . [6449A-02]

Keynote Presentation

9:00 am: **Free-radical probes for functional in-vivo EPR imaging** *(Invited Paper)***,** S. Subramanian, M. C. Krishna, National Institutes of Health . . . . . [6449A-03]

9:40 am: **Efficacy monitoring in colon cancer therapy using high throughput screening and in-vivo imaging,** D. J. Bornhop, Vanderbilt Univ. . . . [6449A-04]

10:10 am: **Novel molecular beacons as integrated optical imaging and photodynamic therapy agents,** G. Zheng, Univ. of Pennsylvania . . [6449A-05]

Coffee Break . . . . . 10:40 to 11:10 am

SESSION 2

Room: Conv. Ctr. J3 . . . . . Wed. 11:10 am to 12:30 pm

Development of Single and Multiphoton Molecular Probes

Chair: **Ramesh Raghavachari**, U.S. Food and Drug Administration

11:10 am: **Near-infrared dyes and upconverting phosphors as biomolecule labels and probes** *(Invited Paper)***,** G. Patonay, L. Strekowski, D. Nguyen, K. J. Seok, Georgia State Univ. . . . . [6449A-06]

11:30 am: **Encapsulation of Indocyanine Green within nano-assembled capsules changes its optical properties,** M. A. Yaseen, J. Yu, M. S. Wong, B. Anvari, Rice Univ. . . . . [6449A-07]

11:50 am: **The application of novel two-photon fluorescent probes in optical tumor imaging,** K. D. Belfield, Z. Huang, A. R. Morales, Univ. of Central Florida; K. J. Schafer-Hales, Emory Univ. . . . . [6449A-08]

12:10 pm: **Synthesis and characterization of new fluorene-based fluorescent probes for two-photon bioimaging,** K. D. Belfield, A. R. Morales, S. Yao, Univ. of Central Florida . . . . . [6449A-09]

Lunch/Exhibition Break . . . . . 12:30 to 2:00 pm

SESSION 3

Room: Conv. Ctr. J3 . . . . . Wed. 2:00 to 3:20 pm

Nanomaterials

Chair: **Darryl J. Bornhop**, Vanderbilt Univ.

2:00 pm: **A fluorescent-magnetic nanostructure: a novel imaging probe for biomedical applications,** T. Pellegrino, National Nanotechnology Lab. (Italy) . . . . . [6449A-10]

2:20 pm: **Size and concentration dependent absorption and scattering characteristics of gold nanoparticles embedded in liquid phantoms,** S. Moon, E. Sim, D. Kim, Yonsei Univ. (South Korea) . . . . . [6449A-11]

2:40 pm: **Metal/dendrimer nanocomposites for enhanced optical breakdown: acoustic characterization and initial targeted cell uptake study,** C. Tse, Univ. of Michigan; W. Lesniak, L. P. Balogh, Roswell Park Cancer Institute; J. Y. Ye, M. O'Donnell, Univ. of Michigan . . . . . [6449A-12]

3:00 pm: **Luminescent up-converting nanocrystals for in-vivo imaging,** I. F. Texier Nogues, E. Heinrich, Commissariat à l'Energie Atomique (France); O. Tillement, C. Louis, NANO-H S.A.S. (France); M. Berger, Commissariat à l'Energie Atomique (France); V. Josserand, ANIMAGE (France); P. Peltie, Commissariat à l'Energie Atomique (France) . . . . . [6449A-13]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 4

Room: Conv. Ctr. J3 . . . . . Wed. 3:50 to 4:50 pm

Molecular Sensors

Chair: **Darryl J. Bornhop**, Vanderbilt Univ.

3:50 pm: **Real-time probing of radical events with a disulfide biomolecule,** Y. A. Gauduel, Y. Glinec, V. Malka, École Nationale Supérieure de Techniques Avancées (France) . . . . . [6449A-14]

4:10 pm: **In-vitro influence of hypoxia on bioluminescence imaging in brain tumor cells,** E. H. Moriyama, Ontario Cancer Inst. (Canada) . . . . . [6449A-15]

4:30 pm: **Oligonucleotide functionalized intrinsic Fabry-Perot interferometric probe for DNA sequence detection,** X. Wang, J. Xu, Z. Wang, K. L. Cooper, A. Wang, Virginia Polytechnic Institute and State Univ. [6449A-16]

SESSION 5

Room: Conv. Ctr. J3 . . . . . Wed. 4:50 to 5:50 pm

Molecular Contrast Imaging Methods

Chair: **Samuel Achilefu**, Washington Univ. in St. Louis

4:50 pm: **In-vivo resolution of two near-infrared fluorophores by time-domain diffuse optical tomagraphy,** W. J. Akers, S. Achilefu, Washington Univ. in St. Louis . . . . . [6449A-17]

5:10 pm: **Fluorescent labels and their activation for the design of noninvasive small animal imaging probes,** I. F. Texier Nogues, M. Berger, J. Boutet, A. Laidevant, A. Da Silva, E. Heinrich, P. Peltie, Commissariat à l'Energie Atomique (France) . . . . . [6449A-18]

5:30 pm: **Fourier domain spectral triangulation for the molecule-specific detection of both scattering- and absorption-based contrast in biological samples,** E. J. McDowell, Z. Yaqoob, C. Yang, California Institute of Technology . . . . . [6449A-19]

Small Animal Whole-Body Optical Imaging Based on Genetically Engineered Probes

Tuesday 23 January

SESSION 6

Room: Conv. Ctr. D . . . . . Tues. 8:10 to 10:20 am

Photophysics of the Color Proteins

Chairs: **Alexander P. Savitsky**, A.N. Bach Institute of Biochemistry (Russia); **Stefan W. Hell**, Deutsches Krebsforschungszentrum (Germany)

8:10 am: **Photoinduced changes in the structure of the green fluorescent protein chromophore,** P. J. Tonge, D. Stoner-Ma, E. H. Melief, Stony Brook Univ.; J. Nappa, Univ. Claude Bernard Lyon 1 (France); K. Ronayne, Rutherford Appleton Lab. (United Kingdom); S. Meech, Univ. of East Anglia Norwich (United Kingdom) . . . . . [6449B-46]

8:30 am: **Modulating proton transfer in the green fluorescent protein,** L. M. Tolbert, K. M. Solntsev, J. Dong, Georgia Institute of Technology; S. J. Remington, Univ. of Oregon; D. Huppert, Tel Aviv Univ. (Israel) . [6449B-24]

8:50 am: **Accurate modeling of the S0-S1 photo-absorption biological chromophores,** A. Nemukhin, A. Bochenkova, K. Bravaya, A. Granovsky, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6449B-25]

9:10 am: **The photoisomerization of fluorescent protein chromophores,** S. C. Olsen, S. C. Smith, The Univ. of Queensland (Australia) . . . . . [6449B-26]

9:30 am: **Modeling trans-cis chromophore isomerization for the asFP595 Kindling protein,** B. Grigorenko, A. Nemukhin, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6449B-27]

9:50 am: **Dynamic stokes shift in a GFP variant: dissecting solvation** *(Invited Paper)***,** S. G. Boxer, Stanford Univ. . . . . [6449B-23]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 7

Room: Conv. Ctr. D . . . . . Tues. 10:50 am to 12:30 pm

Biochemistry and Engineering of the Color Proteins

Chairs: **Rebekka M. Wachter**, Arizona State Univ.; **Atsushi Miyawaki**, The Institute of Physical and Chemical Research (Japan)

10:50 am: **Conformational freedom of the chromophore in FP's,** M. Zimmer, Connecticut College . . . . . [6449B-28]

11:10 am: **Structural basis of reduced excited state heterogeneity in Cerulean GFP,** R. M. Wachter, G. D. Malo, L. J. Pouwels, Arizona State Univ.; D. W. Piston, Vanderbilt Univ. . . . . [6449B-29]

11:30 am: **Fluorescence-based characterization and selection of genetically encoded peptides that fold in the cytoplasm of living cells,** R. E. Campbell, Z. Cheng, Univ. of Alberta (Canada) . . . . . [6449B-30]

11:50 am: **Tuning the inherent and analyte specific bioluminescence of photoproteins,** L. A. Rowe, K. Teasley, Univ. of Kentucky; S. Deo, Indiana Univ.-Purdue Univ. Indianapolis; M. Ensor, S. Daunert, Univ. of Kentucky . [6449B-31]

12:10 pm: **A live-cell, high-throughput imaging based approach to understanding the enzymology and pharmacology of 2-bromopalmitate and palmitoylation,** D. Zacharias, I. Mikic, S. Planey, J. Zhang, C. Ceballos, T. Seron, B. VonMassenbach, R. Watson, Univ. of Florida; S. Callaway, P. McDonough, Vala Sciences Inc; J. H. Price, E. Hunter, Vala Sciences Inc. . . . . [6449B-32]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 8

Room: Conv. Ctr. D . . . . . Tues. 1:30 to 5:20 pm

Small Animal Whole-Body Imaging

Chair: **Robert M. Hoffman**, AntiCancer, Inc.

1:30 pm: **Tri-color whole-body cellular imaging of tumor-stroma interaction and drug response in live mice,** M. Yang, P. Jiang, R. M. Hoffman, AntiCancer, Inc. . . . . [6449B-33]

1:50 pm: **Whole-body multi-color imaging using transgenic rats,** E. Kobayashi, Jichi Medical School (Japan) . . . . . [6449B-34]

2:10 pm: **Preclinical fluorescent mouse models of pancreatic cancer,** M. Bouvet, Univ. of California/San Diego; R. M. Hoffman, AntiCancer, Inc. and Univ. of California/San Diego . . . . . [6449B-35]

2:30 pm: **Development of a novel fluorescent imaging probe for tumor hypoxia by use of a fusion protein with oxygen-dependent degradation domain of HIF-1,** S. Kizaka-Kondoh, S. Tanaka, H. Harada, M. Hiraoka, Kyoto Univ. (Japan) . . . . . [6449B-36]

2:50 pm: **Bio-imaging of luminescence- and LacZ-expressed double transgenic rats,** Y. Hakamata, Nippon Veterinary and Life Science Univ. (Japan); N. Yagishita, K. Konno, T. Murakami, E. Kobayashi, Jichi Medical School (Japan) . . . . . [6449B-37]

Coffee Break . . . . . 3:10 to 3:40 pm

3:40 pm: **Non-invasive and real-time monitoring of molecular targeting therapy with cetuximab and gefitinib for lymph node and peritoneal metastasis in nude mice bearing xenografts of human colorectal cancer cells tagged with GFP and DsRed,** H. Nakanishi, M. Hara, Aichi Cancer Center Research Institute, Division of Oncological Pathology (Japan) . . . . . [6449B-38]

4:00 pm: **Fluorescence lifetime contrast in small animal imaging,** V. K. Ramanujan, B. A. Herman, The Univ. of Texas Health Science Ctr. at San Antonio . . . . . [6449B-39]

4:20 pm: **High-frequency (GHz) diffuse optical tomography for mapping small animal optical properties,** S. V. Patwardhan, J. P. Culver, Washington Univ. . . . . [6449B-40]

4:40 pm: **Molecular imaging of prostate cancer metastasis at a single cell resolution reveals _stemness_ genetic targets for diagnostic, prognostic and therapeutic applications,** G. V. Glinsky, Ordway Research Institute, Inc. . . . . [6449B-47]

5:00 pm: **Whole-body multicolor spectrally resolved fluorescence imaging for development of target-specific optical contrast agents using genetically engineered probes,** H. Kobayashi, Y. Hama, Y. Koyama, National Institutes of Health; T. Barrett, National Institute of Health; Y. Urano, The Univ. of Tokyo (Japan); P. L. Choyke, National Institutes of Health . . . . . [6449B-48]

Tuesday 23 January

✔ Posters-Tuesday

Chairs: **Alexander P. Savitsky**, A.N. Bach Institute of Biochemistry (Russia); **Rebekka M. Wachter**, Arizona State Univ.

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✔ **Fluorescence diffuse tomography for detection of DsRed2-expressed tumors in small animals,** I. V. Turchin, A. G. Orlova, Institute of Applied Physics (Russia); I. G. Meerovich, L. R. Arslanbaeva, V. V. Jerdeva, A.N. Bach Institute of Biochemistry (Russia); M. V. Shirmanova, V. I. Plehanov, V. A. Kamensky, M. S. Kleshnin, E. A. Sergeeva, Institute of Applied Physics (Russia); A. P. Savitsky, A.N. Bach Institute of Biochemistry (Russia) . . . . . [6449B-41]

✔ **In-vivo detecting matrix metalloproteinase (MMP) activity by a genetically engineered fluorescent probe,** J. Yang, Z. Zhang, T. Su, Q. Luo, Huazhong Univ. of Science and Technology (China) . . . . . [6449B-42]

✔ **Chromophore formation in GFP: computational modeling of the immature form of wild-type GFP,** M. Zimmer, N. Lemay, Connecticut College . . . . . [6449B-43]

✔ **Role of pH in the appearance of the fluorescent state of chromo protein asCP595 and its mutants A148S and KFP,** A. L. Rusanov, M.V. Lomonosov Moscow State Univ. (Russia); N. Zubova, A. P. Savitsky, A.N. Bach Institute of Biochemistry (Russia) . . . . . [6449B-44]

✔ **Comparison of pH dependent spectral properties of DsRed and DsRed2,** V. A. Korolenko, M.V. Lomonosov Moscow State Univ. (Russia); M. Ozerova, N. N. Zubova, A. P. Savitsky, A.N. Bach Institute of Biochemistry (Russia) . . . . . [6449B-45]

Technical Group Meeting

IBOS—International Biomedical Optics Society

Tuesday 23 January · 7:30 to 9:00 pm

Chairs: **Lihong Wang,** Washington Univ.; **Jennifer Kehlet Barton,** The Univ. of Arizona

See p. 14 for more information.

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Plasmonics in Biology and Medicine IV

Conference Chairs: **Tuan Vo-Dinh**, Duke Univ.; **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore

Program Committee: **Albert C. Boccara**, École Supérieure de Physique et de Chimie Industrielles (France); **Bruce S. Dunn**, Univ. of California/Los Angeles; **Chris D. Geddes**, Univ. of Maryland/Baltimore; **Zygmunt K. Gryczynski**, Univ. of North Texas; **Naomi J. Halas**, Rice Univ.; **Boris Mizaikoff**, Georgia Institute of Technology; **Shuming Nie**, Emory Univ.; **Ali Serpengüzel**, Koç Univ. (Turkey); **Weihong Tan**, Univ. of Florida; **Andrew Taton**, Univ. of Minnesota; **Richard P. Van Duyne**, Northwestern Univ.; **Jeffrey I. Zink**, Univ. of California/Los Angeles

Tuesday 23 January

SESSION 1

Room: Conv. Ctr. B3 . . . . . Tues. 8:30 to 10:10 am

Plasmonics and SERS

Chair: **Tuan Vo-Dinh**, Duke Univ.

8:30 am: **Theory of surface-enhanced Raman scattering from a molecule adsorbed on a cluster of metallic nanoparticles and nanoshells,** J. Bonner, San José State Univ.; R. B. Murphy, Univ. of California/Davis; K. Arya, San José State Univ. . . . . [6450-01]

8:50 am: **Surface-enhanced Raman biosensors for the detection of cell membrane proteins,** L. Tay, Q. Hu, M. Noestheden, J. P. Pezacki, National Research Council Canada (Canada) . . . . . [6450-02]

9:10 am: **Surface-enhanced Raman spectroscopy (SERS) using holographic plates and substrates prepared from silver colloidal solution and gelatin,** R. D. Bahuguna, San José State Univ.; L. E. Jusinski, Sandia National Labs.; K. Arya, San José State Univ. . . . . [6450-03]

9:30 am: **Highly sensitive detection of DNA molecules by metallic-tip enhanced Raman spectroscopy,** T. Ichimura, S. Kawata, Y. Inouye, Osaka Univ. (Japan) . . . . . [6450-04]

9:50 am: **Plasmonics molecular sentinels: a new concept in biosensing,** T. Vo-Dinh, Duke Univ. . . . . [6450-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. B3 . . . . . Tues. 10:30 am to 12:10 pm

Plasmonics and Fluorescence

Chairs: **Joseph R. Lakowicz**, Univ. of Maryland/Baltimore; **Tuan Vo-Dinh**, Duke Univ.

10:30 am: **A fluorescence biochip with a plasmon active surface,** D. R. Matthews, H. D. Summers, K. L. Njoh, S. Chappell, R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom); I. A. Pope, B. Vojnovic, P. R. Barber, Gray Cancer Institute (United Kingdom); S. Ameer-Beg, King's College London (United Kingdom) . . . . . [6450-06]

10:50 am: **Microwave-accelerated plasmonics: application to ultra-fast and ultra-sensitive clinical assays,** K. Aslan, Univ. of Maryland/Baltimore; M. J. R. Previte, Massachusetts Institute of Technology; Y. Zhang, C. D. Geddes, Univ. of Maryland/Baltimore . . . . . [6450-07]

11:10 am: **Evaluation of Surface-Plasmon Coupled Emission (SPCE) for fluorescence-based biochips,** T. Ruckstuhl, M. Trnavsky, B. D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6450-08]

11:30 am: **Uniform deposition of gold and silver nanoparticles onto plastic substrates for plasmon-enhanced fluorescence,** O. Stranik, R. I. Nooney, C. M. McDonagh, B. D. MacCraith, Dublin City Univ. (Ireland) . . . . . [6450-09]

11:50 am: **Towards the Standing Wave Surface Plasmon Resonance Fluorescence Microscopy,** E. Chung, Massachusetts Institute of Technology; W. T. Tang, National Univ. of Singapore (Singapore); Y. Kim, Massachusetts Institute of Technology; C. J. R. Sheppard, National Univ. of Singapore (Singapore); P. T. C. So, Massachusetts Institute of Technology . . . . . [6450-10]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 3

Room: Conv. Ctr. B3 . . . . . Tues. 1:10 to 2:50 pm

Advanced Plasmonics Structures and Systems

Chair: **Steven Blair**, The Univ. of Utah

1:10 pm: **Nanoplasmonic resonator-based detection of proteolytically active PSA,** J. G. Valentine, K. Su, C. Sun, Univ. of California/Berkeley; F. F. Chen, Lawrence Berkeley National Lab.; X. Zhang, Univ. of California/Berkeley . . . . . [6450-11]

1:30 pm: **Plasmonic nanholes for molecular detection,** S. Blair, F. F. Mahdavi, The Univ. of Utah . . . . . [6450-12]

1:50 pm: **Optimal plasmonic focusing with radial polarization,** Q. Zhan, W. Chen, Univ. of Dayton . . . . . [6450-13]

2:10 pm: **Gold nanocages for photothermal therapy,** J. Chen, D. Wang, L. Au, A. Siekkinen, A. Warsen, P. Kim, Univ. of Washington; S. Elliott, H. Zhang, Institute for Systems Biology; Y. Xia, X. Li, Univ. of Washington . . . . . [6450-14]

2:30 pm: **A novel microlens arrays coupler of surface plasmon resonance for biochemical applications,** N. Chiu, C. Lin, T. Chang, National Taiwan Univ. (Taiwan) . . . . . [6450-15]

SESSION 4

Room: Conv. Ctr. B3 . . . . . Tues. 2:50 to 4:30 pm

Surface Plasmon Resonance Systems and Applications I

Chair: **Zygmunt K. Gryczynski**, Univ. of North Texas

2:50 pm: **Plasmon-resonance enhancement of nonlinear properties of amino acids,** R. E. de Araujo, D. J. Rativa, A. S. L. Gomes, Univ. Federal de Pernambuco (Brazil) . . . . . [6450-16]

3:10 pm: **Effect of metallic nanowires on the sensitivity enhancement of surface plasmon resonance biosensors,** K. M. Byun, Seoul National Univ. (South Korea); S. J. Yoon, D. Kim, Yonsei Univ. (South Korea); S. J. Kim, Seoul National Univ. (South Korea) . . . . . [6450-17]

Coffee Break . . . . . 3:30 to 3:50 pm

3:50 pm: **Multispectral imaging of a biochip based on surface plasmon resonance and integration of chromophores,** N. Mohamed, Univ. de Tunis (Tunisia) and Univ. Paris-Sud II (France); P. Lecaruyer, F. Bardin, Univ. Paris-Sud II (France); J. Sakly, Institut National des Sciences Appliquees et de Technologie (Tunisia); Z. Ben Lakhdhar, Univ. de Tunis (Tunisia); M. Canva, Univ. Paris-Sud II (France) . . . . . [6450-19]

4:10 pm: **Integrated surface plasmon resonance sensor with periodic nanostructures for sensitivity enhancement,** Z. Khalid, C. Alleyne, X. D. Hoa, M. Tabrizian, McGill Univ. (Canada); J. Beauvais, P. G. Charette, Univ. de Sherbrooke (Canada); N. P. Nicorovici, R. C. McPhedran, The Univ. of Sydney (Australia); A. G. Kirk, McGill Univ. (Canada) . . . . . [6450-20]

SESSION 5

Room: Conv. Ctr. B3 . . . . . Tues. 4:50 to 6:10 pm

Surface Plasmon Resonance Systems and Applications II

Chair: **Christopher D. Geddes**, Univ. of Maryland/Baltimore

4:50 pm: **A surface plasmon phase imaging system with subwavelength grating,** Y. Su, S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6450-21]

5:10 pm: **Surface plasmon resonance biosensors with subwavelength grating waveguide,** C. Lin, S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6450-22]

5:30 pm: **Novel Phase-Polarimetry Methods in Surface Plasmon Resonance Biosensing,** A. V. Kabashin, S. V. Patskovsky III, M. Meunier, École Polytechnique de Montréal (Canada); P. P. Markowicz, Univ at Buffalo; W. C. Law, P. N. Prasad, Univ. at Buffalo . . . . . [6450-23]

5:50 pm: **Surface plasmon resonance spectro-imaging sensor for biomolecular surface interaction characterization,** F. Bardin, A. Bellemain, G. Roger, M. Canva, Univ. Paris-Sud II (France) . . . . . [6450-24]

Tuesday 23 January

✔ Posters-Tuesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Tuesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Spatial analysis of a microbead using surface plasmon resonance coupled fluorescence,** S. J. Yoon, D. Kim, Yonsei Univ. (South Korea) . . . . . [6450-18]

✔ **Sensitivity characteristics of extinction-based localized surface plasmon resonance biosensors using metallic nanowires in the presence of surface roughness,** K. M. Byun, Seoul National Univ. (South Korea); S. J. Yoon, Yonsei Univ. (South Korea); S. J. Kim, Seoul National Univ. (South Korea); D. Kim, Yonsei Univ. (South Korea) . . . . . [6450-25]

✔ **Reflection analysis of surface plasmon resonance by wavelength interrogation,** X. Hong, Consultant (United Kingdom) . . . . . [6450-26]

✔ **Investigating the structural changes of β-amyloid peptide aggregation using attenuated-total-reflection surface-enhanced Raman spectroscopy,** K. Chiu, S. Chen, National Cheng Kung Univ. (Taiwan) . . . . . [6450-27]

✔ **Interferometric surface plasmon resonance based on low-cost grating substrates,** N. Sedoglavich, Univ. of Waikato (New Zealand); J. C. Sharpe, The Horticulture and Food Research Institute of New Zealand Ltd. (New Zealand); R. Künnemeyer, S. Talele, Univ. of Waikato (New Zealand) [6450-28]

✔ **Non-invasive noble metal nanoparticle arrays for surface enhanced Raman spectroscopy of proteins,** O. Inya-Agha, D. Lucey, R. J. Forster, T. E. Keyes, Dublin City Univ. (Ireland) . . . . . [6450-29]

✔ **Electrodeposited noble metal SERS: control of single nanoparticle size and control of array interparticle spacing,** E. Sheridan, O. Inya-Agha, T. E. Keyes, R. J. Forster, Dublin City Univ. (Ireland) . . . . . [6450-30]

SPIE Photonics WEST

LASE 2007

Lasers and Applications in Science and Engineering

20–25 January 2007

San Jose Convention Center • San Jose, California USA

Symposium Chairs:

Friedrich G. Bachmann,
ROFIN-SINAR Laser GmbH (Germany)

Henry Helvajian,
The Aerospace Corp. (USA)

Symposium Cochairs

Jan J. Dubowski,
Université de Sherbrooke (Canada)

L. N. Durvasula,
DARPA (USA)

Laser Source Engineering

Program Chair: **Gregory Quarles**, VLOC

Nonlinear Optics

Program Chair: **Peter Powers**, Univ. of Dayton

Semiconductor Lasers and LEDs

Program Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

Laser Communication and Propagation

Program Chair: **G. Stephen Mecherle**, Innocept Inc.

Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp.; **James S. Horwitz**, U.S. Department of Energy

LASE Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Laser Source Engineering

Program Chair: **Gregory Quarles**, VLOC

LASE Plenary Session
10:30 am to 12:30 pm

6451 **Solid State Lasers XVI: Technology and Devices** *(Hoffman, Shori, Hodgson)* p. 130

6452 **Laser Resonators and Beam Control IX** *(Kudryashov, Paxton, Ilchenko)* p. 134

6453 **Fiber Lasers IV: Technology, Systems, and Applications** *(Harter, Tünnermann)* p. 136

6454 **High Energy/Average Power Lasers and Intense Beam Applications** *(Davis, Heaven, Schriempf)* p. 140

Nonlinear Optics

Program Chair: **Peter Powers**, Univ. of Dayton

6455 **Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications VI** *(Powers)* p. 142

Special Events

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Optics Exhibition
San Jose Convention Center, Exhibition Hall 1
1:00 to 5:00 pm | 10:00 am to 4:00 pm

Welcome Reception, Fairmont Hotel, Imperial Ballroom, 6:00 to 7:30 pm, p. 10

Photonics West Exhibition
San Jose Convention Center, Exhibition Hall 1–3, Exhibit Foyer and South Hall
10:00 am to 5:00 pm | 10:00 am to 5:00 pm | 10:00 am to 4:00 pm

Attend the SPIEWorks Career Fair!
Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance
11:00 am to 3:00 pm | 11:00 am to 3:00 pm

LASE Plenary Session, 10:30 am to 12:30 pm, p. 16

OPTO, LASE, MOEMS-MEMS Poster Session, Parkside Hall, Civic Auditorium Complex, 6:00 to 7:30 pm

Technical Group Meeting **Laser Communications** 7:30 to 9:00 pm, p. 17 *Sponsored by:* **Fiberguide**

Best Student Presentation Award: **Solid State Laser Technology XVI: Technology and Devices,** 9:50 am, p. 17

Best Student Presentation Award: **Fiber Lasers IV: Technology, Systems, and Applications,** 5:30 pm, p. 17

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Semiconductor Lasers and LEDs

Program Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

LASE Plenary Session
10:30 am to 12:30 pm

6456 **High-Power Diode Laser Technology and Applications V** *(Zediker)* p. 144

6468 **Physics and Simulation of Optoelectronic Devices XV** *(Osinski, Henneberger, Arakawa)* p. 1778

6473 **Gallium Nitride Materials and Devices II** *(Morkoc, Litton)* p. 190

6474 **Zinc Oxide Materials and Devices II** *(Hosseini Teherani, Litton)* p. 193

6484 **Vertical-Cavity Surface-Emitting Lasers XI** *(Choquette, Guenter)* p. 218

6486 **Light-Emitting Diodes: Research, Manufacturing, and Applications XI** *(Streubel, Jeon)* p. 222

6485 **Novel In-Plane Semiconductor Lasers VI** *(Mermelstein, Bour)* p. 219

Laser Communication and Propagation

Program Chair: **G. Stephen Mecherle**, Innocept Inc.

6457B **Atmospheric Propagation of Electromagnetic Waves** *(Korotkova)* p. 146

6457A **Free-Space Laser Communication Technologies XIX** *(Mecherle)* p. 147

Laser Micro-/Nanoengineering and Applications

Program Chairs: **Henry Helvajian**, The Aerospace Corp.; **James S. Horwitz**, U.S. Department of Energy

6458B **Synthesis and Photonics of Nanoscale Materials V** *(Geohegan, Träger, Dubowski)* p. 151

6458A **Laser Applications in Microelectronic and Optoelectronic Manufacturing XII** *(Arnold, Okada, Meunier, Holmes)* p. 148

6459 **Laser-Based Micro- and Nano-Packaging and Assembly (LBMP-IV)** *(Pfleging, Lu, Washio)* p. 152

6460 **Commercial and Biomedical Applications of Ultrafast Lasers VII** *(Neev, Nolte, Heisterkamp, Schaffer)* p. 154

6461 **Laser Cooling of Solids** *(Epstein, Sheik-Bahae)* p. 157

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Solid State Lasers XVI: Technology and Devices

Conference Chairs: **Hanna J. Hoffman**, Liekki, Inc.; **Ramesh K. Shori**, Naval Air Warfare Ctr.; **Norman Hodgson**, Coherent, Inc.

Program Committee: **Henry R. Aldag**, Physical Sciences Inc.; **Jason M. Eichenholz**, Newport Corp.; **William M. Grossman**, JDS Uniphase Corp.; **Peter Günter**, ETH Zürich (Switzerland); **Hans-Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany); **Helena Jelínková**, Czech Technical Univ. in Prague (Czech Republic); **Yehoshua Y. Kalisky**, Nuclear Research Ctr. Negev (Israel); **Louis McDonagh**, Technische Univ. Kaiserslautern (Germany); **Iain T. McKinnie**, Lockheed-Martin Coherent Corp. (Germany); **Alan B. Petersen**, Spectra-Physics; **Stephen G. Post**, Air Force Research Lab.; **Narasimha S. Prasad**, NASA Langley Research Ctr.; **Gregory J. Quarles**, VLOC; **Wolf R. Seelert**, Coherent Lübeck GmbH (Germany); **David H. Titterton**, Defence Science and Technology Lab. (United Kingdom)

Monday 22 January

Opening Remarks

Conv. Ctr. Room J1 ..... 8:40 to 8:50 am

Hanna J. Hoffman, Liekki, Inc.

SESSION 1

Room: Conv. Ctr. Room J1 ..... Mon. 8:50 to 10:20 am

UV Lasers - CW

Chair: **Norman Hodgson**, Coherent, Inc.

8:50 am: **Continuous wave Praseodymium solid-state lasers** *(Invited Paper)*, G. Huber, A. Richter, E. Heumann, Univ. Hamburg (Germany) ..... [6451-01]

9:20 am: **UV generation by intracavity frequency doubling of an OPS-pumped Pr:YLF laser with 500 mW of cw power at 360 nm,** V. G. Ostroumov, W. R. Seelert, Coherent Luebeck GmbH (Germany); L. E. Hunziker, C. Ihli, Coherent, Inc.; A. Richter, E. Heumann, G. Huber, Univ. Hamburg (Germany) ..... [6451-02]

9:40 am: **522/261 nm cw generation in a Pr3+:LiYF4 laser pumped by an optically pumped semiconductor laser,** V. G. Ostroumov, W. R. Seelert, Coherent Luebeck GmbH (Germany); L. E. Hunziker, C. Ihli, Coherent, Inc. ..... [6451-03]

10:00 am: **High-power long term operation of a low noise 355 nm CW diode-pumped monolithic laser,** N. Aubert, T. Georges, R. Le Bras, C. Chauzat, OXXIUS (France); P. Féron, École Nationale Supérieure des Sciences Appliquées et de Technologie (France) ..... [6451-04]

Coffee Break ..... 10:20 to 10:50 am

SESSION 2

Room: Conv. Ctr. Room J1 ..... Mon. 10:50 am to 12:00 pm

UV Lasers - Pulsed

Chair: **Norman Hodgson**, Coherent, Inc.

10:50 am: **Ultrafast frequency conversion sources for the visible and ultraviolet based on BiB3O6** *(Invited Paper)*, M. Ebrahim-Zadeh, Institut de Ciències Fotòniques (Spain) ..... [6451-05]

11:20 am: **Frequency tripled and quadrupled air-cooled modelocked Nd:YVO4 laser with greater 6W average power,** A. H. Diening, Coherent, Inc.; S. Ahler, S. D. Butterworth, W. R. Seelert, Coherent Luebeck GmbH; O. Mehl, Coherent, Inc. ..... [6451-06]

11:40 am: **35 W at 355 nm from a mode-locked Nd:YV04 MOPA,** L. McDonagh, Technische Univ. Kaiserslautern (Germany); R. E. Wallenstein, Univ. Kaiserslautern (Germany); A. Nebel, Lumera Laser GmbH (Germany) ..... [6451-77]

Lunch Break ..... 12:00 to 1:00 pm

SESSION 3

Room: Conv. Ctr. Room J1 ..... Mon. 1:00 to 3:20 pm

Optically Pumped Semiconductors (OPS) and Disk Lasers

Chair: **Alan B. Petersen**, Spectra-Physics

1:00 pm: **Recent advances in optically pumped semiconductor lasers** *(Invited Paper)*, J. L. A. Chilla, Q. Shu, Coherent, Inc.; H. Zhou, E. S. Weiss, M. K. Reed, Coherent, Inc; L. Spinelli, Coherent, Inc. ..... [6451-08]

1:30 pm: **Power-scaling of optically pumped semiconductor lasers,** L. E. Hunziker, Q. Shu, C. Ihli, G. J. Mahnke, M. Rebut, J. L. A. Chilla, A. L. Caprara, H. Zhou, E. S. Weiss, M. K. Reed, Coherent, Inc. ..... [6451-09]

1:50 pm: **Advances in power scalable, tunable and mode-locked semiconductor disk lasers** *(Invited Paper)*, O. G. Okhotnikov, A. Härkönen, E. J. Saarinen, J. Rautiainen, M. Guina, Tampere Univ. of Technology (Finland) ..... [6451-72]

2:20 pm: **New wavelengths in the yellow orange range between 545 nm and 580 nm generated by intracavity frequency-doubled optically pumped semiconductor lasers,** S. Hilbich, W. R. Seelert, V. G. Ostroumov, C. Kannengiesser, R. von Elm, J. Mueller, Coherent Luebeck GmbH (Germany); E. S. Weiss, H. Zhou, J. L. A. Chilla, Coherent, Inc. ..... [6451-10]

2:40 pm: **Pulsed Yb:YAG thin disk laser with 100 W at 515 nm,** G. Hollemann, P. Heist, S. Heinitz, J. Symanowski, T. Eidam, JENOPTIK Laser, Optik, Systeme GmbH (Germany); C. Stolzenburg, A. Giesen, Univ. Stuttgart (Germany) ..... [6451-11]

3:00 pm: **Thin disk Yb:YAG laser with Q-switching and frequency doubling for the generation of strong pulses at 515 nm with excellent beam properties,** C. Petermann, G. E. Hummelt, ELS Elektronik Laser System GmbH (Germany) ..... [6451-12]

Coffee Break ..... 3:20 to 3:50 pm

SESSION 4

Room: Conv. Ctr. Room J1 ..... Mon. 3:50 to 5:40 pm

New Developments in Diode Pumped Solid State Lasers

Chair: **Hanna J. Hoffman**, Liekki, Inc.

3:50 pm: **888-nm pumping of NdYVO4 for high-power high-efficiency TEM00 lasers** *(Invited Paper)*, L. Mc Donagh, Univ. Kaiserslautern (Germany) [6451-13]

4:20 pm: **High-power 885-nm end-pumped Nd:YAG laser,** M. Frede, Laser Zentrum Hannover e.V. (Germany) ..... [6451-14]

4:40 pm: **Lightweight, 100 mJ 1064 nm laser designator,** J. C. McCarthy, R. C. Day, P. A. Ketteridge, K. J. Snell, E. P. Chicklis, BAE Systems North America ..... [6451-15]

5:00 pm: **Diode pumped Nd:YGG laser for direct generation of pulsed 935 nm radiation for water vapour measurements,** J. Löhring, K. Nicklaus, N. Kujath, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) [6451-16]

5:20 pm: **Nd:GSAG laser for water vapor detection by lidar near 942 nm,** F. Kallmeyer, S. G. Strohmaier, D. Schmidt, H. J. Eichler, Technische Univ. Berlin (Germany); R. Treichel, EADS Astrium (Germany); S. Nikolov, EADS ASTRIUM (Germany) ..... [6451-28]

Tuesday 23 January

SESSION 5

Room: Conv. Ctr. Room J1 . . . . . Tues. 8:10 to 10:00 am

Mid IR Lasers

Chair: **Ramesh K. Shori**, Naval Air Warfare Ctr.

8:10 am: **Progress in mid-IR transition metal lasers** *(Invited Paper)*, K. L. Schepler, Air Force Research Lab. . . . . [6451-71]

8:40 am: **Fe:ZnSe passive q-switching of 2.8-μm Er:Cr:YSGG laser cavity,** A. R. Gallian, A. Martinez, P. Marine, V. V. Fedorov, S. B. Mirov, The Univ. of Alabama at Birmingham; V. V. Badikov, Kuban State Univ. (Russia); D. M. Boutoussov, M. Andriasyan, BIOLASE Technology, Inc. . . . . [6451-20]

9:00 am: **ZnSe:Cr2+ laser crystal grown by Bridgeman technique: characteristics and laser performance,** P. Koranda, H. Jelínková, Czech Technical Univ. in Prague (Czech Republic); M. E. Doroshenko, General Physics Institute (Russia); J. Sulc, M. Nemec, Czech Technical Univ. in Prague (Czech Republic); T. T. Basiev, General Physics Institute (Russia); V. K. Komar, M. Kosmyna, Institute for Single Crystals (Ukraine) . . . . . [6451-21]

9:20 am: **Properties of Ho3+ -doped PbWO4 as laser active and stimulated Raman scattering active crystals,** I. S. Mirov, V. V. Fedorov, I. S. Moskalev, The Univ. of Alabama at Birmingham; S. Beloglovsky, S. Burachas, Y. Saveliev, A. Tseitline, North Crystals . . . . . [6451-22]

9:40 am: **Novel infrared Q-switch materials,** C. N. Pannell, Optronic Labs., Inc.; J. Ward, Gooch & Housego PLC (United Kingdom); T. E. Stenger, Cleveland Crystals, Inc.; R. K. Shori, Naval Air Warfare Ctr. . . . . [6451-73]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Room: Conv. Ctr. Room J1 . . . . . Tues. 10:30 to 11:30 am

Lasers in the Eye-Safe Range

Chair: **Narasimha S. Prasad**, NASA Langley Research Ctr.

10:30 am: **Bragg grating improves characteristic of resonantly diode-pumped Er:YAG, 1.65-mm DPSSL,** I. Kudryashov, D. Z. Garbuzov, Princeton Lightwave Corp.; M. A. Dubinskii, Army Research Lab. . . . . [6451-23]

10:50 am: **Room temperature, multi-wavelength operation in Er:YALO3,** S. Sharma, C. L. Vergien, R. K. Shori, O. M. Stafsudd, Univ. of California/Los Angeles . . . . . [6451-24]

11:10 am: **Microchip Nd:YAG laser for safe laser applications,** H. Jelínková, J. Šulc, M. Nemec, J. Koranda, J. Pašta, K. Nejezchleb, V Škoda, Czech Technical Univ. in Prague (Czech Republic) . . . . . [6451-26]

Lunch/Exhibition Break . . . . . 11:30 am to 12:50 pm

SESSION 7

Room: Conv. Ctr. Room J1 . . . . . Tues. 12:50 to 2:00 pm

Injection Seeded and Frequency Stable Lasers

Chair: **Iain T. McKinnie**, Lockheed Martin Coherent Technologies

12:50 pm: **Multi ten-watt, ultra-stable and tuneable Innoslab-based single frequency MOPA** *(Invited Paper)*, M. Höfer, M. Traub, R. Kleindienst, H. Sipma, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); P. Weßels, P. Burdack, InnoLight GmbH (Germany) . . . . . [6451-17]

1:10 pm: **Seeded single-frequency q-switched laser: new approach,** A. I. Khizhnyak, V. Markov, MetroLaser, Inc. . . . . [6451-29]

1:30 pm: **Single-frequency stabilization of frequency tripled nanosecond Ti:sapphire laser injection seeded for silicon atom optics** *(Invited Paper)*, Y. Shiomi, T. Yamamoto, H. Kumagai, A. Kobayashi, Osaka City Univ. (Japan) . . . . . [6451-30]

SESSION 8

Room: Conv. Ctr. Room J1 . . . . . Tues. 2:00 to 3:30 pm

Cryogenically Cooled Lasers

Chair: **Hans-Dieter Hoffmann**, Fraunhofer-Institut für Lasertechnik (Germany)

2:00 pm: **Cryogenically cooled Ti:sapphire regenerative amplifier,** S. Fournier, Coherent France (France); J. Heritier, G. J. Germann, B. Resan, A. Fry, Coherent, Inc. . . . . [6451-31]

2:20 pm: **A high-average power femtosecond laser for synchrotron light source applications,** R. B. Wilcox, R. W. Schoenlein, Lawrence Berkeley National Lab. . . . . [6451-32]

2:40 pm: **High-power operation of cryogenic Yb:YAG** *(Invited Paper)*, K. F. Wall, P. F. Moulton, Q-Peak, Inc. . . . . [6451-33]

3:10 pm: **Innovative high-power CW Yb:YAG cryogenic laser,** D. C. Brown, J. M. Singley, E. Yager, J. W. Kuper, B. J. Lotito, L. L. Bennett, Snake Creek Lasers, LLC . . . . . [6451-34]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 9

Room: Conv. Ctr. Room J1 . . . . . Tues. 4:00 to 5:40 pm

Tunable, Mode-Locked, and Ultrafast Lasers

Chair: **William M. Grossman**, JDS Uniphase Corp.

4:00 pm: **Extended tunability of Ti:sapphire lasers in CW and quasi-cw operation,** I. MacGillivray, A. S. Bell, G. Friel, Coherent Scotland Ltd. (United Kingdom) . . . . . [6451-35]

4:20 pm: **Pulse shaping, characterization and phase compensation system for enhanced ultrafast laser performance,** B. Resan, W. M. Tulloch, S. Fournier, G. J. Germann, J. Heritier, A. Fry, Coherent, Inc. . . . . [6451-36]

4:40 pm: **Noncryogenic 10-kHz Ti:sapphire amplifier,** G. Matras, Univ. Jean Monnet Saint-Etienne (France) and Thales Laser SA (France); E. Baubeau, Thales Laser SA (France); N. Huot, E. Audouard, Univ. Jean Monnet Saint-Etienne (France) . . . . . [6451-37]

5:00 pm: **Amplification of ultrashort pulses to 0.5TW at 5Hz with a flashlamp pumped Cr:LiSAF gain medium,** R. E. Samad, G. E. C. Nogueira, S. L. Baldochi, N. D. Vieira, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6451-38]

5:20 pm: **Semiconductor saturable absorbers with recovery time controlled through band-gap design and growth condition,** M. Guina, Tampere Univ. of Technology (Finland) and RefleKron Ltd. (Finland); P. Tuomisto, O. G. Okhotnikov, Tampere Univ. of Technology (Finland) . . . . . [6451-75]

Wednesday 24 January

Opening Remarks

Conv. Ctr. Room J1 . . . . . **7:50 to 8:00 am**

SESSION 10

Room: Conv. Ctr. Room J1 . . . . . **Wed. 8:00 to 10:10 am**

High Power Solid State Lasers

Joint Session with Conference 6454

Chairs: **Steven J. Davis**, Physical Sciences Inc.;
Hanna J. Hoffman, Liekki, Inc.

8:00 am: **Power scaleable reimaging waveguide laser** *(Invited Paper)*, I. T. McKinnie, Lockheed Martin Coherent Technologies . . . . . [6451-39]

8:30 am: **J-HPPSL Nd:YAG ceramic ThinZag laser program,** A. E. Mandl, D. E. Klimek, Textron Systems . . . . . [6451-74]

8:50 am: **Technical challenges for the future of high-energy lasers**, K. N. LaFortune, R. L. Hurd, S. N. Fochs, M. D. Rotter, P. H. Pax, R. L. Combs, S. S. Olivier, J. M. Brase, R. M. Yamamoto, Lawrence Livermore National Lab. . . . . [6454-26]

9:10 am: **The InnoSlab laser, extending the parameter range for industrial and scientific applications** *(Invited Paper)*, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6451-40]

9:40 am: **Emerging fiber laser developments** *(Invited Paper)*, M. Neice, High Energy Laser Joint Technology Office; W. Fink, California Institute of Technology; D. D. Seeley, High Energy Laser Joint Technology Office . . . . . [6451-76]

Coffee Break . . . . . 10:10 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

10:30 am: **Welcome and Introductions**

10:40 am: **The Laser: Its Origin, Development, and Possible Future**
Charles H. Townes, Univ. of California/Berkeley

11:20 am: **Lasers: Astrophysics to Particle Physics**
Robert L. Byer, Stanford Univ.

11:50 am: **Optical Technologies: Engine for Innovations in Industrial Applications of Lasers**
Hans-Juergen Kahlert, JENOPTIK Laser, Optik, Systeme GmbH (Germany)

12:20 pm: **Closing Remarks**

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 11

Room: Conv. Ctr. Room J1 . . . . . **Wed. 1:30 to 3:30 pm**

Laser Materials Characterization, Modeling, and Growth

Chair: **Helena Jelínková**,
Czech Technical Univ. in Prague (Czech Republic)

1:30 pm: **Laser performance of Yb3+:YAG ceramic microchip lasers,** J. Dong, A. Shirakawa, K. Ueda, The Univ. of Electro-Communications (Japan); H. Yagi, T. Yanagitani, Konoshima Chemical Co., Ltd. (Japan); A. A. Kaminskii, Institute of Crystallography (Russia) . . . . . [6451-41]

1:50 pm: **Thermal and mechanical stress analysis of ceramic YAG crystals with different Nd concetrations,** N. Kenar, G. Oke, A. Esendemir, Middle East Technical Univ. (Turkey) . . . . . [6451-42]

2:10 pm: **Modeling visible and infrared stimulated emission from Tb3+ in TbAlO3,** K. L. Nash, J. B. Gruber, R. M. Yow, The Univ. of Texas at San Antonio; U. V. Valiev, National Univ. of Uzbekistan (Uzbekistan); D. K. Sardar, The Univ. of Texas at San Antonio . . . . . [6451-43]

2:30 pm: **Continuous-wave diode-pumped Yb:LuVO4 lasers,** J. Liu, V. P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); J. Wang, J. Wang, M. Jiang, Shandong Univ. (China); U. Griebner, F. Noack, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany) . . . . . [6451-44]

2:50 pm: **Determination of Cr:LiSAF crystals ablation thresholds on the 20-ps regime using a diagonal scan,** R. E. Samad, S. L. Baldochi, N. D. Vieira, Instituto de Pesquisas Energéticas e Nucleares (Brazil) . . . . . [6451-45]

3:10 pm: **Time-resolved pump-probe measurements of new cerium-doped BaY2F8 UV materials,** H. Liu, D. Spence, D. Coutts, Macquarie Univ. (Australia); M. Tonelli, A. Toncelli, Univ. di Pisa (Italy) . . . . . [6451-46]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 12

Room: Conv. Ctr. Room J1 . . . . . **Wed. 4:00 to 5:20 pm**

Laser Systems Designs, Measurements, and Modeling

Chair: **David H. Titterton**,
Defence Science and Technology Lab. (United Kingdom)

4:00 pm: **Detailed single-shot spectral measurements of Q-switched solid state lasers,** C. Veltkamp, A. B. Petersen, J. D. Kafka, Spectra-Physics . . . . . [6451-19]

4:20 pm: **High-power DPSS laser hosted on a HMW-THS,** M. Checchetti, Microptronics Srl (Italy) . . . . . [6451-47]

4:40 pm: **Autostabilization of generations of solid state laser with nonlinear transparency absorber,** A. S. Kuchyanov, Institute of Automation and Electrometry (Russia) . . . . . [6451-48]

5:00 pm: **1.44 μm giant pulse generation,** J. Šulc, H. Jelínková, P. Arator, K. Nejezchleb, V. Škoda, Czech Technical Univ. in Prague (Czech Republic) . . . . . [6451-49]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Five simultaneously q-switch mode-locked passive laser modulators,** J. Chen, Chung-Hua Univ. (Taiwan) . . . . . [6451-62]

✔ **Ultra-narrow-linewidth combined CW Ti:sapphire/dye laser for atom cooling and high-precision spectroscopy,** S. M. Kobtsev, Novosibirsk State Univ. (Russia); V. I. Baraoulya, V. M. Lunin, Tekhnoscan JSC (Russia) . . . . . [6451-64]

✔ **A compact remote-controlled underwater lidar system,** Z. Yi, K. Yang, J. Rao, X. Min, Huazhong Univ. of Science and Technology (China) [6451-65]

✔ **Optimization of q-switch performance of Co2+ by crystal-field tuning of the stark levels in the absorber host crystal for the resonantly pumped Er:YAG laser (1.6 μm),** B. Zandi, Army Research Lab.; J. B. Gruber, The Univ. of Texas at San Antonio; A. S. Nijjar, nLight Corp.; M. R. Kokta, Saint Gobain Crystals; D. K. Sardar, K. L. Nash, The Univ. of Texas at San Antonio[6451-66]

✔ **Spectroscopic performances and diode-pumped lasing of calcium-niobium-gallium garnets (CNGG) and sodium-gadolinium tungstates (NGW) doped with Tm3+ ions,** A. V. Popov, Y. K. Voronko, E. V. Zharikov, A. A. Sobol, K. A. Subbotin, S. N. Ushakov, M. N. Hromov, General Physics Institute (Russia); A. V. Shestakov, Elements of Laser Systems Corp. (Russia) . . . . . [6451-67]

✔ **A promising new Yb-doped oxyorthosilicate laser crystal Yb:Gd2SiO5,** J. Xu, G. Zhao, C. Yan, L. Su, L. Zheng, X. Liang, Shanghai Institute of Optics and Fine Mechanics (China); W. Li, S. Xu, H. Pan, L. Ding, H. Zeng, East China Normal Univ. (China) . . . . . [6451-68]

✔ **Characteristics of Q-switched Er:YALO3 operating at eye-safe wavelengths,** K. Rogers, S. Sharma, R. K. Shori, O. M. Stafsudd, Univ. of California/Los Angeles . . . . . [6451-69]

✔ **Super-Gaussian pumping profiles for solid state lasers,** X. Liu, Y. Zhao, Beijing Institute of Technology (China); A. Yang, W. Xie, Western Photonics Technology . . . . . [6451-50]

Thursday 25 January

SESSION 13

Room: Conv. Ctr. Room J1 . . . . . Thurs. 8:00 to 9:50 am

Applications of Solid State Lasers

Chair: **Wolf R. Seelert**, Coherent Luebeck GmbH (Germany)

8:00 am: **Lasers in confocal imaging _ standard applications and new trends** *(Invited Paper)***,** E. Simbuerger, Carl Zeiss Jena GmbH (Germany) . . . . . [6451-51]

8:30 am: **Industrial microprocessing with advanced solid state lasers,** J. Stollhof, S. Weiler, D. Sutter, J. Kleinbauer, M. Kumkar, TRUMPF Laser GmbH & Co. KG (Germany) . . . . . [6451-52]

8:50 am: **Advances in laser processing of microelectronics,** B. W. Baird, R. F. Hainsey, S. Peng, P. Y. Pirogovsky, Electro Scientific Industries, Inc. . . . . [6451-53]

9:10 am: **Frequency stabilization of q-switched Nd:YAG oscillators for airborne and spaceborne lidar systems,** K. Nicklaus, V. Morasch, M. Höfer, J. Luttmann, M. Vierkoetter, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); M. Ostermeyer, Univ. Potsdam (Germany); J. Höffner, Leibniz-Institut fur Atmospharenphysik e.V. (Germany) . . . . . [6451-54]

9:30 am: **The injection laser system on the National Ignition Facility,** M. W. Bowers, S. C. Burkhart, S. J. Cohen, G. V. Erbert, J. E. Heebner, M. R. Hermann, D. R. Jedlovec, Lawrence Livermore National Lab. . . . . [6451-55]

Presentation of Awards for Best Student Papers

Award presented by:
Norman Hodgson, Coherent, Inc.

9:50 to 10:00 am · Conv. Ctr. Room J1

Prizes donated by:

COHERENT.

Best Student Presentation Award

We are pleased to announce that prizes in the amount of $1,500 US and $500 US will be awarded to the best student oral presentation and the best student poster presentation, respectively, in the conference on Solid State Laser Technology XVI: Technology and Devices, at SPIE's Photonics West Symposium taking place next January in San Jose, California. The prize money has been donated by Coherent, Inc. and the awards will be presented by Norman Hodgson, Vice President of Engineering.

SPIE gratefully acknowledges Coherent, Inc. for generously sponsoring this award.

Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee headed by Louis McDonagh, University of Kaiserslautern (Germany) . To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral or poster presentation. The prizes will be awarded based on the quality of the presentation and not on the content of the submitted abstract. The winners of the Best Student Presentation Awards will be announced during the Student Award Session scheduled to take place on Thursday morning.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 14

Room: Conv. Ctr. Room J1 . . . . . Thurs. 10:30 am to 12:20 pm

Field, Air, and Space Qualifyable lasers and Components

Chairs: **Ramesh K. Shori**, Naval Air Warfare Ctr.;
Narasimha S. Prasad, NASA Langley Research Ctr.

10:30 am: **Narrow linewidth coherent beam combining of optical fiber amplifier arrays** *(Invited Paper)***,** T. M. Shay, Air Force Research Lab. [6451-57]

11:00 am: **CALIPSO on-orbit lidar performance** *(Invited Paper)***,** W. S. Luck, Jr., NASA Langley Research Ctr. . . . . [6451-58]

11:30 am: **High resolving power tunable filter for spaced-based lidar applications,** W. B. Cook, NASA Langley Research Ctr.; V. Markov, MetroLaser, Inc. . . . . [6451-59]

11:50 am: **A consideration of the requirements for laser devices used in countermeasure applications** *(Invited Paper)***,** D. H. Titterton, Defence Science and Technology Lab. (United Kingdom) . . . . . [6451-56]

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6452

Laser Resonators and Beam Control X

Conference Chairs: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia); **Alan H. Paxton**, Air Force Research Lab.; **Vladimir S. Ilchenko**, OEwaves, Inc.

Program Committee: **Jean-Claude M. Diels**, The Univ. of New Mexico; **Hans J. Eichler**, Technische Univ. Berlin (Germany); **Pierre Galarneau**, Institut National d'Optique (Canada); **Thomas Graf**, Univ. Stuttgart (Germany); **James R. Leger**, Univ. of Minnesota; **Andrey B. Matsko**, Jet Propulsion Lab.

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room F1 ..... Mon. 8:30 to 10:10 am

Opening session

Chair: **Alexis V. Kudryashov**, Moscow State Open Univ. (Russia)

8:30 am: **Beam-quality-enhancement in multi-kW rod-based lasers by use of radially-polarized light and phase-front correction** *(Invited Paper)*, I. Moshe, S. M. Jackel, A. Meir, Y. Lumer, G. Machavariani, S. Rosenberg, Soreq Nuclear Research Ctr. (Israel) ..... [6452-46]

9:00 am: **Dynamically-tuned microresonator complexes** *(Invited Paper)*, M. L. Povinelli, S. Sandhu, S. L. Fan, Stanford Univ. ..... [6452-15]

9:20 am: **Dispersive elements for enhanced-laser gyroscopy and cavity stabilization,** D. D. Smith, The Univ. of New Mexico; H. Chang, The Univ. of Alabama in Huntsville; L. Arissian, J. M. Diels, The Univ. of New Mexico ..... [6452-09]

9:50 am: **Nanojet-induced modes in 1D chains of microspheres,** A. M. Kapitonov, V. N. Astratov, The Univ. of North Carolina at Charlotte ..... [6452-11]

Coffee Break ..... 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room F1 ..... Mon. 10:30 am to 12:10 pm

Characterization of Laser Beams

Chair: **Jean-Claude M. Diels**, The Univ. of New Mexico

10:30 am: **Accuracy of laser beam parameters and beam propagation from real-time Hartmann-Shack experiments,** B. Schäfer, K. R. Mann, Laser-Lab. Goettingen e.V. (Germany) ..... [6452-02]

10:50 am: **Beam quality measurements with Shack-Hartmann wavefront sensor and M2-sensor: comparison of two methods,** J. V. Sheldakova, A. V. Kudryashov, V. Y. Zavalova, Moscow State Open Univ. (Russia); T. Cherezova, M.V. Lomonosov Moscow State Univ. (Russia) ..... [6452-45]

11:10 am: **Improvement and commissioning of a novel technology for the measurement of laser-beam profile,** S. R. G. Hall, S. D. Knox, A. Bridge, National Physical Lab. (United Kingdom); D. A. Robinson, H. Yang, Arden Photonics Ltd. (United Kingdom) ..... [6452-04]

11:30 am: **Diffractive gradient mirror as an effective intracavity element for TEM00 mode shaping of the Nd:YAG laser,** A. I. Plekhanov, A. S. Kuchyanov, A. G. Poleshchuk, V. V. Cherkashin, Institute of Automation and Electrometry (Russia) ..... [6452-01]

11:50 am: **Beam profiling at focus- the search for the holy grail,** L. I. Green, Spiricon, Inc. ..... [6452-05]

Lunch Break ..... 12:10 to 1:10 pm

SESSION 3

Room: Conv. Ctr. Room F1 ..... Mon. 1:10 to 3:10 pm

Resonators and Mode Control

Chair: **Pierre Galarneau**, Institut National d'Optique (Canada)

1:10 pm: **Adaptive optics control of solid state lasers,** W. Lubeigt, G. J. Valentine, D. Burns, Univ. of Strathclyde (United Kingdom) .... [6452-06]

1:30 pm: **Far field laser intensity distribution formation by means of intracavity adaptive optics,** A. V. Kudryashov, Moscow State Open Univ. (Russia); I. G. Ilyina, T. Cherezova, M.V. Lomonosov Moscow State Univ. (Russia) ..... [6452-44]

1:50 pm: **Thick-waist bi-top-hat coherent beams generated by diffractive optical elements,** M. A. Golub, Tel Aviv Univ. (Israel) ..... [6452-07]

2:10 pm: **Adaptive wavelets applied to mode-structure stability in diode-laser arrays,** K. J. Jones, Rice Univ. ..... [6452-03]

2:30 pm: **Odd-mode separation in hemispheric resonator with biprism like element,** Y. N. Parkhomenko, B. Spektor, J. Shamir, Technion-Israel Institute of Technology (Israel) ..... [6452-08]

2:50 pm: **Experimental and theoretical study of a coaxial, hybrid-stable-unstable resonator for high-power lasers,** J. Deile, B. Ehlers, S. S. Sumrain, V. Granson, V. Negoita, TRUMPF Photonics ..... [6452-10]

Coffee Break ..... 3:10 to 3:40 pm

SESSION 4

Room: Conv. Ctr. Room F1 ..... Mon. 3:40 to 5:40 pm

Microresonators 1

Chair: **James R. Leger**, Univ. of Minnesota/Twin Cities

3:40 pm: **Bound whispering gallery modes in circular arrays of dielectric spherical particles** *(Invited Paper)*, A. L. Burin, G. S. Blaustein, Tulane Univ. ..... [6452-12]

4:10 pm: **Long-distance photon transfer between two individual nanoparticles via whispering-gallery modes** *(Invited Paper)*, S. Goetzinger, Stanford Univ.; S. Kuehn, V. Sandoghdar, ETH Zürich (Switzerland); L. d. S. Menezes, A. Mazzei, O. Benson, Humboldt-Univ. zu Berlin (Germany) [6452-31]

4:40 pm: **How to simulate the whispering-gallery modes of axisymmetric dielectric microresonators using FEMLAB/COMSOL,** M. Oxborrow, National Physical Lab. (United Kingdom) ..... [6452-14]

5:00 pm: **Polarization-discrimating spectra of a fiber-microsphere system,** S. Takeuchi, H. Konishi, H. Takashima, H. Fujiwara, K. Sasaki, Hokkaido Univ. (Japan) ..... [6452-16]

5:20 pm: **Lasing eigenvalue problems: the electromagnetic modeling of microlasers,** T. M. Benson, The Univ. of Nottingham (United Kingdom); A. I. Nosich, M. Balaban, M. Balaban, Institute of Radiophysics and Electronics of Ukraine NAS (Ukraine); P. Sewell, The Univ. of Nottingham (United Kingdom) ..... [6452-17]

Tuesday 23 January

SESSION 5

Room: Conv. Ctr. Room F1 . . . . . Tues. 8:10 to 10:00 am

Microresonators 2

Chair: **Hans J. Eichler**, Technische Univ. Berlin (Germany)

8:10 am: **Overview of novel integrated optical ring resonator bio/chemical sensors** *(Invited Paper)*, X. Fan, I. M. White, H. Zhu, J. D. Suter, H. Oveys, Univ. of Missouri/Columbia . . . . . [6452-18]

8:40 am: **Photonic clocks and cQED on a silicon chip** *(Invited Paper)*, K. J. Vahala, California Institute of Technology . . . . . [6452-21]

9:10 am: **Highly confined cavities for active and passive devices on chip** *(Invited Paper)*, M. F. Lipson, Cornell Univ. . . . . [6452-22]

9:40 am: **The maximum group delay in a resonator: an unconventional approach,** A. B. Matsko, A. A. Savchenkov, V. S. Ilchenko, D. V. Strekalov, L. Maleki, Jet Propulsion Lab. . . . . [6452-33]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 6

Room: Conv. Ctr. Room F1 . . . . . Tues. 10:20 am to 12:20 pm

Microresonators 3

Chair: **Andrey B. Matsko**, Jet Propulsion Lab.

10:20 am: **Semiclassical dynamics of light beams supported by adiabatically tapered photonic nanowires** *(Invited Paper)*, M. Sumetsky, OFS Labs. . . . . [6452-24]

10:40 am: **Ultra-resolution microwave-assisted dispersion measurements in high-Q WGM resonators,** N. Morozov, I. V. Solomatine, OEwaves, Inc.; L. Maleki, Jet Propulsion Lab.; V. S. Ilchenko, OEwaves, Inc. . . . . [6452-25]

11:00 am: **Enhancement of spin coherence using Q-factor engineering in semiconductor microdisk lasers** *(Invited Paper)*, N. Samarth, The Pennsylvania State Univ. . . . . [6452-26]

11:30 am: **Sensitivity and progress in bio-chemical sensors with WG-mode resonators** *(Invited Paper)*, Y. Lin, V. S. Ilchenko, Jet Propulsion Lab. [6452-27]

12:00 pm: **Dome-shaped microresonators,** J. U. Nöckel, D. H. Foster, Univ. of Oregon . . . . . [6452-28]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room F1 . . . . . Tues. 1:30 to 3:40 pm

Microresonators 4

Chair: **Vladimir S. Ilchenko**, OEwaves, Inc.

1:30 pm: **Light coupling and propagation in 3D lattices of spherical cavities,** S. P. Ashili, V. N. Astratov, The Univ. of North Carolina at Charlotte . . . [6452-34]

1:50 pm: **Photonic molecules made of matched and mismatched microcavities: new functionalities of microlasers and optoelectronic components** *(Invited Paper)*, S. V. Boriskina, National Science Ctr. Kharkov Institute of Physics and Technology (Ukraine); T. M. Benson, P. Sewell, The Univ. of Nottingham (United Kingdom) . . . . . [6452-30]

2:20 pm: **Confined modes in small photonic structures** *(Invited Paper)*, J. F. Donegan, The Univ. of Dublin, Trinity College (Ireland) . . . . . [6452-32]

2:50 pm: **Efficient generation of truncated Bessel beams using cylindrical waveguides** *(Invited Paper)*, A. B. Matsko, V. S. Ilchenko, M. Mohageg, A. A. Savchenkov, L. Maleki, Jet Propulsion Lab. . . . . [6452-19]

3:20 pm: **Low loss WGM transport in 3D networks of coupled cavities,** V. N. Astratov, The Univ. of North Carolina at Charlotte . . . . . [6452-13]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Microsphere resonator reflector for fiber laser,** K. Q. Kieu, M. Mansuripur, The Univ. of Arizona . . . . . [6452-37]

✔ **Optical modes in linear arrays of dielectric spherical particles: a numerical investigation,** G. S. Blaustein, A. L. Burin, Tulane Univ. [6452-35]

✔ **Comparison of photo-acoustic and optogalvanic effect in CO_2 laser frequency stabilization,** J. Choi, Honam Univ. (South Korea) . . . . [6452-36]

✔ **Analysis of enhanced local fields within a defect region of a random medium,** H. Fujiwara, K. Sasaki, Hokkaido Univ. (Japan) . . . . . [6452-40]

✔ **Real-time measurement of laser beam quality factor (M^2) by imaging transverse scattered light,** K. C. Jorge, R. Riva, N. A. S. Rodrigues, M. G. Destro, Instituto de Estudos Avancados (Brazil) . . . . . [6452-41]

✔ **Subpicosecond vacuum ultraviolet-laser system for advanced materials processing,** S. Kubodera, Y. Taniguchi, A. Hosotani, M. Katto, A. Yokotani, Univ. of Miyazaki (Japan); N. Miyanaga, K. Mima, Osaka Univ. (Japan) . . . . . [6452-39]

✔ **Mode selectivity of random lasing in one-dimensional model,** S. Takeda, M. Obara, Keio Univ. (Japan) . . . . . [6452-38]

✔ **Acoustic measurement method in investigation of optical phenomena in a modulated CO_2 laser plasma,** D. A. Wojaczek, E. F. Plinski, L. Rosinski, R. Trawinski, Politechnika Wroclawska (Poland) . . . . . [6452-42]

Monday-Thursday 22-25 January 2007 • Proceedings of SPIE Vol. 6453

Fiber Lasers IV: Technology, Systems, and Applications

Conference Chairs: **Donald J. Harter**, IMRA America, Inc.; **Andreas Tünnermann**, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)

Cochairs: **Jes Broeng**, Crystal Fibre A/S (Denmark); **Clifford Headley III**, OFS Fitel, LLC

Program Committee: **Richard W. Berdine**, Air Force Research Lab.; **Andrew J. W. Brown**, Aculight Corp.; **Jay W. Dawson**, Lawrence Livermore National Lab.; **L. N. Durvasula**, Defense Advanced Research Projects Agency; **Benjamin J. Eggleton**, The Univ. of Sydney (Australia); **Alexander L. Gaeta**, Cornell Univ.; **Almantas Galvanauskas**, Univ. of Michigan; **Denis V. Gapontsev**, IPG Photonics Corp.; **Dahv A. V. Kliner**, Sandia National Labs.; **Johan Nilsson**, Univ. of Southampton (United Kingdom); **Kyunghwan Oh**, Gwangju Institute of Science and Technology (South Korea); **Fabian Röser**, Friedrich-Schiller-Univ. Jena (Germany); **Jasbinder S. Sanghera**, Naval Research Lab.; **Kanishka Tankala**, Nufern; **Ken-ichi Ueda**, The Univ. of Electro-Communications (Japan); **Robert G. Waarts**, Coherent Inc.; **Luis A. Zenteno**, Corning Inc.

Monday 22 January

Welcome and Opening Remarks

Conv. Ctr. Room J2 . . . . . Mon. 9:00 to 9:10

Donald Harter, IMRA, America, Inc;
Andreas Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)

SESSION 1

Room: Conv. Ctr. Room J2 . . . . . Mon. 9:10 to 10:10 am

Keynote Presentation

9:10 am: **Photonic crystal fibers: opportunities and challenges** *(Presentation Only)*, P. S. J. Russell, Univ. of Erlangen (Germany) . [6453-01]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 2

Room: Conv. Ctr. Room J2 . . . . . Mon. 10:40 am to 12:20 pm

High Power Fiber Lasers I

10:40 am: **High-peak-power and high-energy fiber amplifiers** *(Invited Paper)*, J. Minelly, Aculight Corp. . . . . [6453-02]

11:10 am: **Super powerful QCW fiber lasers with elevated peak power** *(Invited Paper)*, V. P. Gapontsev, IPG Photonics Corp. . . . . [6453-03]

11:40 am: **High-peak-power pulsed amplifiers in a monolithically integrated all-fiber configuration,** S. Caplette, C. A. Delisle, F. Séguin, N. Holehouse, ITF Optical Technologies, Inc. (Canada) . . . . . [6453-04]

12:00 pm: **High-peak-power pulsed single-mode linearly polarized LMA fiber amplifier and Q-switch laser,** V. Khitrov, B. N. Samson, D. P. Machewirth, D. Yan, K. Tankala, A. Held, Nufern . . . . . [6453-05]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 3

Room: Conv. Ctr. Room J2 . . . . . Mon. 1:20 to 3:00 pm

Advanced Fiber Designs and Modelling I

1:20 pm: **Ultra-large mode-area fibers: approaches and realizations** *(Invited Paper)*, S. Ramachandran, OFS Labs. . . . . [6453-06]

1:50 pm: **Photonic crystal fiber designs for power scaling of single-polarization amplifiers** *(Invited Paper)*, B. G. Ward, U.S. Air Force Academy; C. Robin, M. A. Culpepper, Air Force Research Lab. . . . . [6453-07]

2:20 pm: **Yb-doped LMA triple-clad fiber for power amplifiers,** P. Laperle, C. Paré, H. Zheng, Y. Taillon, A. Croteau, Institut National d'Optique (Canada) . . . . . [6453-08]

2:40 pm: **Numerical modeling of self-focusing beams in fiber amplifiers,** R. L. Farrow, G. R. Hadley, A. V. Smith, D. A. V. Kliner, Sandia National Labs. . . . . [6453-09]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room J2 . . . . . Mon. 3:30 to 5:30 pm

Fiber Lasers in IR, VIS and UV I

3:30 pm: **Nonlinear optics and frequency conversion - fiber lasers in IR, VIS and UV** *(Invited Paper)*, J. R. Taylor, B. Cumberland, A. Ferin, A. Rulkov, J. C. Travers, S. V. Popov, Imperial College London (United Kingdom) [6453-10]

4:00 pm: **High-power and highly efficient mid-infrared fiber lasers** *(Invited Paper)*, S. D. Jackson, The Univ. of Sydney (Australia) . . . . . [6453-11]

4:30 pm: **Broadly tunable high-power, pulsed fiber laser system for mid-IR applications,** V. V. Ter-Mikirtychev, J. B. Paul, J. J. Scherer, NovaWave Technologies, Inc. . . . . [6453-12]

4:50 pm: **Fiber-based laser with tunable repetition rate, fixed pulse duration, and multiple wavelength output,** P. E. Schrader, R. L. Farrow, Sandia National Labs.; D. A. V. Kliner, Sandia National Labs; J. Feve, N. Landru, Teem Photonics SA (France) . . . . . [6453-13]

5:10 pm: **Watt level high-repetition-rate, mid-infrared pulses generated by wavelength conversion of an eye-safe fiber source,** F. Di Teodoro, S. Desmoulins, Aculight Corp. . . . . [6453-14]

Tuesday 23 January

SESSION 5

Room: Conv. Ctr. Room J2 . . . . . Tues. 8:00 to 10:10 am

Fiber Optical Components I

8:00 am: **Fibers with resonant mode suppression** *(Invited Paper)*, J. M. Fini, Fitel USA Corp. . . . . [6453-15]

8:30 am: **Frequency agile, electronically tunable, high-power ytterbium-doped PM LMA fiber laser,** J. Ding, The Pennsylvania State Univ.; A. R. Geiger, Akamai Physics, Inc. . . . . [6453-16]

8:50 am: **Low-photodarkening single cladding ytterbium fiber amplifier,** B. Morasse, S. Chatigny, C. Hovington, É. Gagnon, J. De Sandro, CorActive High-Tech Inc. (Canada) . . . . . [6453-17]

9:10 am: **Tapered fused-bundle splitter capable of 1kW CW operation,** F. Seguin, A. Wetter, ITF Optical Technologies, Inc. (Canada); M. J. Lovelady, SPI Lasers plc (United Kingdom) . . . . . [6453-18]

9:30 am: **Fused fiber components for fiber lasers and amplifiers,** A. Robertson, Sifam Fibre Optics Ltd. (United Kingdom) . . . . . [6453-19]

9:50 am: **Diode-bar side-pumping of double-clad fibers,** S. W. Moore, J. P. Koplow, D. A. V. Kliner, A. Hansen, G. Wien, Sandia National Labs. . . . . [6453-20]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Room: Conv. Ctr. Room J2 . . . . . Tues. 10:40 am to 12:20 pm

Ultrafast Fiber Lasers and Amplifiers I

10:40 am: **Pulse compression down to single-cycle pulses in photonic crystal fibers** *(Invited Paper)*, A. L. Gaeta, Cornell Univ. . . . . [6453-21]

11:10 am: **Fiber laser pumped ultra-fast optical parametric amplifiers** *(Invited Paper)*, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); T. V. Andersen, NKT Research & Innovation A/S (Denmark) and Friedrich-Schiller-Univ. Jena (Germany); C. Aguergaray, E. Cormier, Univ. Bordeaux I (France) and Friedrich-Schiller-Univ. Jena (Germany); J. Rothhardt, O. Schmidt, F. Röser, T. Schreiber, K. Rademaker, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6453-22]

11:40 am: **Dispersion compensation with solid-core photonic bandgap fiber in an Yb-doped mode-locked fiber laser,** C. K. Nielsen, Åarhus Univ. (Denmark); K. G. Jespersen, Risø National Lab. (Denmark); T. V. Andersen, S. R. Keiding, Åarhus Univ. (Denmark) . . . . . [6453-23]

12:00 pm: **High-average-power, low-nonlinearity ytterbium-fiber amplifier using spectral compression,** Y. Zaouter, C. Hönninger, Amplitude Systemes (France); E. Cormier, Univ. Bordeaux I (France); E. P. Mottay, Amplitude Systemes (France) . . . . . [6453-24]

Lunch/Exhibition Break . . . . . 12:20 to 1:20 pm

SESSION 7

Room: Conv. Ctr. Room J2 . . . . . Tues. 1:20 to 3:00 pm

Coherent and Incoherent Coupling I

1:20 pm: **Passive coherent combining of fiber oscillators** *(Invited Paper)*, M. L. Minden, HRL Labs., LLC . . . . . [6453-25]

1:50 pm: **Characterization and stabilising dynamic phase fluctuations in large mode area fibers** *(Invited Paper)*, A. M. Scott, D. C. Jones, QinetiQ (United Kingdom) . . . . . [6453-26]

2:20 pm: **Ultimate efficiency of multi-channel spectral beam combiners by means of volume Bragg gratings,** A. Sevian, I. V. Ciapurin, G. B. Venus, L. B. Glebov, College of Optics & Photonics/Univ. of Central Florida . [6453-27]

2:40 pm: **522-W spectrally beam combined fiber laser with near-diffraction limited-beam quality,** T. H. Loftus, P. R. Hoffman, A. M. Thomas, M. A. Norsen, R. Royse, E. Honea, Aculight Corp. . . . . [6453-28]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Room: Conv. Ctr. Room J2 . . . . . Tues. 3:30 to 4:50 pm

Applications I

3:30 pm: **Slow, fast, and backwards light in an erbium-doped optical fiber** *(Invited Paper)*, R. W. Boyd, G. M. Gehring, A. Schweinsberg, Univ. of Rochester . . . . . [6453-29]

4:00 pm: **Optical signal processing by fiber-based parametric devices** *(Invited Paper)*, C. J. McKinstrie, Lucent Technologies/Bell Labs. . . . . [6453-30]

4:30 pm: **Multichannel all-fiber laser system for LADAR applications,** M. P. Savage-Leuchs, E. C. Eisenberg, J. Henrie, M. S. Bowers, Aculight Corp. . . . . [6453-37]

SESSION 9

Room: Conv. Ctr. Room J2 . . . . . Tues. 4:50 pm

Late Breaking Developments

Wednesday 24 January

SESSION 10

Room: Conv. Ctr. Room J2 . . . . . Wed. 8:00 to 10:00 am

Ultrafast Fiber Lasers and Amplifiers II

8:00 am: **Control and compression of extreme spectrally-broadened pulses in highly nonlinear fiber** *(Invited Paper)*, J. M. Dudley, Univ. de Franche-Comté (France) . . . . . [6453-32]

8:30 am: **Ultrafast fiber lasers for industrial and bio-medical applications** *(Invited Paper)*, J. R. Clowes, P. Dupriez, A. B. Grudinin, Fianium Ltd. (United Kingdom) . . . . . [6453-33]

9:00 am: **Numerical study of pulse evolution,** T. Schreiber, B. Ortac, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6453-34]

9:20 am: **Compact 50W ultrashort pulse fiber laser for precision and high-speed material processing,** L. Shah, M. E. Fermann, IMRA America, Inc.; J. W. Dawson, C. P. J. Barty, Lawrence Livermore National Lab. . . . . [6453-35]

9:40 am: **90-W average-power, high-energy femtosecond fiber laser system,** F. Röser, D. N. Schimpf, O. Schmidt, B. Ortac, K. Rademaker, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6453-36]

Coffee Break . . . . . 10:00 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

10:30 am: **Welcome and Introductions**

10:40 am: **The Laser: Its Origin, Development, and Possible Future**
Charles H. Townes, Univ. of California/Berkeley

11:20 am: **Lasers: Astrophysics to Particle Physics**
Robert L. Byer, Stanford Univ.

11:50 am: **Optical Technologies: Engine for Innovations in Industrial Applications of Lasers**
Hans-Juergen Kahlert, JENOPTIK Laser, Optik, Systeme GmbH (Germany)

12:20 pm: **Closing Remarks**

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 11

Room: Conv. Ctr. Room J2 . . . . . Wed. 1:30 to 3:00 pm

Applications II

1:30 pm: **A C_2H_2 frequency-stabilized erbium-doped fiber laser and its application to coherent communication** *(Invited Paper)*, M. Yoshida, K. Kasai, J. Hongo, M. Nakazawa, Tohoku Univ. (Japan) . . . . . [6453-85]

2:00 pm: **Fiber-based mid-IR sources and applications** *(Invited Paper)*, I. D. Aggarwal, B. L. Shaw, J. S. Sanghera, Naval Research Lab. . . . . [6453-38]

2:30 pm: **Integrated fiber-laser frequency combs with sub-hertz residual linewidths** *(Invited Paper)*, I. Hartl, IMRA America, Inc. . . . . [6453-39]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 12

Room: Conv. Ctr. Room J2 . . . . . Wed. 3:30 to 6:00 pm

High-Power Fiber Lasers II

3:30 pm: **Kilowatt-level, narrow-linewidth capable fibers and lasers** *(Invited Paper)*, D. T. Walton, Corning Inc. . . . . [6453-40]

4:00 pm: **High-power photonic crystal fiber lasers and amplifiers** *(Invited Paper)*, T. Schreiber, F. Röser, B. Ortac, O. Schmidt, J. Limpert, A. Tünnermann, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6453-41]

4:30 pm: **Robust single-mode operation in 50 μm Ytterbium doped leakage channel fibers** *(Invited Paper)*, L. Dong, X. Peng, W. S. Wong, J. Li, IMRA America, Inc. . . . . [6453-42]

5:00 pm: **Deterministic nanosecond laser-induced breakdown thresholds in pure and Yb3+-doped fused silica,** A. V. Smith, B. T. Do, Sandia National Labs.; M. J. Söderlund, Liekki Oy (Finland) . . . . . [6453-43]

5:20 pm: **Multi-MW peak power, single transverse mode operation of a 100 micron core diameter, Yb-doped photonic crystal rod amplifier,** F. Di Teodoro, C. Brooks, Aculight Corp. . . . . [6453-44]

5:40 pm: **30W Q-SW fiber laser,** M. Nakai, K. Shima, M. Saito, T. Kitabayashi, Fujikura Ltd. (Japan) . . . . . [6453-45]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Mode-locking characteristics of hybrid soliton pulse source,** N. Dogru, M. Sayin, S. M. Ozyazici, Gaziantep Univ. (Turkey) . . . . . [6453-65]

✔ **Q-switched fiber laser using a novel rotary mirror,** A. K. Chin, Axcel Photonics, Inc.; T. F. Morse, F. Luo, Boston Univ. . . . . [6453-66]

✔ **Preparation of large-mode-area laser fibers with microstructured cores,** J. Kobelke, K. Schuster, S. Unger, V. Reichel, A. Schwuchow, J. Kirchhof, Institut für Physikalische Hochtechnologie e.V. (Germany) . . . . . [6453-67]

✔ **Fiber Raman laser in visible wavelength region,** Y. Feng, D. Bonaccini Calia, W. K. P. Hackenberg, European Southern Observatory (Germany) . . . . . [6453-68]

✔ **Soliton resonance in dispersion oscillating fiber,** A. A. Sysoliatin, General Physics Institute (Russia); A. I. Konyukhov, L. A. Melnikov, Saratov State Univ. (Russia); V. Stasuyk, PriTel Inc. . . . . [6453-69]

✔ **Multiple wavelengths generation with 22-GHz-spacing incorporating hybrid Brillouin-Erbium dual-cavity fiber laser,** M. A. Mahdi, Univ. Putra Malaysia (Malaysia); M. H. Al-Mansoori, Multimedia Univ. (Malaysia); S. J. Iqbal, M. K. Abdullah, Univ. Putra Malaysia (Malaysia) . . . . . [6453-70]

✔ **mJ pulse-energy fiber lasers based on Yb-doped photonic crystal fibers,** T. Feuchter, NKT Research & Innovation A/S (Denmark); O. Lumholt, Danmarks Tekniske Univ. (Denmark) . . . . . [6453-71]

✔ **Passively mode-locked short-cavity 10-GHz Er:Yb-codoped phosphate-fiber laser using carbon nanotubes,** S. Yamashita, T. Yoshida, S. Y. Set, The Univ. of Tokyo (Japan); P. G. Polynkin, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6453-72]

✔ **Integration aspects of a flexible, pulsed high-power single-transverse mode fiber laser system in MOPA configuration,** T. Lauterborn, S. W. Heinemann, Fraunhofer USA Inc.; A. Galvanauskas, Univ. of Michigan . . . . . [6453-73]

✔ **Long-wavelength operation of double-clad Tm:silica-fiber lasers,** Z. S. Sacks, Z. Schiffer, D. David, El-Op Electrooptics Industries Ltd. (Israel) . . . . . [6453-74]

✔ **Microsecond-pulsed ytterbium-fiber laser system with a broad tuning range and a small spectral linewidth,** M. Engelbrecht, D. Wandt, D. Kracht, Laser Zentrum Hannover e.V. (Germany) . . . . . [6453-76]

✔ **Two-stage single-pump Er-doped fiber amplifier with 55-dB amplification ns-long pulses,** B. Ibarra-Escamilla, E. A. Kuzin, M. A. Bello, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); R. Rojas-Laguna, Univ. de Guanajuato (Mexico) . . . . . [6453-77]

✔ **Experimental investigation of a figure-eight fiber laser with a symmetrical NOLM and highly twisted fiber in the loop,** B. Ibarra-Escamilla, E. A. Kuzin, R. Grajales-Coutiño, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); O. Pottiez, Ctr. de Investigaciones en Óptica A.C. (Mexico); J. W. Haus, Univ. of Dayton; R. Rojas-Laguna, Univ. de Guanajuato (Mexico) . . . . . [6453-78]

✔ **10-W ASE-free single-mode high-power double-cladding erbium-ytterbium amplifier,** B. Morasse, CorActive High-Tech Inc. (Canada); S. Agger, Koheras A/S (Denmark); S. Chatigny, É. Gagnon, J. de Sandro, CorActive High-Tech Inc. (Canada); C. V. Poulsen, Koheras A/S (Denmark) . . . . . [6453-79]

✔ **High-peak-power pulse amplification using Yb-doped double-clad fiber,** K. Tei, H. Sunaga, R. Horiuchi, S. Yamaguchi, K. Nanri, T. Fujioka, Tokai Univ. (Japan) . . . . . [6453-81]

✔ **Multiwavelength fiber-ring laser with switchable fiber Bragg gratings,** E. J. Jung, C. Kim, M. Y. Jeong, Pusan National Univ. (South Korea); Y. Han, S. B. Lee, Korea Institute of Science and Technology (South Korea) [6453-82]

✔ **High-power multi-FO-lasers hosted on a THS,** M. Checchetti, Microptronics Srl (Italy) . . . . . [6453-83]

✔ **Gamma radiation effects in Yb-doped optical fiber,** K. Simmons-Potter, B. P. Fox, Z. Schneider, The Univ. of Arizona; W. J. Thomes, Jr., D. C. Meister, R. P. Bambha, D. A. V. Kliner, Sandia National Labs. . . . . [6453-84]

✔ **Coherence measurements of supercontinuum source based on a fiber laser and highly nonlinear dispersion shifted fiber,** H. Song, Y. Kim, D. U. Kim, W. Song, D. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6453-61]

Thursday 25 January

SESSION 13

Room: Conv. Ctr. Room J2 . . . . . Thurs. 8:00 to 10:20 am

Advanced Fiber Designs and Modeling II

8:00 am: **Solid-core bandgap fibers** *(Invited Paper)*, S. Fevrier, Univ. de Limoges (France) . . . . . [6453-46]

8:30 am: **Three-dimensional, time-dependent modeling of high-power fiber amplifiers** *(Invited Paper)*, G. R. Hadley, R. L. Farrow, A. V. Smith, Sandia National Labs. . . . . [6453-47]

9:00 am: **Design of refractive-index and rare-earth-dopant distributions for large-mode-area fibers used in coiled high-power amplifiers,** R. L. Farrow, G. R. Hadley, D. A. V. Kliner, J. P. Koplow, Sandia National Labs. . . . . [6453-48]

9:20 am: **Fiber designs for exceeding the bulk-media self-focusing threshold,** A. D. Yablon, J. C. Jasapara, OFS Fitel, LLC . . . . . [6453-49]

9:40 am: **Photodarkening measurements in large mode area fibers,** J. J. Koponen, M. J. Söderlund, H. J. Hoffman, Liekki Oy (Finland); D. A. V. Kliner, J. P. Koplow, Sandia National Labs. . . . . [6453-50]

10:00 am: **Current developments in high-power, monolithic, polarization maintaining fiber amplifiers for coherent beam combining applications,** D. P. Machewirth, Q. Wang, B. N. Samson, K. Tankala, M. O'Connor, M. Alam, Nufern . . . . . [6453-51]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 14

Room: Conv. Ctr. Room J2 . . . . . Thurs. 10:50 am to 12:30 pm

Nonlinear Optics and Frequency Conversion I

10:50 am: **All-fiber mid-infrared supercontinuum source to 4 μm with 1.3 watts time-averaged power in ZBLAN fluoride fibers** *(Invited Paper)*, C. Xia, M. Kumar, M. Cheng, Univ. of Michigan; M. N. Islam, Univ. of Michigan and Omni Sciences Inc.; A. Galvanauskas, F. L. Terry, Jr., Univ. of Michigan; M. J. Freeman, Omni Sciences Inc.; M. Poulain, Univ. de Rennes I (France); G. Mazé, Le Verre Fluore (France) . . . . . [6453-52]

11:20 am: **High-power, high-brightness green laser based on a frequency doubled picosecond fiber laser** *(Invited Paper)*, P. Dupriez, J. K. Sahu, Y. Jeong, A. Malinowski, D. J. Richardson, J. Nilsson, Univ. of Southampton (United Kingdom) . . . . . [6453-53]

11:50 am: **Forward and backward-seeded CW Raman-fiber amplifiers based on multimode fibers,** N. B. Terry, K. Engel, T. G. Alley, Air Force Institute of Technology; T. H. Russell, Air Force Research Lab.; W. B. Roh, Air Force Institute of Technology . . . . . [6453-54]

12:10 pm: **Single-frequency photonic crystal fiber amplifier with 148-W output power,** M. Hildebrandt, Laser Zentrum Hannover e.V. (Germany) . . . . . [6453-55]

Lunch Break . . . . . 12:30 to 2:00 pm

SESSION 15

Room: Conv. Ctr. Room J2 . . . . . Thurs. 2:00 to 3:00 pm

Coherent and Incoherent Coupling II

2:00 pm: **An all-fiber approach for in-phase supermode phase-locked operation of multicore fiber lasers,** L. Li, A. Schülzgen, V. L. Temyanko, H. Li, J. V. Moloney, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6453-57]

2:20 pm: **Spectral beam combining of fiber lasers with increased channel density,** O. G. Andrusyak, I. V. Ciapurin, College of Optics & Photonics/Univ. of Central Florida; V. I. Smirnov, OptiGrate; G. B. Venus, L. B. Glebov, College of Optics & Photonics/Univ. of Central Florida . . . . . [6453-58]

2:40 pm: **Spectral beam combining of Yb-doped fiber lasers,** S. Klingebiel, R. Kinney, F. Röser, B. Ortac, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6453-59]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 16

Room: Conv. Ctr. Room J2 . . . . . Thurs. 3:30 to 5:00 pm

Nonlinear Optics and Frequency Conversion II

3:30 pm: **Highly nonlinear single-mode chalcogenide fibers for signal processing** *(Invited Paper)*, L. Fu, V. G. Ta'eed, M. Rochette, The Univ. of Sydney (Australia); A. Fuerbach, Macquarie Univ. (Australia); I. C. Littler, M. Pelusi, M. R. Lamont, H. C. Nguyen, K. Finsterbusch, D. J. Moss, E. C. Mägi, B. J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6453-60]

4:00 pm: **Methods of supercontinuum generation for effective down-conversion in photonic crystal fibers,** P. Falk, O. Bang, Danmarks Tekniske Univ. (Denmark); L. Thrane, Risø National Lab. (Denmark); M. H. Frosz, Danmarks Tekniske Univ. (Denmark); K. P. Hansen, J. Broeng, Crystal Fibre A/S (Denmark); A. O. Bjarklev, Danmarks Tekniske Univ. (Denmark); P. E. Andersen, Risø National Lab. (Denmark) . . . . . [6453-62]

4:20 pm: **Limiting effects of four-wave-mixing in high-power pulsed-fiber amplifiers,** J. Feve, Teem Photonics SA (France); P. E. Schrader, R. L. Farrow, D. A. V. Kliner, Sandia National Labs. . . . . [6453-63]

4:40 pm: **Nonlinear frequency conversion with mode-locked erbium-fiber lasers,** F. Tauser, J. Posthumus, T. Renner, W. G. Kaenders, TOPTICA Photonics AG (Germany) . . . . . [6453-64]

Closing Remarks and Best Student Presentation Award

Conv. Ctr. Room J2 . . . . . Thurs. 5:30 to 5:30 pm

Donald Harter, IMRA, America, Inc;
Andreas Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)

Presentation of Award for Best Student Papers

Award presented by:
Donald J. Harter, IMRA America, Inc.;
Andreas Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)

Thursday, 25 January 2007 · 5:20 pm · Conv. Ctr. Room J2

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Best Student Presentation Award

We are pleased to announce that a prize in the amount of $1,000 US will be awarded to the best student oral presentation in the conference on Fiber Lasers III: Technology, Systems, and Applications at SPIE's Photonics West Symposium taking place next January in San Jose, California. This year's prize money has been donated by IPG Photonics Corp and the award will be presented by an IPG Photonics representative

SPIE gratefully acknowledges IPG Photonics Corp. for generously sponsoring this award.

Student Paper Competition

Qualifying student presentations will be evaluated by a conference steering committee headed by last year's student prize winner, **Fabian Röser,** Friedrich-Schiller-Univ. Jena (Germany). To be eligible for consideration a student must be listed as an author on an accepted paper, must have conducted the majority of the work being presented, and must make the oral presentation. The prize will be awarded based on the quality of the presentation and not on the content of the submitted abstract. Any student papers presented in the Late Breaking Developments session will also be eligible for this award. The winner of the Best Student Presentation Award will be announced during the Student Award Session scheduled to take place on Thursday afternoon.

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6454

High Energy/Average Power Lasers and Intense Beam Applications II

Conference Chairs: **Steven J. Davis**, Physical Sciences Inc.; **Michael C. Heaven**, Emory Univ.; **J. Thomas Schriempf**, The Pennsylvania State Univ.

Program Committee: **David L. Carroll**, CU Aerospace LLC; **Jarmila Kodymova**, Akademie Ved Ceské Republiky (Czech Republic); **Timothy J. Madden**, Air Force Research Lab.; **William E. McDermott**, Univ. of Denver; **Wilson T. Rawlins**, Physical Sciences Inc.

Monday 22 January

SESSION 1

Room: Hilton Hotel: Plaza Room . . . . . Mon. 8:30 to 10:30 am

Laser Interactions

Chair: **J. Thomas Schriempf**, The Pennsylvania State Univ.

8:30 am: **Solid sampling with 193-nm excimer laser ablation,** R. F. Delmdahl, Coherent Lambda Physik GmbH (Germany) . . . . . [6454-01]

8:50 am: **High-average-power CO2 laser MOPA system for Sn target LPP EUV light source,** T. Ariga, H. Hoshino, T. Miura, A. Endo, Extreme Ultraviolet Lithography System Development Association (Japan) . . . . . [6454-02]

9:10 am: **Distributions of temperature and thermal stress in soda-lime glass irradiated by CO2 laser,** X. Wang, J. Jiao, X. Wang, Huazhong Univ. of Science and Technology (China) . . . . . [6454-03]

9:30 am: **Some experimental studies on the UV-preionized TEA CO2 laser propulsion,** L. Hong, D. Zuo, Z. Cheng, B. Zhai, X. Wang, Huazhong Univ. of Science and Technology (China) . . . . . [6454-04]

9:50 am: **Laser hardening process simulation for mechanical parts,** G. Tani, Univ. degli Studi di Bologna (Italy); L. Orazi, Univ. degli Studi di Modena e Reggio Emilia (Italy); A. Fortunato, G. Campana, G. Cuccolini, Univ. degli Studi di Bologna (Italy) . . . . . [6454-05]

10:10 am: **Measurement of cutting performance of high-power laser on concrete,** K. Tei, S. Yamaguchi, K. Nanri, T. Fujioka, Tokai Univ. (Japan) . . . . . [6454-06]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 2

Room: Hilton Hotel: Plaza Room . . . . . Mon. 11:00 am to 12:20 pm

Gas Lasers

Chair: **William E. McDermott**, Univ. of Denver

11:00 am: **Repetitively pulsed and cw sealed-off slab CO laser with cryogenic cooling,** A. A. Ionin, L. V. Seleznev, P.N. Lebedev Physical Institute (Russia); A. Shelestovich, Moscow Engineering Physics Institute (Russia); D. V. Sinitsyn, P.N. Lebedev Physical Institute (Russia) . . . . . [6454-07]

11:20 am: **Electra: durable repetitively pulsed 700 J, 100-ns electron-beam pumped KrF laser,** M. F. Wolford, Science Applications International Corp.; M. C. Myers, J. L. Giuliani, Jr., J. D. Sethian, P. Burns, F. Hegeler, R. Jaynes, Naval Research Lab. . . . . [6454-08]

11:40 am: **The conception for creation of industrial CO laser for dismantlement of reactors and hardening of rails,** I. Y. Baranov, Baltic State Technical Univ. (Russia) . . . . . [6454-09]

12:00 pm: **High-intensity optical sources of femtosecond pulses on the base of hybrid laser systems with wide-aperture gas laser amplifiers,** A. A. Ionin, A. Konyashchenko, P.N. Lebedev Physical Institute (Russia); B. M. Kovalchuk, Institute of High Current Electronics (Russia); O. N. Krokhin, P.N. Lebedev Physical Institute (Russia); V. F. Losev, Institute of High Current Electronics (Russia); G. Mesyats, A. G. Molchanov, L. D. Mikheev, Y. Novoselov, A. N. Starodub, P.N. Lebedev Physical Institute (Russia); V. F. Tarasenko, Institute of High Current Electronics (Russia); S. I. Yakovlenko, General Physics Institute (Russia); V. D. Zvorykin, P.N. Lebedev Physical Institute (Russia) . . . . . [6454-10]

Lunch Break . . . . . 12:20 to 1:20 pm

SESSION 3

Room: Hilton Hotel: Plaza Room . . . . . Mon. 1:20 to 3:20 pm

Beam Propagation and Cleanup

Chair: **Steven J. Davis**, Physical Sciences Inc.

1:20 pm: **Tracking system by phase conjugation for laser energy transmission,** C. A. Schäfer, O. Matoba, N. Kaya, Kobe Univ. (Japan) [6454-11]

1:40 pm: **The effect of a prepulse technique in the stimulated Brillouin scattering and its applications,** D. H. Beak, K. Park, H. J. Kong, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6454-12]

2:00 pm: **Development of the high-energy/power laser system with high-repetition rate using the beam combination technique,** H. J. Kong, J. W. Yoon, J. S. Shin, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6454-13]

2:20 pm: **Long-term stabilization of the phase control technique of the stimulated Brillouin scattering wave for the beam combination technique,** J. W. Yoon, J. S. Shin, H. J. Kong, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6454-14]

2:40 pm: **Prepulse technique for preserving the pulse shape of the stimulated Brillouin scattering,** H. J. Kong, D. H. Beak, K. Park, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6454-15]

3:00 pm: **High-power phase conjugate mirror for CW radiation,** D. A. Rockwell, R. S. Baltimore, Raytheon Space and Airborne Systems . . [6454-16]

Tuesday 23 January

SESSION 4

Room: Hilton Hotel: Plaza Room . . . . . Tues. 8:30 to 11:40 am

COIL, EOIL, and Optically Pumped Lasers

Chair: **Michael C. Heaven**, Emory Univ.

8:30 am: **A singlet oxygen generator on a chip for MEMS-based COIL,** C. Livermore, T. Hill, L. Velásquez-García, Massachusetts Institute of Technology; B. Wilhite, Univ. of Connecticut; A. H. Epstein, K. F. Jensen, Massachusetts Institute of Technology; W. T. Rawlins, S. Lee, S. J. Davis, Physical Sciences Inc. . . . . [6454-17]

8:50 am: **Kinetics of oxygen discharges and I(2P1/2) excitation for EOIL,** W. T. Rawlins, S. Lee, D. B. Oakes, S. J. Davis, Physical Sciences Inc. [6454-18]

9:10 am: **ElectricOIL experiments and modeling,** D. L. Carroll, J. T. Verdeyen, D. M. King, A. D. Palla, J. K. Laystrom, G. F. Benavides, CU Aerospace LLC; J. W. Zimmerman, B. S. Woodard, T. Lim, W. C. Solomon, Univ. of Illinois at Urbana-Champaign . . . . . [6454-19]

9:30 am: **The role of I_2(B)in the dissocition of iodine by $O_2(^1\Delta)$,** V. N. Azyazov, Emory Univ.; I. O. Antonov, Emory Univ. (Russia); M. C. Heaven, Emory Univ.; A. V. Mezhenin, P. A. Mikheyev, N. I. Ufimtsev, P.N. Lebedev Physical Institute (Russia) . . . . . [6454-20]

9:50 am: **Observation of fast quenching of $O_2(^1a\Delta)$ in $O/O_2/O_3$ mixtures,** V. N. Azyazov, M. H. Kabir, M. C. Heaven, Emory Univ. . . . . [6454-21]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **Characterization of the AFRL EOIL teststand,** D. A. Hostutler, Air Force Research Lab. . . . . [6454-22]

11:00 am: **A laser-diode array-pumped Cesium-vapor laser,** B. Zhdanov, T. Ehrenreich, R. J. Knize, U.S. Air Force Academy . . . . . [6454-24]

11:20 am: **Theoretical simulation of diode-pumped alkali vapor laser,** J. Yu, Q. Zhu, W. Zheng, Shenzhen Univ. (China) . . . . . [6454-25]

Wednesday 24 January

Opening Remarks

Room: Conv. Ctr. Room J1 . . . . . Wed. 7:50 to 8:00 am

SESSION 5

Room: Conv. Ctr. Room J1 . . . . . Wed. 8:00 to 10:10 am

High Power Solid State Lasers

Joint Session with Conference 6451

Chairs: **Steven J. Davis**, Physical Sciences Inc.;
Hanna J. Hoffman, Liekki, Inc.

8:00 am: **Power scaleable reimaging waveguide laser** *(Invited Paper)*, I. T. McKinnie, Lockheed Martin Coherent Technologies . . . . . [6451-39]

8:30 am: **J-HPPSL Nd:YAG ceramic ThinZag laser program,** A. E. Mandl, D. E. Klimek, Textron Systems . . . . . [6451-74]

8:50 am: **Technical challenges for the future of high-energy lasers**, K. N. LaFortune, R. L. Hurd, S. N. Fochs, M. D. Rotter, P. H. Pax, R. L. Combs, S. S. Olivier, J. M. Brase, R. M. Yamamoto, Lawrence Livermore National Lab. . . . . [6454-26]

9:10 am: **The InnoSlab laser, extending the parameter range for industrial and scientific applications** *(Invited Paper)*, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6451-40]

9:40 am: **Emerging fiber laser developments** *(Invited Paper)*, M. Neice, High Energy Laser Joint Technology Office; W. Fink, California Institute of Technology; D. D. Seeley, High Energy Laser Joint Technology Office . . . . . [6451-76]

Coffee Break . . . . . 10:10 to 10:30 am

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Gas-dispersed active medium for high-energy HF/DF laser systems based on a photon-branched chain reaction,** R. R. Letfullin, Rose-Hulman Institute of Technology; T. F. George, Univ. of Missouri/St. Louis . . [6454-28]

✔ **DPSS lasers hosted on a THS,** M. Checchetti, Microptronics Srl (Italy) . . . . . [6454-29]

✔ **Laser milling simulation system for moulds manufacturing,** G. Tani, Univ. degli Studi di Bologna (Italy); L. Orazi, Univ. degli Studi di Modena e Reggio Emilia (Italy); A. Fortunato, G. Cuccolini, Univ. degli Studi di Bologna (Italy) . . . . . [6454-30]

✔ **Experimental research of the RF discharge in pure oxygen and oxygen mixture with He, Ar, Xe,** X. Wang, H. Fan, Huazhong Univ. of Science and Technology (China) . . . . . [6454-31]

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Nonlinear Frequency Generation and Conversion: Materials, Devices, and Applications VI

Tuesday 23 January

Introduction

Room: Conv. Ctr. Room F2 ..... Tues. 8:55 to 9:00 am

Chair: **Peter E. Powers**, Univ. of Dayton

SESSION 1

Room: Conv. Ctr. Room F2 ..... Tues. 9:00 to 10:20 am

Visible and UV Nonlinear Optical Devices

Chair: **Peter E. Powers**, Univ. of Dayton

9:00 am: **Design and characterization of a rugged and compact setup for widely tunable harmonic generation in the ultraviolet,** B. Jungbluth, M. Vierkoetter, M. Höfer, J. Löhring, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) ..... [6455-01]

9:20 am: **Generation of >300 mW diffraction-limited light at 405 nm by second-harmonic generation of an external cavity tapered diode laser,** O. B. Jensen, J. Holm, Risø National Lab. (Denmark); B. Sumpf, G. Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); P. E. Andersen, P. M. Petersen, Risø National Lab. (Denmark) ..... [6455-02]

9:40 am: **Novel low-loss ring resonator for second-harmonic generation of 808 nm into 404 nm using periodically poled KTP in a compact 3 element setup,** J. Holm, Risø National Lab. (Denmark) and Lunds Tekniska Högskola (Sweden); O. B. Jensen, Risø National Lab. (Denmark); B. Sumpf, G. Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); S. Andersson-Engels, Lunds Tekniska Högskola (Sweden); P. E. Andersen, P. M. Petersen, Risø National Lab. (Denmark) ..... [6455-03]

10:00 am: **Multiwatt CW 589-nm Na D2-line frequency doubled Raman fiber laser system for LGS-assisted AO,** L. R. Taylor, Y. Feng, W. K. P. Hackenberg, D. Bonaccini Calia, European Southern Observatory (Germany) ..... [6455-04]

Coffee Break ..... 10:20 to 10:50 am

SESSION 2

Room: Conv. Ctr. Room F2 ..... Tues. 10:50 to 11:50 am

Nonlinear Optical Applications

Chair: **Michael W. Millard**, ITT Industries, Inc.

10:50 am: **Frequency doubling of ps Ti:sapphire laser with PPMgLN waveguide for spin polarization of 3He,** K. Kyutoku, S. Maeda, H. Kumagai, A. Kobayashi, Osaka City Univ. (Japan) ..... [6455-05]

11:10 am: **Integrated ultraviolet and tunable mid-infrared laser source for analyses of proteins,** H. Hazama, Osaka Univ. (Japan); Y. Takatani, Kawasaki Heavy Industries, Ltd. (Japan); K. Awazu, Osaka Univ. (Japan) ..... [6455-06]

11:30 am: **Active narrowband multiple fundamental and second-harmonic wavelength filters in aperiodically poled lithium niobates,** Y. Chen, C. Lin, J. Chang, National Central Univ. (Taiwan) ..... [6455-07]

Lunch/Exhibition Break ..... 11:50 am to 1:00 pm

SESSION 3

Room: Conv. Ctr. Room F2 ..... Tues. 1:00 to 3:10 pm

Nonlinear Optical Testing

Chair: **Yehoshua Y. Kalisky**, Nuclear Research Ctr. Negev (Israel)

1:00 pm: **Terahertz wave generation in orientation-patterned GaAs using resonantly enhanced schemes** *(Invited Paper)***,** K. L. Vodopyanov, Stanford Univ. ..... [6455-09]

1:30 pm: **Nonlinear wavelength conversion into the mid-infrared within engineered glass-bonded QPM GaAs crystals,** P. D. Mason, P. J. Webber, B. J. Perrett, S. C. Woods, D. A. Orchard, QinetiQ Ltd. (United Kingdom) ..... [6455-10]

1:50 pm: **Optimization of noncollinear optical parametric amplification,** D. N. Schimpf, J. Rotthardt, J. Limpert, A. Tuennermann, Friedrich-Schiller-Univ. Jena (Germany) ..... [6455-11]

2:10 pm: **Optical parametric generation of high-energy femtosecond pulses in the 1-3 μm spectral range using BiB3O6,** V. P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); M. Ghotbi, Institut de Ciències Fotòniques (Spain); P. N. Tzankov, F. Noack, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); M. Ebrahim-Zadeh, Institut de Ciències Fotòniques (Spain) ..... [6455-12]

2:30 pm: **Compact sub-mW mid-infrared DFG laser source using direct-bonded QPM-LN ridge waveguide and laser diodes,** O. Tadanaga, Y. Nishida, T. Yanagawa, K. Magari, T. Umeki, M. Asobe, H. Suzuki, NTT Photonics Labs. (Japan) ..... [6455-13]

2:50 pm: **8.6-watt single-frequency CW OPO,** A. J. Henderson, R. Stafford, Aculight Corp. ..... [6455-14]

Coffee Break ..... 3:10 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room F2 ..... Tues. 3:30 to 5:40 pm

Ultrafast Nonlinear Optics

Chair: **Thomas J. Kulp**, Sandia National Labs.

3:30 pm: **Nonlinear optics for high-order frequency conversion: applied attosecond science** *(Invited Paper)***,** X. Zhang, A. Lytle, O. Cohen, D. Gaudiosi, T. Popmintchev, H. C. Kapteyn, M. M. Murnane, Univ. of Colorado/Boulder ..... [6455-15]

4:00 pm: **Coherent detection of multicycle THz pulses generated in periodically inverted GaAs,** Y. Lee, W. C. Hurlbut, Oregon State Univ.; K. L. Vodopyanov, M. M. Fejer, Stanford Univ.; V. G. Kozlov, Microtech Instruments, Inc. ..... [6455-16]

4:20 pm: **Fiber continuum-seeded ultrafast parametric amplification,** C. Aguergaray, Univ. Bordeaux I (France); T. V. Andersen, J. Rothhardt, O. Schmidt, Friedrich-Schiller-Univ. Jena (Germany); E. Cormier, Univ. Bordeaux I (France); J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); A. Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) ..... [6455-17]

4:40 pm: **Nonlinear control of ultrafast lasers with intense coherent THz pulses,** G. L. Carr, Y. Shen, C. Kao, Brookhaven National Lab. ..... [6455-18]

5:00 pm: **Arbitrary THz pulse shaping in fanned-out periodically poled lithium niobate,** Y. Lee, J. R. Danielson, N. Amer, Oregon State Univ. [6455-19]

5:20 pm: **Extending the flat gain bandwidth of combined Raman-parametric fiber amplifiers using highly nonlinear fiber,** M. F. Arend, M. A. Ummy, City College/CUNY; L. Leng, NYC College of Technology; R. Dorsinville, City College/CUNY ..... [6455-20]

Wednesday 24 January

SESSION 5

Room: Conv. Ctr. Room F2 . . . . . Wed. 8:00 to 10:00 am

Nonlinear Optical Modeling and Devices

Chair: **Robert C. Eckardt**, Cleveland Crystals, Inc.

8:00 am: **Cascaded-stage parametric amplification,** A. R. Pandey, J. W. Haus, P. E. Powers, Univ. of Dayton . . . . . [6455-21]

8:20 am: **Four-dimensional treatment of frequency conversion and the effect of smoothing by spectral dispersion,** P. A. Treadwell, AWE plc (United Kingdom) . . . . . [6455-22]

8:40 am: **Iterative resonator model describing the Stokes and anti-Stokes emission of a continuous-wave silicon-based Raman laser,** N. Vermeulen, C. Debaes, H. Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [6455-30]

9:00 am: **Analysis of a third-order optical parametric oscillator in TiO2,** C. Wang, M. Sheik-Bahae, The Univ. of New Mexico . . . . . [6455-24]

9:20 am: **Singly resonant optical parametric oscillators with pump-modulation transfer for frequency modulated spectroscopy in the mid-infrared,** I. D. Lindsay, P. Gross, C. J. Lee, Univ. Twente (Netherlands); M. E. Klein, Art Innovation BV (Netherlands); B. Adhimoolam, K. Boller, Univ. Twente (Netherlands) . . . . . [6455-25]

9:40 am: **Simultaneous SHG of orthogonally polarized fundamentals in single QPM crystals,** B. F. Johnston, Macquarie Univ. (Australia); S. M. Saltiel, Sofia Univ. (Bulgaria); M. J. Withford, Macquarie Univ. (Australia); Y. S. Kivshar, The Australian National Univ. (Australia) . . . . . [6455-26]

Coffee Break . . . . . 10:00 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room F2 . . . . . Wed. 1:30 to 3:20 pm

Nonlinear Optical Materials and Characterization I

Chair: **Darrell J. Armstrong**, Sandia National Labs.

1:30 pm: **Improved NLO crystals for mid-IR laser applications** *(Invited Paper)***,** P. G. Schunemann, BAE Systems . . . . . [6455-27]

2:00 pm: **Raman gain measurements and photo-induced transmission effects in germanium and arsenic-based chalcogenide glass,** R. A. Stegeman, Univ. of Arizona; L. C. Petit, N. Carlie, K. A. Richardson, Clemson Univ.; G. I. Stegeman, P. J. Delfyett, Jr., College of Optics & Photonics/Univ. of Central Florida . . . . . [6455-28]

2:20 pm: **Stimulated Raman scattering in new organic and inorganic crystalline materials,** H. Rhee, Technische Univ. Berlin (Germany); A. A. Kaminskii, Institute of Crystallography (Russia); H. J. Eichler, Technische Univ. Berlin (Germany) . . . . . [6455-29]

2:40 pm: **Modeling mid-infrared continuous-wave silicon-based Raman lasers,** N. Vermeulen, C. Debaes, H. Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [6455-23]

3:00 pm: **Third-order nonlinear optical properties of tellurite glasses in femtosecond regime,** M. A. R. C. Alencar, R. F. Souza, Univ. Federal de Estado de Alagoas (Brazil); R. Kobayashi, L. R. P. Kassab, Univ. Estadual de São Paulo (Brazil); J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . [6455-31]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 7

Room: Conv. Ctr. Room F2 . . . . . Wed. 3:40 to 5:30 pm

Nonlinear Optical Materials and Characterization II

Chair: **Peter E. Powers**, Univ. of Dayton

3:40 pm: **Optimization of nonlinear optical frequency conversion** *(Invited Paper)***,** S. Guha, L. P. Gonzalez, J. M. Murray, Air Force Research Lab. . . . . [6455-32]

4:10 pm: **Red to green upconversion in erbium-doped BaTiO3 nanocrystals,** M. A. R. C. Alencar, Univ. Federal de Estado de Alagoas (Brazil); G. S. Maciel, C. B. Araújo, Univ. Federal de Pernambuco (Brazil); A. Patra, Central Glass and Ceramic Research Institute (India) . . . . . [6455-34]

4:30 pm: **Reduction of the optical damage in lithium niobate crystals by thermo-electric oxidization,** M. Falk, I. Breunig, T. Woike, K. Buse, Univ. Bonn (Germany) . . . . . [6455-35]

4:50 pm: **Novel high-sensitivity thermal managed eclipse Z-scan technique,** A. S. L. Gomes, R. E. de Araujo, D. J. Rativa, E. L. Falcão Filho, C. B. de Araujo, Univ. Federal de Pernambuco (Brazil) . . . . . [6455-36]

5:10 pm: **Magnetization-induced second- and third-harmonic generation in magnetophotonic crystals,** O. A. Aktsipetrov, T. V. Murzina, M.V. Lomonosov Moscow State Univ. (Russia); M. Inoue, T. Yoshida, H. Uchida, Toyohashi Univ. of Technology (Japan); V. G. Golubev, D. A. Kurdyukov, S. Kaplan, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6455-37]

✔ Posters-Wednesday

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✔ **Comparison between stimulated Raman and Brillouin scattering processes in magnetized doped III-V semiconductors,** M. Singh, P. Aghamkar, N. Kishore, Guru Jambheshwar Univ. of Science and Technology (India) . . . . . [6455-38]

✔ **Parametric oscillation in BiB3O6 pumped at 1.0642 μm,** K. Kato, Chitose Institute of Science and Technology (Japan) . . . . . [6455-39]

✔ **Noncritical phase-matched difference-frequency generation in AgGa1-xInxS2,** S. Banerjee, K. Kato, Chitose Institute of Science and Technology (Japan) . . . . . [6455-40]

✔ **New experimental results for SHG and DFG in AgGaGeS4,** K. Miyata, Chitose Institute of Science and Technology (Japan); V. P. Petrov, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); N. Umemura, K. Kato, Chitose Institute of Science and Technology (Japan); N. Saito, S. Wada, The Institute of Physical and Chemical Research (Japan) . . . . . [6455-41]

✔ **Hybrid intra-extra cavity OPO using monolithic crystal for improvement in OPO efficiency,** S. K. Verma, D. R. Korhalkar, A. Nautiyal, Bharat Electronics Ltd. (India) . . . . . [6455-43]

✔ **Supercontinuum generation enhanced by conventional Raman amplification at pumping by nanosecond pulses from a directly modulated DFB laser,** R. Rojas-Laguna, Univ. de Guanajuato (Mexico); J. Gutiérrez Gutiérrez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) and Univ. Autonoma de Zacatecas (Mexico); J. M. Estudillo-Ayala, Univ. de Guanajuato (Mexico); E. A. Kuzin, B. Ibarra-Escamilla, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); J. W. Haus, Univ. of Dayton . . . . . [6455-44]

✔ **Resonant doubler with a 2-THz automatic quasi-smooth scan range for widely tunable CW single-frequency lasers,** S. M. Kobtsev, Novosibirsk State Univ. (Russia); V. M. Lunin, Tekhnoscan JSC (Russia) . . . . . [6455-45]

✔ **Mid-infrared ZnGeP2 optical parametric oscillator directly pumped by a q-switched Cr,Tm,Ho:YAG laser,** A. Nieuwenhuis, P. J. M. van der Slot, P. Gross, I. D. Lindsay, C. J. Lee, Univ. Twente (Netherlands) . . . . . [6455-46]

✔ **Amplitude and frequency characteristics of a multiphonon light scattering in tellurium dioxide single crystal,** A. S. Shcherbakov, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); A. Aguirre López, Univ. Technologica de la Mixteca (Mexico); Y. Ledeneva, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6455-47]

✔ **Optical parametric generation at extremely low pump irradiance in a long periodically poled lithium niobate,** S. Acco, P. Blau, S. Pearl, Soreq Nuclear Research Ctr. (Israel); A. Arie, Tel-Aviv Univ. (Israel) . . . . . [6455-48]

✔ **CW Z-scan measurements in ionic liquids,** M. A. R. C. Alencar, R. F. Souza, M. R. Meneghetti, Univ. Federal de Estado de Alagoas (Brazil); J. Dupont, Univ. Federal do Rio Grande do Sul (Brazil); J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . . . . . [6455-49]

✔ **Domain inversion in lithium niobate patterned by interference lithography,** C. Chiang, J. Chen, Y. Lee, National Central Univ. (Taiwan) . . . . . [6455-50]

✔ **Fast-acting nonlinear optical limiters and switchers, based on fullerenes and fullerene-like nanostructures,** I. M. Belousova, V. P. Belousov, N. G. Mironova, T. D. Murav'eva, A. G. Scobelev, A. N. Ponomarev, M. S. Yur'ev, S.I. Vavilov State Optical Institute (Russia) . . . . . [6455-51]

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6456

High-Power Diode Laser Technology and Applications V

Conference Chair: **Mark S. Zediker**, Nuvonyx, Inc.

Program Committee: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Jason Farmer**, nLight Corp.; **Stefan W. Heinemann**, Fraunhofer USA Inc.; **Volker K. Krause**, Laserline GmbH (Germany); **Erik P. Zucker**, JDS Uniphase Corp.

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room J3 ..... Mon. 8:30 to 11:20 am

High-Power Laser Diode Bar Reliability

Chair: **Jason Farmer**, nLight Corp.

8:30 am: **Thermal and strain characteristics of high-power 940-nm bars mounted with AuSn solders on CuW submounts** *(Invited Paper)*, J. L. Hostetler, G. W. Charache, R. Roff, T. Li, C. Miester, F. Dorsch, TRUMPF Photonics ..... [6456-01]

9:10 am: **Heat transfer and thermal lensing in large-mode high-power laser diodes,** K. L. Chan, K. P. Pipe, Univ. of Michigan; J. J. Plant, R. B. Swint, P. W. Judoawlkis, MIT Lincoln Lab. ..... [6456-02]

9:30 am: **Robust hard-solder packaging of conduction cooled laser diode bars,** D. A. Schleuning, C. D. Nabors, G. L. Ng, J. C. McNulty, H. Zhou, Coherent, Inc. ..... [6456-03]

9:50 am: **Reliability and failure-mode investigation of high-power multimode InGaAs strained quantum well single emitters,** Y. Sin, M. Mason, N. Presser, B. Foran, J. Scarpulla, S. C. Moss, The Aerospace Corp. . [6456-04]

Coffee Break ..... 10:10 to 10:40 am

10:40 am: **Degradation behavior and thermal properties of red (650 nm) high-power diode single emitters and laser bars,** J. W. Tomm, T. Q. Tien, F. Weik, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); B. Sumpf, M. Zorn, U. Zeimer, G. Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) ..... [6456-05]

11:00 am: **High-reliable, high-power AlGaAs/GaAs 808-nm diode laser bars,** R. Hülsewede, H. Schulze, J. Sebastian, P. Hennig, M. Schroeder, J. Meusel, JENOPTIK Laserdiode GmbH (Germany) ..... [6456-06]

SESSION 2

Room: Conv. Ctr. Room J3 ..... Mon. 11:20 am to 12:20 pm

High-Power Laser Diodes I

Chair: **Erik P. Zucker**, JDS Uniphase Corp.

11:20 am: **Goals and status of the German national research initiative BRIOLAS (brilliant diode lasers)** *(Invited Paper)*, F. G. Bachmann II, Rofin-Sinar Laser GmbH (Germany) ..... [6456-07]

12:00 pm: **Recent advances in actively cooled high-power laser diode bars,** N. P. Ostrom, S. D. Roh, D. M. Grasso, Nuvonyx Inc. ..... [6456-08]

Lunch Break ..... 12:20 to 1:20 pm

SESSION 3

Room: Conv. Ctr. Room J3 ..... Mon. 1:20 to 3:20 pm

High-Power Laser Diodes II

Chair: **Erik P. Zucker**, JDS Uniphase Corp.

1:20 pm: **Ongoing development of high-efficiency and high-reliability laser diodes at Spectra-Physics,** H. Li, I. Chyr, F. O. Reinhardt, J. Xu, K. Kuppuswamy, T. Towe, J. S. Mott, J. Harrison, Spectra-Physics Semiconductor Lasers ..... [6456-09]

1:40 pm: **High-brightness semiconductor lasers,** P. T. Rudy, J. E. Ungar, M. L. Osowski, R. M. Lammert, S. W. Oh, Quintessence Photonics Corp. ..... [6456-10]

2:00 pm: **High-power single emitter 12xx-nm quantum dot lasers with 12W peak power and 36% power conversion efficiency suitable for medical and sensing applications,** P. A. Crump, S. Patterson, S. Elim, S. Zhang, M. Bougher, J. Patterson, S. Das, W. Dong, M. Grimshaw, J. Wang, D. Wise, M. DeFranza, J. Bell, J. Farmer, M. A. DeVito, R. J. Martinsen, nLight Corp.; A. R. Kovsh, NL Nanosemiconductor GmbH (Germany) ..... [6456-11]

2:20 pm: **High-brightness, high-power 9xx-nm diode laser bars: developments at JENOPTIK diode lab,** J. Sebastian, H. Schulze, R. Hülsewede, P. Hennig, M. Schroeder, J. Meusel, JENOPTIK Laserdiode GmbH (Germany) ..... [6456-12]

2:40 pm: **High-power, high-efficiency laser diodes at JDSU,** M. G. Peters, V. V. Rossin, M. P. Everett, E. P. Zucker, JDS Uniphase Corp. ..... [6456-13]

3:00 pm: **8-W reliable operation of 808-nm broad-area diode lasers by near-field distribution control in a multistripe contact geometry,** K. Paschke, G. Erbert, S. Einfeldt, P. Ressel, B. Sumpf, H. Wenzel, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) ..... [6456-14]

Coffee Break ..... 3:20 to 3:50 pm

SESSION 4

Room: Conv. Ctr. Room J3 ..... Mon. 3:50 to 6:10 pm

High-Power Laser Diodes III

Chair: **Stefan W. Heinemann**, Fraunhofer USA Inc.

3:50 pm: **Scalable high-power (>1kW/cm^2) diode laser stacks based on silicon monolithic microchannel coolers** *(Invited Paper)*, P. Reichert, M. Fouksman, H. Zhou, C. D. Nabors, J. Alcala, Coherent, Inc.; M. A. Toivonen, S. Lehkonen, J. Haapaman, Coherent Finland Oy (Finland) ..... [6456-15]

4:30 pm: **Novel high-peak current pulsed diode laser sources for direct material processing,** M. Traub, M. Bock, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany); M. Bartram, J. Andreas, PicoLAS GmbH (Germany) ..... [6456-16]

4:50 pm: **High-power, high-brightness 100-W QCW diode laser at 940 nm,** C. Fiebig, G. Erbert, W. Pittroff, H. Wenzel, A. Maasdorf, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) ..... [6456-17]

5:10 pm: **High-power, high-brightness, high-reliability laser diodes emitting at 800-1000 nm,** D. A. Yanson, J. H. Marsh, S. P. Najda, S. D. McDougall, H. Fadli, G. Masterton, B. C. Qiu, O. P. Kowalski, G. Bacchin, G. W. McKinnon, Intense Photonics Ltd. (United Kingdom) ..... [6456-18]

5:30 pm: **100-W+ diode laser bars show > 71% power conversion from 790-nm to 1000-nm and have clear route to > 85%,** P. A. Crump, W. Dong, M. Grimshaw, J. Wang, S. Patterson, D. Wise, M. DeFranza, S. Elim, S. Zhang, M. Bougher, J. Patterson, S. Das, J. Bell, J. Farmer, M. A. DeVito, R. J. Martinsen, nLight Corp. ..... [6456-19]

5:50 pm: **Increased power of broad-area lasers (808 nm/980 nm) and applicability to 10-mm bars,** D. Schröder, J. Meusel, P. Hennig, R. Hülsewede, J. Sebastian, JENOPTIK Laserdiode GmbH (Germany) ..... [6456-20]

Tuesday 23 January

SESSION 5

Room: Conv. Ctr. Room J3 ..... Tues. 8:30 to 11:40 am

High-Power Direct Diode Laser I

Chair: **Friedrich G. Bachmann II**, Rofin-Sinar Laser GmbH (Germany)

8:30 am: **11-kW direct diode laser system with homogenized 55x20 mm^2 top-hat intensity distribution** *(Invited Paper)*, B. Koehler, A. Noeske, T. Kindervater, A. Wessollek, T. Brand, J. Biesenbach, Dilas Diodenlaser GmbH (Germany) ..... [6456-22]

9:10 am: **High-brightness fiber coupled diode laser systems,** S. D. Roh, D. M. Grasso, N. P. Ostrom, Nuvonyx Inc. ..... [6456-23]

9:30 am: **Efficient high-brightness diode laser modules offer new industrial applications,** M. Revermann, A. Timmermann, J. Meinschien, P. Bruns, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . . . [6456-24]

9:50 am: **Concepts for modular high-power diode lasers as line generators,** J. Meinschien, A. Bayer, H. Ganser, T. Mitra, LIMO-Lissotschenko Mikrooptik GmbH (Germany) . . . . . [6456-26]

Coffee Break . . . . . 10:10 to 10:40 am

10:40 am: **An innovative technique for fiber-coupled diode laser arrays,** A. Rosenberg, K. Babajanyan, A. Bablumyan, Comp-Optics, LLC . . . [6456-27]

11:00 am: **Novel high-brightness fiber coupled diode laser device,** M. Haag, B. Koehler, J. Biesenbach, Dilas Diodenlaser GmbH (Germany) . . . . . [6456-28]

11:20 am: **Fiber-coupled laser diode modules with wavelengths around 2 µm,** K. Wieching, M. Haverkamp, M. Traub, K. M. Boucke, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6456-29]

Lunch/Exhibition Break . . . . . 11:40 to 1:00 am

SESSION 6

Room: Conv. Ctr. Room J3 . . . . . Tues. 1:00 to 3:40 pm

High-Power Narrow Linewidth Arrays and Beam Combining

Chair: **Volker K. Krause**, Laserline GmbH (Germany)

1:00 pm: **High-power distributed feedback laser bars and stacks with 60% power conversion efficiency** *(Invited Paper)***,** M. Kanskar, J. Cai, Y. He, Alfalight, Inc. . . . . [6456-30]

1:40 pm: **Volume Bragg grating external cavity for grating coupled surface emitted laser diode,** G. B. Venus, V. K. Rotar, L. B. Glebov, O. V. Smolski, J. K. O'Daniel, E. G. Johnson, College of Optics & Photonics/Univ. of Central Florida . . . . . [6456-31]

2:00 pm: **Fiber coupled diode laser of high-spectral and spatial beam quality with kW class output power,** C. Wessling, M. Traub, H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6456-32]

2:20 pm: **Wavelength stabilization of HPDL array: fast-axis collimation optic with integrated VHG,** C. Schnitzler, V. R. Sinhoff, O. Rübenach, S. Hambücker, Ingeneric GmbH (Germany); C. Wessling, Fraunhofer-Institut für Lasertechnik (Germany); G. J. Steckman, Ondax, Inc.; H. Hoffmann, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6456-33]

2:40 pm: **Mode selection and phase locking of sidelobe emitting semiconductor laser arrays using an external cavity with a narrow-bandwidth volume grating,** S. Riyopoulos, Science Applications International Corp.; G. B. Venus, L. B. Glebov, College of Optics and Photonics/Univ. of Central Florida . . . . . [6456-34]

3:00 pm: **Wavelength-tunable narrowband high-power diode laser stacks based on volume Bragg grating(r) technology,** B. L. Volodin, S. Dolgy, E. D. Melnik, PD-LD, Inc.; J. Harrison, T. R. Crum, D. Hu, Spectra-Physics Semiconductor Lasers . . . . . [6456-35]

3:20 pm: **Splicing asymmetric reflective array for combining high-powered lasers,** P. Palffy-Muhoray, Kent State Univ.; J. P. Fontana, Liquid Crystal Institute, KSU; B. Taheri, AlphaMicron, Inc. . . . . [6456-36]

Coffee Break . . . . . 3:40 to 4:10 pm

SESSION 7

Room: Conv. Ctr. Room J3 . . . . . Tues. 4:10 to 6:50 pm

Improved Packaging of Laser Diode Arrays

Chair: **Jason Farmer**, nLight Corp.

4:10 pm: **Elimination of deionized cooling water requirement for microchannel-cooled laser diode arrays,** E. F. Stephens, R. Feeler, Northrop Grumman Corp. . . . . [6456-37]

4:30 pm: **Highly reliable hard-soldered 1.6kW QCW laser diode stack packaging platform,** P. K. Rosenberg, P. Reichert, S. Tolman, Coherent, Inc. . . . . [6456-38]

4:50 pm: **Stackable air-cooled heatsinks for diode laser bars,** T. R. Crum, J. Harrison, R. Srinivasan, R. L. Miller, Spectra-Physics Semiconductor Lasers . . . . . [6456-39]

5:10 pm: **Next generation of cooling approaches for diode laser bars,** M. Leers, C. Scholz, K. M. Boucke, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6456-40]

5:30 pm: **Monolithically stacked high-power diode laser bars in quasi-continuous-wave operation exceeding 500 W,** M. Müller, M. Philippens, G. Grönninger, H. König, J. Luft, Osram Opto Semiconductors GmbH (Germany); M. Stoiber, Dilas Diodenlaser GmbH (Germany); D. Lorenzen, JENOPTIK Laserdiode GmbH (Germany) . . . . . [6456-41]

5:50 pm: **Highly efficient and reliable 1 kW QCW laser stacks with diffraction limited fast axis beam collimation,** N. Feldman, Y. Berk, A. Algali, S. Geva, Y. Karni, G. Klumel, M. Levy, S. Risemberg, L. Sitner, SemiConductor Devices (Israel) . . . . . [6456-42]

6:10 pm: **Next-generation active and passive heatsink design for diode lasers,** R. Srinivasan, R. L. Miller, D. Hu, K. Kuppuswamy, T. Nguyen, D. Brown, T. R. Crum, T. Towe, R. T. Morris, E. Wolak, J. Harrison, Spectra-Physics Semiconductor Lasers . . . . . [6456-43]

6:30 pm: **Active microcooler with matched CTE,** T. Ebert, IQ Evolution GmbH (Germany) . . . . . [6456-52]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Pulsed tapered diode lasers,** O. B. Jensen, Risø National Lab. (Denmark); A. Klehr, F. Dittmar, B. Sumpf, G. Erbert, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); P. E. Andersen, P. M. Petersen, Risø National Lab. (Denmark) . . . . . [6456-44]

✔ **Lifetime testing of laser diode coolers,** T. Loeffler, Curamik Electronics GmbH (Germany); K. L. Credle, Jr., Curamik Electronics Inc.; K. Schmidt, M. Goetz, Curamik Electronics GmbH (Germany) . . . . . [6456-46]

✔ **Photosynthetically supplemental lighting for vegetable crop production with super-bright laser diode,** Y. Hu, P. Li, J. Shi, JiangSu Univ. (China) . . . . . [6456-47]

✔ **Reliable operation of 785-nm DFB diode lasers for rapid Raman spectroscopy,** M. Maiwald, G. Erbert, A. Klehr, B. Sumpf, H. Wenzel, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); J. Wiedmann, T. Laurent, eagleyard Photonics GmbH (Germany); H. G. Schmidt, H. Kronfeldt, Technische Univ. Berlin (Germany) . . . . . [6456-48]

✔ **High-power, high-brightness transmission through SMA-based fiber cables,** T. A. Trebst, F. Schuberts, CeramOptec GmbH (Germany) . [6456-49]

✔ **Dynamics of thermo-optical properties of semiconductor lasers,** E. Kowalczyk, L. Ornoch, Z. Gniazdowski, B. Mroziewicz, Instytut Technologii Elektronowej (Poland) . . . . . [6456-50]

✔ **High-power, highly reliable single emitter laser diodes at 808 nm,** W. Gao, Z. Xu, L. Cheng, K. Luo, A. Mastrovito, K. Shen, Axcel Photonics, Inc. . . . . [6456-51]

✔ **23-mW tunable diffraction limited light at 488 nm by frequency doubling of a broad-area diode laser using PPLN,** A. Jechow, R. Menzel, Univ. Potsdam (Germany) . . . . . [6456-53]

✔ **Welding laser hosted on a THS,** M. Checchetti, Microptronics Srl (Italy) . . . . . [6456-54]

Wednesday 24 January 2007 • Part of Proceedings of SPIE Vol. 6457

Atmospheric Propagation of Electromagnetic Waves

Conference Chair: **Olga Korotkova**, Univ. of Rochester and College of Optics and Photonics/Univ. of Central Florida

Program Committee: **Larry C. Andrews**, Univ. of Central Florida; **Yahya K. Baykal**, Çankaya Univ. (Turkey); **Aristide C. Dogariu**, College of Optics and Photonics/Univ. of Central Florida; **Greg Gbur**, The Univ. of North Carolina at Charlotte; **Steve Mecherle**, Innocept Inc.; **Ronald L. Phillips**, Univ. of Central Florida; **Jennifer C. Ricklin**, Defense Advanced Research Projects Agency; **Chaim Schwartz**, Univ. of Central Florida; **Robert K. Tyson**, Univ. of North Carolina/Charlotte

Wednesday 24 January

SESSION 4

Room: Hilton Hotel: Plaza Room . . . . . Wed. 8:15 to 10:05 am

Modeling, Simulation, and Experiments Involving Propagation of Electromagnetic Waves in Atmospheric Turbulence

Chair: **Olga Korotkova**, Univ. of Rochester

8:15 am: **Simulating partially coherent fields and other special beam classes in turbulence** *(Invited Paper)***,** G. Gbur, The Univ. of North Carolina at Charlotte . . . . . [6457B-16]

8:45 am: **Propagation of arbitrary random beams in turbulent atmosphere,** O. Korotkova, Univ. of Rochester; G. Gbur, The Univ. of North Carolina at Charlotte . . . . . [6457B-17]

9:05 am: **Propagation of partially coherent beams in a convective medium,** A. Carbajal-Domínguez, Universidad Juárez Autónoma de Tabasco (Mexico) [6457B-30]

9:25 am: **Atmospheric turbulence profiling by detection of the test beam's wave function,** A. I. Khizhnyak, V. Markov, MetroLaser, Inc. . . . . [6457B-19]

9:45 am: **Scintillation index for N Gaussian laser beams with different wavelengths in weak atmospheric turbulence,** A. Peleg, J. V. Moloney, The Univ. of Arizona . . . . . [6457B-20]

Coffee Break . . . . . 10:05 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

10:30 am: **Welcome and Introductions**

10:40 am: **The Laser: Its Origin, Development, and Possible Future**
Charles H. Townes, Univ. of California/Berkeley

11:20 am: **Lasers: Astrophysics to Particle Physics**
Robert L. Byer, Stanford Univ.

11:50 am: **Optical Technologies: Engine for Innovations in Industrial Applications of Lasers**
Hans-Juergen Kahlert, JENOPTIK Laser, Optik, Systeme GmbH (Germany)

12:20 pm: **Closing Remarks**

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 5

Room: Hilton Hotel: Plaza Room . . . . . Wed. 1:30 to 3:20 pm

Mitigation of Atmospheric Effects, Adaptive Optics, and Applications for Laser Radar Systems and Laser Communications through the Atmosphere

Chair: **Olga Korotkova**, Univ. of Rochester

1:30 pm: **Tunable high-power high-brightness VECSELs as partially coherent sources for lasercom** *(Invited Paper)***,** J. V. Moloney, The Univ. of Arizona . . . . . [6457B-21]

2:00 pm: **Dual-frequency multifunction lidar,** R. Diaz, S. Chan, J. Liu, Univ. of California/Los Angeles . . . . . [6457B-22]

2:20 pm: **Performances of liquid crystal spatial light modulator (LCSLM) as a wavefront corrector for atmospheric turbulence compensation,** D. Cai, N. Ling, W. Jiang, Institute of Optics and Electronics (China) . . . . . [6457B-23]

2:40 pm: **On the use of Gaussian filter functions for adaptive optics,** M. Assad, Lockheed Martin Co. and Univ. of Central Florida; L. C. Andrews, Univ. of Central Florida . . . . . [6457B-24]

3:00 pm: **The black fringe wavefront sensor: white-light real-time analog phase measurement without a computer,** R. J. Tansey, A. Honkan, H. M. Chan, Lockheed Martin Advanced Technology Ctr. . . . . [6457B-25]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 6

Room: Hilton Hotel: Plaza Room . . . . . Wed. 3:50 to 6:00 pm

Wave Propagation in Non-classical (Non-Kolmogorov) Turbulence and Propagation of Pulses

Chair: **Olga Korotkova**, Univ. of Rochester

3:50 pm: **Critical issues encountered in experiments and measurements involving optical turbulence** *(Invited Paper)***,** F. D. Eaton, Air Force Research Lab. . . . . [6457B-26]

4:20 pm: **Free space optical system performance for laser beam propagation through non-Kolmogorov turbulence,** I. Toselli, Politecnico di Torino (Italy); L. C. Andrews, Univ. of Central Florida; R. L. Phillips, Florida Space Institute . . . . . [6457B-18]

4:40 pm: **Backscattering under intense pulse propagation in air,** O. K. Khasanov, T. V. Smirnova, O. M. Fedotova, Institute of Solid State and Semiconductor Physics (Belarus); A. P. Sukhorukov, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6457B-27]

5:00 pm: **High-intensive vortex pulsed-beam propagation in the atmosphere,** O. K. Khasanov, T. V. Smirnova, O. M. Fedotova, Institute of Solid State and Semiconductor Physics (Belarus); A. P. Sukhorukov, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6457B-28]

5:20 pm: **Humidity contribution to Cn2 over 600m pathlength in tropical marine environment,** E. S. Oh, C. O. Font, G. C. Gilbreath, Naval Research Lab.; M. P. J. L. Chang, Univ. de Puerto Rico Mayagüez . . . . . [6457B-29]

5:40 pm: **Enhanced performance of low-power (<60mW) femtosecond free space optical communication system over conventional CW operation,** P. A. Corrigan, R. Martini, Stevens Institute of Technology; T. M. Chaffee, Attochron, LLC. . . . . [6457B-31]

Thursday 25 January 2007 • Part of Proceedings of SPIE Vol. 6457

Free-Space Laser Communication Technologies XIX

Conference Chair: **Steve Mecherle**, Innocept Inc.

Program Committee: **David L. Begley**, Ball Aerospace & Technologies Corp.; **Don M. Boroson**, MIT Lincoln Lab.; **Robert T. Carlson**, BAE Systems (Canada); **Florian X. David**, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); **Frederic M. Davidson**, Johns Hopkins Univ.; **Wayne R. Fenner**, The Aerospace Corp.; **Hamid Hemmati**, Jet Propulsion Lab.; **Eric J. Korevaar**, MRV Communications Inc.; **Yoshisada Koyama**, National Institute of Information and Communications Technology (Japan); **Robert Lange**, Tesat-Spacecom GmbH & Co. KG (Germany); **Donald J. Nicholson**, Air Force Research Lab.; **Vladimir V. Nikulin**, Binghamton Univ.; **Zoran Sodnik**, European Space Agency (Netherlands); **Morio Toyoshima**, National Institute of Information and Communications Technology (Japan); **Shiro Yamakawa**, Japan Aerospace Exploration Agency (Japan)

Wednesday 24 January

Technical Group Meeting

Laser Communications

7:30 to 9:00 pm|Fairmont Hotel: Glen Ellen Room

Chair: **Steve Mecherle,** Innocept Inc.

Sponsored by:

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The technical group on Laser Communications will hold its annual meeting in conjunction with the Free-Space Laser Communication Technologies XIX conference. All professionals involved in applications of free-space laser communications and supporting technologies are invited to participate in an open discussion on a variety of topics related to the challenges and advancement of the field. Members and visitors are invited to bring suggestions for discussion topics.

SPIE gratefully acknowledges Fiberguide Industries for generously sponsoring this award.

Thursday 25 January

SESSION 1

Room: Hilton Hotel: San Carlos Room . . . . . Thurs. 8:00 to 10:00 am

System Demonstrations

Chair: **Steve Mecherle**, Innocept Inc.

8:00 am: **Overview of the inter-orbit and the orbit-to-ground lasercom demonstration by OICETS** *(Invited Paper)***,** T. Jono, Y. Takayama, Japan Aerospace Exploration Agency (Japan); K. Arai, Japan Aerospace Exploration Agency; K. Shiratama, I. Mase, NEC TOSHIBA Space Systems, Ltd.; B. Demelenne, European Space Agency; M. Toyoshima, National Institute of Information and Communications Technology (Japan); D. Giggenbach, DLR Standort Oberpfaffenhofen (Germany) . . . . . [6457A-01]

8:30 am: **Homodyne BPSK-based optical inter-satellite communication links** *(Invited Paper)***,** R. Lange, Tesat-Spacecom GmbH & Co. KG (Germany) . . . . . [6457A-02]

9:00 am: **Results of the optical downlink experiment KIODO from OICETS satellite to Optical Ground Station Oberpfaffenhofen (OGS-OP),** N. Perlot, M. Knapek, D. Giggenbach, J. Horwath, M. Brechtelsbauer, DLR Standort Oberpfaffenhofen (Germany); Y. Takayama, T. Jono, Japan Aerospace Exploration Agency (Japan) . . . . . [6457A-03]

9:20 am: **Multichannel high-data-rate optical transmission between ground and airborne platforms,** D. W. Young, J. C. Juarez, J. E. Sluz, R. M. Sova, Johns Hopkins Applied Physics Lab.; J. Phillips, D. Driver, A. McClarin, AOptix Technologies, Inc. . . . . [6457A-04]

9:40 am: **OPTEL terminal for deep-space telemetry links,** G. C. Baister, Contraves Space AG (Switzerland) . . . . . [6457A-05]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Hilton Hotel: San Carlos Room . . . . . Thurs. 10:30 am to 12:10 pm

Acquisition, Pointing, and Tracking

Chair: **Hamid Hemmati**, Jet Propulsion Lab.

10:30 am: **Tracking and pointing characteristics of OICETS optical terminal in communication demonstrations with ground stations** *(Invited Paper)***,** Y. Takayama, National Institute of Information and Communications Technology (Japan); T. Jono, Japan Aerospace Exploration Agency (Japan); M. Toyoshima, H. Kunimori, National Institute of Information and Communications Technology (Japan); D. Giggenbach, N. Perlot, M. Knapek, DLR Standort Oberpfaffenhofen (Germany); K. Shiratama, NEC TOSHIBA Space Systems, Ltd. (Japan); J. Abe, Space Engineering Development Co., Ltd. (Japan); K. Arai, Japan Aerospace Exploration Agency (Japan) . . . . . [6457A-06]

10:50 am: **Communications system performance via an optical-phased array,** C. W. Hindman, P. Collier, Air Force Research Lab.; J. P. Hunt, Schafer Corp.; S. L. Lacy, R. L. Moser, S. B. Alejandro, Air Force Research Lab. . . . . [6457A-07]

11:10 am: **Hybrid beam steering system for laser communication between mobile platforms,** V. V. Nikulin, Binghamton Univ.; D. J. Nicholson, Air Force Research Lab. . . . . [6457A-08]

11:30 am: **Earth image tracking in the long wave infrared for deep-space optical communications: feasibility study based on laboratory emulator,** Y. Chen, J. Charles, H. Hemmati, Jet Propulsion Lab. . . . . [6457A-09]

11:50 am: **Beam tracking system for a high-speed optical link,** A. E. Dudelzak, A. S. Koujelev, Canadian Space Agency (Canada) . . [6457A-10]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Hilton Hotel: San Carlos Room . . . . . Thurs. 1:30 to 3:30 pm

Receiver and Modulation Technologies

Chair: **Abhijit Biswas**, Jet Propulsion Lab.

1:30 pm: **Signal acquisition and timing for a free space laser communications receiver,** G. Zogbi, L. M. Candell, MIT Lincoln Lab.[6457A-11]

1:50 pm: **Link performance of linear mode photon counting detectors,** W. H. Farr, D. Q. Zhu, M. W. Wright, J. M. Kovalik, K. Quirk, J. Gin, B. Moision, M. K. Cheng, M. Nakashima, Jet Propulsion Lab.; D. V. Nguyen, Texas A&M Univ. . . . . [6457A-12]

2:10 pm: **Mitigation of optical turbulence effects using a modified simplex optimization approach: experimental study,** R. M. Khandekar, V. V. Nikulin, Binghamton Univ. . . . . [6457A-13]

2:30 pm: **Improving bit error rate through multipath differential demodulation,** Y. K. Lize, École Polytechnique de Montréal (Canada); L. C. Christen, S. Nuccio, A. E. Willner, Univ. of Southern California; R. Kashyap, École Polytechnique de Montréal (Canada) . . . . . [6457A-14]

2:50 pm: **Chaotic communication in radio-over-fiber system based on optoelectronic feedback semiconductor laser,** M. Tsai, F. Lin, National Tsing Hua Univ. (Taiwan) . . . . . [6457A-15]

3:10 pm: **Design and evaluation of a virtual quadrant receiver for 4-ary pulse position modulation/optical code division multiple access (4-ary PPM/O-CDMA),** A. J. Mendez, Mendez R&D Associates; V. Hernandez, Univ. of California/Davis; R. M. Gagliardi, Univ. of Southern California; C. V. Bennett, Lawrence Livermore National Lab. . . . . [6457A-32]

Monday-Wednesday 22-24 January 2007 • Part of Proceedings of SPIE Vol. 6458

Laser Applications in Microelectronic and Optoelectronic Manufacturing XII

Conference Chairs: **Craig B. Arnold**, Princeton Univ.; **Tatsuo Okada**, Kyushu Univ. (Japan); **Michel Meunier**, École Polytechnique de Montréal (Canada); **Andrew S. Holmes**, Imperial College London (United Kingdom)

Program Committee: **David G. Cahill**, Univ. of Illinois at Urbana-Champaign; **Boris N. Chichkov**, Laser Zentrum Hannover e.V. (Germany); **Andre Gorbunoff**, Hochschule für Technik und Wirtschaft Dresden (Germany); **Costas P. Grigoropoulos**, Univ. of California/Berkeley; **Bo Gu**, GSI Lumonics Inc.; **Henry Helvajian**, The Aerospace Corp.; **Koji Ikuta**, Nagoya Univ. (Japan); **Yongfeng Lu**, Univ. of Nebraska/Lincoln; **Eric Mazur**, Harvard Univ.; **Yoshiki Nakata**, Kyushu Univ. (Japan); **Alberto Piqué**, Naval Research Lab.; **Koji Sugioka**, The Institute of Physical and Chemical Research (Japan); **Paul C. van der Wilt**, Columbia Univ.

Monday 22 January

Opening Welcome Remarks

Conv. Ctr. Room J4 . . . . . Mon. 8:25 to 8:30 am

Craig B. Arnold, Princeton Univ.

SESSION 1

Room: Conv. Ctr. Room J4 . . . . . Mon. 8:30 to 10:30 am

Laser Processing of Semiconductors

Chair: **Craig B. Arnold**, Princeton Univ.

8:30 am: **Assembly and integration of thin bare die using laser direct-write** *(Invited Paper)*, A. Piqué, R. C. Y. Auyeung, N. Charipar, H. Kim, Naval Research Lab.; S. A. Mathews, The Catholic Univ. of America . . . . . [6458A-01]

9:00 am: **Excimer laser processing of novel materials for spintronic and optoelectronic applications** *(Invited Paper)*, M. Tabbal, American Univ. of Beirut (Lebanon) . . . . . [6458A-02]

9:30 am: **Micro-welding of electronic components with 532nm laser radiation,** F. Otte, A. Ostendorf, U. Stute, T. Stehr, Laser Zentrum Hannover e.V. . . . . [6458A-03]

9:50 am: **Processing of semiconductors and metals by laser-induced air breakdown plasma,** A. V. Kabashin, A. Trudeau, M. Meunier, École Polytechnique de Montréal (Canada); W. I. Marine, Univ. de la Méditerranée-Aix Marseille II (France) . . . . . [6458A-04]

10:10 am: **Thermodynamics of double-pulse laser irradiation of silicon,** P. Lorazo, Ecole Polytechnique de Montreal (Canada) and Univ. de Montreal (Canada); L. J. Lewis, Univ. de Montreal (Canada); M. Meunier, Ecole Polytechnique de Montreal (Canada) . . . . . [6458A-05]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 2

Room: Conv. Ctr. Room J4 . . . . . Mon. 11:00 am to 12:10 pm

Time Resolved Imaging and Ablation Fundamentals

Chair: **Alberto Piqué**, Naval Research Lab.

11:00 am: **Time-resolved imaging of explosive phase change in metals** *(Invited Paper)*, C. Porneala, D. A. Willis, Southern Methodist Univ. . [6458A-06]

11:30 am: **Laser-imaging diagnostics of debris behavior from laser-produced tin plasma for EUV-light sources,** T. Okada, Kyushu Univ. (Japan) . . . . . [6458A-07]

11:50 am: **Time-resolved force and ICCD Schlieren imaging study of TEA CO_2 laser ablation of liquid and polymer,** J. Lin, J. E. Sinko, A. V. Pakhomov, The Univ. of Alabama/Huntsville . . . . . [6458A-08]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room J4 . . . . . Mon. 1:30 to 3:00 pm

Optical and Microfluidic Devices

Chair: **Tatsuo Okada**, Kyushu Univ. (Japan)

1:30 pm: **Fabrication of bio-chips by laser ablation** *(Invited Paper)*, Y. Yoshida, Toyo Univ. (Japan) . . . . . [6458A-09]

2:00 pm: **Fabrication of a microfluidic bioarray device using laser-machined surface microstructures,** T. Sato, R. Kurosaki, A. Narazaki, Y. Kawaguchi, H. Niino, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6458A-10]

2:20 pm: **Fabrication of OLED display by an ultrashort laser: selective patterning of thin metal electrod,** Y. Ito, Y. Onodera, R. Tanabe, Nagaoka Univ. of Technology (Japan); M. Ichihara, H. Kamada, Tokki Corp. (Japan) [6458A-11]

2:40 pm: **Effect of CO_2 laser irradiation on the performances of sol-gel-derived Er^{3+}-activated SiO_2-ZrO_2 and SiO_2-HfO_2 planar waveguides,** C. Goyes, Univ. del Valle (Colombia); C. Armellini, M. Ferrari, A. Chiasera, Y. Jestin, M. Montagna, A. Chiappini, Univ. degli Studi di Trento (Italy); G. C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy); E. Solarte, A. Casas Bedoya, Univ. del Valle (Colombia); A. Devia, Univ. Nacional de Colombia (Colombia); C. Meacock, Instituto Superior Tecnico (Portugal) . . . . . [6458A-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room J4 . . . . . Mon. 3:30 to 5:10 pm

Laser Micromachining of Dielectrics

Chair: **David A. Willis**, Southern Methodist Univ.

3:30 pm: **UV-laser ablation of fused silica mediated by solid coating absorption** *(Invited Paper)*, J. Ihlemann, Laser Laboratorium Gottingen e.V. (Germany) . . . . . [6458A-15]

4:00 pm: **DPSSL for direct dicing and drilling of dielectrics,** D. Ashkenasi, M. Schwagmeier, Laser-und Medizin-Technologie GmbH (Germany) [6458A-14]

4:20 pm: **Photo-ionization of wide-bandgap dielectrics by high-intensity radiation of ultrashort laser pulses,** V. E. Gruzdev, J. K. Chen, Univ. of Missouri/Columbia . . . . . [6458A-17]

4:40 pm: **Physical mechanisms of fast structure modification of glass-like materials under laser action** *(Invited Paper)*, V. P. Veiko, St.-Petersburg State Univ. of Information Technologies, Mechanics and Optics (Russia) . . [6458A-16]

MOEMS-MEMS papers of related interest: 6462A-01, 6462A-02, 6462A-03, 6462A-04,6462A-05, 6462B-27, 6462B-31, 6462B-35, 6462B-37, and6462B-41.

Tuesday 23 January

NOTE ROOM CHANGE

SESSION 5

Room: Conv. Ctr. Room A6 . . . . . Tues. 8:00 to 10:10 am

Optical Waveguides I

Joint Session with Conference 6460

Chairs: **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany); **Alfred Vogel**, Univ. zu Lübeck (Germany)

8:00 am: **Ultrastrong photosensitivity in chalcogenide waveguides for on-chip filter applications** *(Invited Paper)*, B. J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6458A-18]

8:30 am: **Coupling management of fs laser written waveguides**, A. Szameit, F. Dreisow, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)[6460-30]

8:50 am: **Optical and structural properties of waveguides in $LiNbO_3$ fabricated by ultrashort laser pulses**, J. Burghoff, H. Hartung, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6460-31]

9:10 am: **Inscription of optical waveguides in Z-cut lithium niobate by circularly polarized 1.0-ps laser pulses**, A. H. Nejadmalayeri, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6458A-19]

9:30 am: **Deep-subsurface waveguides with circular-mode symmetry by direct laser writing with astigmatically shaped beams at low-numerical aperture**, J. Siegel, V. Diez-Blanco, J. Solis, Consejo Superior de Investigaciones Científicas (Spain) . . . . . [6460-32]

9:50 am: **Thermal annealing of fused silica after and during fs-laser waveguide writing**, J. J. Witcher, Univ. of California/Davis; W. J. Reichman, Lawrence Livermore National Lab. and Univ.of California/Davis; D. M. Krol, Univ. of California/Davis . . . . . [6458A-20]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 6

Room: Conv. Ctr. Room A6 . . . . . Tues. 10:40 am to 12:10 pm

Optical Waveguides II

Joint Session with Conference 6460

Chair: **Benjamin J. Eggleton**, The Univ. of Sydney (Australia)

10:40 am: **Formation of silicon structures in silicate glass by femtosecond laser** *(Invited Paper)*, K. Miura, Y. Shimotsuma, M. Sakakura, S. Kanehira, K. Hirao, Kyoto Univ. (Japan) . . . . . [6458A-21]

11:10 am: **Type II ultrafast-laser writing of Bragg grating waveguides in bulk glass**, H. Zhang, S. M. Eaton, S. Ho, M. L. Ng, J. Li, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6460-33]

11:30 am: **Inscribing fiber Bragg gratings using IR-fs pulses and a phase-mask scanning technique: potential and applications**, E. Wikszak, J. Thomas, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6460-34]

11:50 am: **Direct written Bragg grating structures in optical waveguides**, G. D. Marshall, M. Ams, N. Jovanovic, A. Fuerbach, J. A. Piper, M. J. Withford, Macquarie Univ. (Australia) . . . . . [6458A-22]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

SESSION 7

Room: Conv. Ctr. Room A6 . . . . . Tues. 1:10 to 3:10 pm

Fundamentals of Laser Material Interactions

Joint Session with Conference 6460

Chair: **Alexander Szameit**, Friedrich-Schiller-Univ. Jena (Germany)

1:10 pm: **X-ray diffraction studies of ultrafast bond softening** *(Invited Paper)*, D. A. Reis, Univ. of Michigan . . . . . [6458A-23]

1:40 pm: **Effect of amplified spontaneous emission pedestal on femtosecond laser pulse interaction** *(Invited Paper)*, V. V. Semak, The Pennsylvania State Univ. . . . . [6458A-24]

2:10 pm: **Modeling of ultrashort pulse propagation and nonlinear plasma formation in transparent Kerr media using realistic initial conditions**, C. L. Arnold, Laser Zentrum Hannover e.V. (Germany); W. Ertmer, Univ. Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6460-35]

2:30 pm: **Nonlinear response in optical materials using ultrashort laser technology**, D. Ashkenasi, Laser-und Medizin-Technologie GmbH (Germany) . . . . . [6458A-25]

2:50 pm: **Luminescent high-energy density femtosecond plasmas in bulk materials**, A. Vogel, N. Linz, S. Freidank, Univ. zu Lübeck (Germany); G. Paltauf, Karl-Franzens-Univ. Graz (Austria) . . . . . [6460-36]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 8

Room: Conv. Ctr. Room A6 . . . . . Tues. 3:40 to 6:00 pm

Nanoscale Machining and Joining

Joint Session with Conference 6460

Chairs: **Vladimir V. Semak**, The Pennsylvania State Univ.; **David Ashkenasi**, Laser-und Medizin-Technologie GmbH (Germany)

3:40 pm: **Femtosecond laser nanomachining of silicon wafers and two-photon nanolithography**, K. König, F. Bauerfeld, D. Sauer, H. Schuck, T. Velten, S. Schenkl, Fraunhofer-Institut für Biomedizinische Technik (Germany); R. LeHarzic, JenLab GmbH (Germany) . . . . . [6460-37]

4:00 pm: **Femtosecond lasers: combining 5-D microscopy and 3-D nanoprocessing**, J. Li, P. R. Herman, H. Zhang, S. M. Eaton, A. H. Nejadmalayeri, A. Hosseini, Univ. of Toronto (Canada) . . . . . [6460-38]

4:20 pm: **Ultrafast pulsed laser ablation for synthesis of nanocrystals**, B. Liu, Y. Che, Z. Hu, IMRA America, Inc.; Y. Chen, X. Pan, Univ. of Michigan . . . . . [6460 39]

4:40 pm: **An ultrashort pulse laser lathe for axisymmetric micromachining of explosives**, J. A. Palmer, E. J. Welle, Sandia National Labs. . . . . [6460-40]

5:00 pm: **High-repetition rate micromachining results**, G. Matras, Univ. Jean Monnet Saint-Etienne (France) and Univ. Jean Monnet/ Lab. TSI (France); N. Huot, E. Audouard, Univ. Jean Monnet Saint-Etienne (France) . . . [6458A-26]

5:20 pm: **Welding of transparent materials with high repetition rate femtosecond lasers**, J. M. Bovatsek, Spectra-Physics; J. Nguyen, B. Chen, Cornell Univ.; F. Yoshino, IMRA America, Inc.; L. Bonassar, Cornell Univ.; A. Y. Arai, IMRA America, Inc.; C. B. Schaffer, Cornell Univ. . . . . [6460-41]

5:40 pm: **Joining of transparent materials by femtosecond laser pulses**, W. Watanabe, National Institute of Advanced Industrial Science and Technology (Japan); S. Onda, T. Tamaki, K. Itoh, Osaka Univ. (Japan) . . . . . [6460-42]

Wednesday 24 January

SESSION 9

Room: Conv. Ctr. Room J4 . . . . . Wed. 8:30 to 10:00 am

Rapid Prototyping and Thin Film Growth

Chair: **Andrew S. Holmes**, Imperial College London (United Kingdom)

8:30 am: **Rapid prototyping of frequency selective surfaces by laser direct-write** *(Invited Paper)*, S. A. Mathews, M. S. Mirotznik, The Catholic Univ. of America . . . . . [6458A-27]

9:00 am: **Selective metallization of photosensitive glass using near-IR femtosecond laser,** Y. Hanada, K. Sugioka, K. Midorikawa, The Institute of Physical and Chemical Research (Japan) . . . . . [6458A-28]

9:20 am: **Improved writing method of bimetallic grayscale photomasks,** G. H. Chapman, J. M. Dykes, D. K. Poon, C. Choo, J. Wang, J. T. K. Tsui, R. Tu, Simon Fraser Univ. (Canada) . . . . . [6458A-29]

9:40 am: **Room-temperature deposition of a conducting polymer by resonant IR laser vaporization,** H. K. Park, S. L. Johnson, R. F. Haglund, Jr., Vanderbilt Univ. . . . . [6458A-30]

Coffee Break . . . . . 10:00 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

10:30 am: **Welcome and Introductions**

10:40 am: **The Laser: Its Origin, Development, and Possible Future**
Charles H. Townes, Univ. of California/Berkeley

11:20 am: **Lasers: Astrophysics to Particle Physics**
Robert L. Byer, Stanford Univ.

11:50 am: **Optical Technologies: Engine for Innovations in Industrial Applications of Lasers**
Hans-Juergen Kahlert, JENOPTIK Laser, Optik, Systeme GmbH (Germany)

12:20 pm: **Closing Remarks**

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:50 pm

SESSION 10

Room: Conv. Ctr. Room J4 . . . . . Wed. 1:50 to 3:30 pm

Nanostructuring and Beam Shaping

Chair: **Scott K. Matthews**, Oregon Health & Science Univ.

1:50 pm: **Tunable Bessel beams for pulsed laser materials processing,** E. J. R. B. McLeod, C. B. Arnold, Princeton Univ. . . . . [6458A-32]

2:10 pm: **Enhancing silicon cutting performance by shaping the focused beam,** L. R. Migliore, Coherent, Inc. . . . . [6458A-33]

2:30 pm: **Structured beam shaping for precision laser dicing of multilayered substrates,** T. E. Lizotte, O. P. Ohar, T. Tuttle, Hitachi Via Mechanics USA, Inc. . . . . [6458A-34]

2:50 pm: **Compensator optics to improve the stability of laser beam delivery systems that utilize beam shaping technology,** T. E. Lizotte, Hitachi Via Mechanics USA, Inc. . . . . [6458A-35]

3:10 pm: **Compact EUV source and optics for direct structuring of surfaces,** A. Bayer, F. Barkusky, C. Peth, H. Töttger, K. R. Mann, Laser-Lab. Göttingen e.V. (Germany) . . . . . [6458A-36]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 11

Room: Conv. Ctr. Room J4 . . . . . Wed. 4:00 to 5:40 pm

Laser Deposition of Nanoscale Structures

Chair: **Michel Meunier**, École Polytechnique de Montréal (Canada)

4:00 pm: **Laser fabrication of nanomaterials in solution** *(Invited Paper)*, F. Mafune, K. Yamada, H. Muto, The Univ. of Tokyo (Japan) . . . . . [6458A-37]

4:30 pm: **Patterning microconductor on flexible polymer using nanosecond laser ablation of metal nanoparticle film,** S. Han, T. Lim, S. Lee, J. Chung, Korea Univ. (South Korea); S. H. Ko, C. P. Grigoropoulos, Univ. of California/Berkeley; J. Moon, Yonsei Univ. (South Korea) . . . . . [6458A-38]

4:50 pm: **Lithography free high-resolution inkjet-printed OFET(organic field effect transistor) fabrication on polymer by laser processing,** S. H. Ko, H. Pan, C. P. Grigoropoulos, Univ. of California/Berkeley; D. Poulikakos, ETH Zurich (Switzerland) . . . . . [6458A-39]

5:10 pm: **Laser production and processing of metal nanoparticles with controlled features** *(Invited Paper)*, J. A. Gonzalo, J. Margueritat, V. Resta, J. Siegel, C. N. Afonso, Consejo Superior de Investigaciones Científicas (Spain) . . . . . [6458A-40]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Laser direct-write and crystallization of FeSi2 micro-dot array for NIR light-emitting device application,** A. Narazaki, R. Kurosaki, T. Sato, Y. Kawaguchi, H. Niino, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6458A-41]

✔ **Holographic femtosecond laser processing by use of a spatial light modulator,** S. Hasegawa, Y. Hayasaki, The Univ. of Tokushima (Japan) . . . . . [6458A-42]

✔ **Measuring some characteristics of a supersonic air microjet,** J. G. Velasquez-Aguilar, G. Toker, Univ. Autónoma del Estado de Morelos (Mexico) . . . . . [6458A-43]

✔ **Fabrication of ZnO nanorods by pulsed laser deposition method with catalyst-free process and its properties,** R. Nishimura, T. Sakano, T. Okato, M. Obara, Keio Univ. (Japan) . . . . . [6458A-44]

✔ **Pulsed laser processing of shallow micro-optical structures; ablation vs. lithography,** J. E. A. Pedder, A. S. Holmes, Imperial College London (United Kingdom) . . . . . [6458A-45]

✔ **Effects of surface roughness on cell-surface interactions,** J. P. Ulerich, L. C. Ionescu, J. Chen, W. W. Soboyejo, C. B. Arnold, Princeton Univ. . . . . [6458A-46]

✔ **Laser-light materials processing with control of microstructure parameters,** Y. N. Bulkin, RFNC-VNIIEF (Russia); G. A. Turichin, V. K. Syssoev, Lavochkin Scientific and Production Association (Russia); G. Alekseev, Lavochkin Research and Production Association (Russia) . . . . . [6458A-48]

Thursday 25 January 2007 • Part of Proceedings of SPIE Vol. 6458

Synthesis and Photonics of Nanoscale Materials V

Thursday 25 January

SESSION 1

Room: Conv. Ctr. Room F2 . . . . . Thurs. 8:00 to 10:00 am

Chair: **David B. Geohegan**, Oak Ridge National Lab.

8:00 am: **Femtosecond laser-induced self-organized surface and bulk periodic structures for applications in biophotonics** *(Invited Paper)***,** E. S. Simova, C. Hnatovsky, R. S. Taylor, D. M. Rayner, P. B. Corkum, National Research Council Canada (Canada) . . . . . [6458B-51]

8:40 am: **Stability of biofunctionalized surface of GaAs,** X. Ding, Univ. de Sherbrooke (Canada); G. Marshall, F. Bensebaa, National Research Council (Canada); J. J. Dubowski, Univ. de Sherbrooke (Canada) . . . . . [6458B-52]

9:00 am: **Atomic layer deposition of atomic mirror for silicon,** T. Fujimoto, Y. Shiomi, H. Kumagai, A. Kobayashi, Osaka City Univ. (Japan) . . . . [6458B-53]

9:20 am: **Femtosecond laser nanostructured substrates for surface-enhanced Raman scattering,** E. D. Diebold, E. Mazur, Harvard Univ. [6458B-54]

9:40 am: **Growth of supported gold nanoparticles: the influence of substrate material, temperature, and laser irradiation,** N. Borg, D. Blázquez-Sánchez, C. Hendrich, H. Ouacha, F. Hubenthal, F. Träger, Univ. Kassel (Germany) . . . . . [6458B-55]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room F2 . . . . . Thurs. 10:30 am to 12:30 pm

Chair: **Jan J. Dubowski**, Univ. de Sherbrooke (Canada)

10:30 am: **Laser-based techniques for innovative biosensing** *(Invited Paper)***,** I. K. Ilev, U.S. Food and Drug Administration . . . . . [6458B-56]

11:10 am: **Monocrystal photonic opal films and hetero-structures,** A. I. Plekhanov, Institute of Automation & Electrometry (Russia); D. V. Kalinin, V. V. Serdobintseva, Trofimuk United Institute of Geology, Geophysics and Mineralogy (Russia) . . . . . [6458B-57]

11:30 am: **Probing the chemical role of ambient O_2 in the formation of carbon nanotubes via excimer laser ablation,** G. Radhakrishnan, P. M. Adams, The Aerospace Corp.; L. S. Bernstein, Spectral Sciences, Inc. . . . . [6458B-58]

11:50 am: **Laser induced coalescence of gold nanoparticles-molecular dynamics study,** H. Pan, S. H. Ko, C. P. Grigoropoulos, Univ. of California/Berkeley . . . . . [6458B-59]

12:10 pm: **Effects of surface asymmetry on femtosecond second-harmonic generation from metal nanoparticle arrays,** D. Ferrara, M. D. McMahon, R. Lopez, R. F. Haglund, Jr., Vanderbilt Univ. . . . . [6458B-60]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room F2 . . . . . Thurs. 1:30 to 3:30 pm

Chair: **Frank Träger**, Univ. Kassel (Germany)

1:30 pm: **Fabrication and characterization of optical negative-index metamaterials** *(Invited Paper)***,** H. Yuan, A. V. Kildishev, U. Chettiar, W. Cai, A. E. Boltasseva, V. P. Drachev, V. M. Shalaev, Purdue Univ. . . . . [6458B-69]

2:10 pm: **Self-organized embedded silver nanocolumns produced by pulsed laser deposition for plasmonics,** J. Margueritat, J. A. Gonzalo, C. N. Afonso, Consejo Superior de Investigaciones Científicas (Spain); D. Babonneau, Univ. de Poitiers (France) . . . . . [6458B-61]

2:30 pm: **Control of shape and distribution of silver nanoparticles in glass by ultrafast laser irradiation,** A. V. Podlipensky, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); A. Abdolvand, G. Seifert, H. Graener, Martin-Luther Univ. Halle-Wittenberg (Germany) . . . . . [6458B-62]

2:50 pm: **Modification of noble metal nanoparticles in a silica matrix by pulsed tunable infrared laser irradiation,** A. Halabica, Vanderbilt Univ.; R. H. Magruder III, Belmont Univ.; R. F. Haglund, Jr., Vanderbilt Univ. [6458B-63]

3:10 pm: **Pulsed laser deposition of nanoparticles with nano- and femtosecond pulses,** M. S. Rogers, S. S. Mao, C. P. Grigoropoulos, Univ. of California/Berkeley . . . . . [6458B-64]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 4

Room: Conv. Ctr. Room F2 . . . . . Thurs. 4:00 to 5:55 pm

Chair: **Richard F. Haglund, Jr.,** Vanderbilt Univ.

4:00 pm: **Recent advances in the optical spectroscopy of single-walled carbon nanotubes** *(Invited Paper)***,** T. F. Heinz, Columbia Univ. . . . . [6458B-71]

4:40 pm: **High-power laser vaporization synthesis of single wall carbon nanotubes and nanohorns,** D. B. Geohegan, A. A. Puretzky, D. J. Styers-Barnett, C. M. Rouleau, B. Zhao, H. Hu, Z. Liu, I. N. Ivanov, P. F. Britt, Oak Ridge National Lab. . . . . [6458B-70]

4:55 pm: **Pulsed laser heating for controlled growth and processing of SWNTs,** D. J. Styers-Barnett, Z. Liu, A. A. Puretzky, C. M. Rouleau, K. Xiao, I. N. Ivanov, D. H. Lowndes, D. B. Geohegan, Oak Ridge National Lab. . . . . [6458B-68]

5:10 pm: **Efficient coupling between guided optical modes in ZnO nanowire-waveguides and tapered silica fibers,** T. Voss, G. T. Svacha, E. Mazur, Harvard Univ. . . . . [6458B-67]

5:25 pm: **Mechanisms of nanoparticle formation by short laser pulses,** T. E. Itina, K. Gouriet, M. Povarnitsyn, S. Noel, J. Hermann, Univ. de la Méditerranée-Aix Marseille II (France) . . . . . [6458B-65]

5:40 pm: **TEM investigation of laser-induced periodic surface structures on polymer surfaces,** U. M. Prendergast, C. O'Connell, R. J. Sherlock, T. J. Glynn, National Univ. of Ireland/Galway (Ireland) . . . . . [6458B-66]

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6459

Laser-Based Micro- and Nano-Packaging and Assembly (LBMP-IV)

Conference Chairs: **Wilhelm Pfleging**, Forschungszentrum Karlsruhe (Germany); **Yongfeng Lu**, Univ. of Nebraska/Lincoln; **Kunihiko Washio**, Paradigm Laser Research Ltd (Japan)

Cochairs: **Friedrich G. Bachmann**, Rofin-Sinar Laser GmbH (Germany); **Willem Hoving**, Philips Applied Technologies (Netherlands)

Program Committee: **Dieter Bäuerle**, Johannes Kepler Univ. Linz (Austria); **Shaochen Chen**, The Univ. of Texas at Austin; **Richard F. Haglund, Jr.**, Vanderbilt Univ.; **Amako Jun**, Seiko Epson Corp. (Japan); **Thomas Klotzbücher**, Institut für Mikrotechnik Mainz GmbH (Germany); **Sergey I. Kudryashov**, Arkansas State Univ.; **Xinbing Liu**, Panasonic Technologies Co.; **Tuan-Anh Mai**, Synova SA (Switzerland); **Vladimir Mezentsev**, Aston Univ. (United Kingdom); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Marius Przybylski**, ATL Lasertechnik GmbH (Germany); **Vladimir V. Semak**, The Pennsylvania State Univ.; **Gurinder P. Singh**, Hitachi Global Storage Technology; **Koji Sugioka**, The Institute of Physical and Chemical Research (Japan); **Vadim P. Veiko**, Saint-Petersburg State Univ. (Russia)

Monday 22 January

SESSION 1

Room: Hilton Hotel: Almaden I . . . . . Mon. 8:30 to 10:00 am

Welding and Bonding

Chair: **Friedrich G. Bachmann II**, Rofin-Sinar Laser GmbH (Germany)

8:30 am: **Requirements and potentialities of packaging for bioreactors with LTCC and polymers** *(Invited Paper)*, U. Klotzbach, V. Franke, F. Sonntag, L. Morgenthal, E. Beyer, Fraunhofer-Institut für Werkstoff- und Strahltechnik (Germany) . . . . . [6459-01]

9:00 am: **Laser welding of micro plastic parts,** E. Haberstroh, W. Hoffmann, Institut für Kunststoffverarbeitung an der RWTH Aachen (Germany) . . [6459-02]

9:20 am: **Hybrid micro-optical system integration by laser beam soldering,** E. Beckert, H. Banse, R. Eberhardt, A. Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); F. Buchmann, Askion GmbH (Germany) . . . . . [6459-03]

9:40 am: **Laser-based rework in electronics production,** F. Albert, M. H. M. Schmidt, I. Mys, Bayerisches Laserzentrum GmbH (Germany) . . . . . [6459-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Hilton Hotel: Almaden I . . . . . Mon. 10:30 am to 12:10 pm

Microfluidics

Chair: **Udo Klotzbach**, Fraunhofer-Institut für Werkstoff- und Strahltechnik (Germany)

10:30 am: **Combined laser texturing and molecular vapor deposition for wetting angle control** *(Invited Paper)*, M. F. Jensen, K. Vestentoft, K. Haugshøj, L. H. Christensen, Danish Technological Institute (Denmark) . . . . . [6459-05]

11:00 am: **Laser-assisted modification of polymers for microfluidic, micro-optics, and cell culture applications,** W. Pfleging, M. Bruns, Forschungszentrum Karlsruhe GmbH (Germany); H. J. Brückner, Univ. of Applied Sciences (Germany); A. Welle, Forschungszentrum Karlsruhe GmbH (Germany) . . . . . [6459-06]

11:20 am: **Rapid prototyping of microfluidic components by laser beam processing** *(Invited Paper)*, M. M. Wehner, P. Jacobs, R. Poprawe, Fraunhofer-Institut für Lasertechnik (Germany) . . . . . [6459-07]

11:50 am: **Laser micromachining of optical biochips,** A. Goater, J. P. H. Burt, D. J. Morris, N. H. Rizvi, Prifysgol Cymru Bangor (United Kingdom); D. R. Matthews, H. D. Summers, Cardiff Univ. (United Kingdom) . . . . [6459-08]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Hilton Hotel: Almaden I . . . . . Mon. 1:30 to 3:00 pm

Optics and Photonics

Chair: **Willem Hoving**, Philips Applied Technologies (Netherlands)

1:30 pm: **Development of micromirrors in optical-electric printed wiring boards using excimer laser** *(Invited Paper)*, T. Matsushima, K. Tanaka, T. Nakashiba, H. Yagyu, M. Kubo, Matsushita Electric Works, Ltd. (Japan) . . . . . [6459-09]

2:00 pm: **Femtosecond laser microfabrication of subwavelength structures in photonics,** V. Mezentsev, M. Dubov, J. S. Petrovic, I. Bennion, Aston Univ. (United Kingdom); H. Schmitz, J. Dreher, R. Grauer, Ruhr-Univ. Bochum (Germany) . . . . . [6459-10]

2:20 pm: **Optical properties of aligned nanowire arrays,** S. H. Ko, N. Misra, L. Xu, C. P. Grigoropoulos, Univ. of California/Berkeley . . . . . [6459-11]

2:40 pm: **Laser annealing of silicon nanowires,** N. Misra, L. Xu, C. P. Grigoropoulos, Univ. of California/Berkeley; Y. Pan, Nanosys, Inc. [6459-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Hilton Hotel: Almaden I . . . . . Mon. 3:30 to 5:40 pm

Micro- and Nanomachining I

Chair: **Wilhelm Pfleging**, Forschungszentrum Karlsruhe (Germany)

3:30 pm: **Femtosecond laser plasmonic ablation by gold nanoparticles** *(Invited Paper)*, D. S. Eversole, X. Guo, The Univ. of Texas/Austin; B. S. Luk'yanchuk, Data Storage Institute; A. Ben-Yakar, The Univ. of Texas/Austin . . . . . [6459-13]

4:00 pm: **Deep-UV laser-based nanopatterning with holographic techniques,** D. Sawaki, A. Jun, Seiko Epson Corp. (Japan) . . . . . [6459-14]

4:20 pm: **Machining hole arrays in polyimide using a UV solid state laser and predetermined temporal pulse patterns,** C. Mullan, D. Ilie, G. M. O'Connor, S. Favre, T. J. Glynn, National Univ. of Ireland/Galway (Ireland) . . . . . [6459-15]

4:40 pm: **Processing benefits of high-repetition-rate and high-average-power 355-nm laser for micromachining of microelectronics packaging materials,** R. S. Patel, J. M. Bovatsek, Spectra-Physics . . . . . [6459-16]

5:00 pm: **New high-repetition-rate, high-energy 308 nm excimer laser for material processing,** I. Klaft, I. Bragin, H. Albrecht, L. Herbst, Coherent Lambda Physik GmbH (Germany) . . . . . [6459-17]

5:20 pm: **Potentials of fiber laser technology in microfabrication,** V. Franke, U. Klotzbach, J. Hauptmann, M. J. Panzner, R. Püschel, Fraunhofer-Institut für Werkstoff- und Strahltechnik (Germany) . . . . . [6459-18]

MOEMS-MEMS papers of related interest: 6462A-01, 6462A-02, 6462A-03, 6462A-04,6462A-05, 6462B-27, 6462B-31, 6462B-35, 6462B-37, and6462B-41.

Tuesday 23 January

NOTE ROOM CHANGE

SESSION 5

Room: Conv. Ctr. Room J4 . . . . . Tues. 8:10 to 10:20 am

Micro- and Nanomachining II

Chair: **Kunihiko Washio**, Paradigm Laser Research Ltd (Japan)

8:10 am: **High-precision small geometry laser trimming for emerging microelectronics devices** *(Invited Paper)*, B. Gu, GSI Lumonics Inc. [6459-19]

8:40 am: **Laser patterning of thin films for high-tech devices on flexible and large-area substrates,** R. M. Allott, P. Grunewald, P. Sykes, A. Henwood, Exitech Ltd. (United Kingdom) . . . . . [6459-20]

9:00 am: **The promise of solar energy: applications and opportunities for laser processing in the manufacturing of solar cells,** C. M. Dunsky, Coherent, Inc. . . . . [6459-21]

9:20 am: **Mechanisms of femtosecond laser nanomachining of dielectric surfaces,** A. J. Hunt, Univ. of Michigan; S. I. Kudryashov, Arkansas State Univ. . . . . [6459-22]

9:40 am: **Laser micromachining of the ceramics: can lasers match the performance of diamond saws?,** D. Patterson, G. P. Singh, Hitachi Global Storage Technologies . . . . . [6459-23]

10:00 am: **Laser MicroJet: an agile micromachining tool,** R. Housh, Synova SA (Switzerland) . . . . . [6459-24]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 6

Room: Conv. Ctr. Room J4 . . . . . Tues. 10:50 am to 12:40 pm

Micro- and Nanomaterials

Chair: **Yongfeng Lu**, Univ. of Nebraska/Lincoln

10:50 am: **Laser-induced formation of photocatalytic TiO_2 micronetworks on a UV-absorbing glass surface** *(Invited Paper)*, A. Narazaki, Y. Kawaguchi, H. Niino, National Institute of Advanced Industrial Science and Technology (Japan); M. Shojiya, H. Koyo, K. Tsunetomo, Nippon Sheet Glass Co., Ltd. (Japan) . . . . . [6459-25]

11:20 am: **Laser modification of ceramic surfaces with micro- and nanoparticles,** M. Rohde, Forschungszentrum Karlsruhe (Germany) . [6459-26]

11:40 am: **Fabrication of back-gated SWNT field-effect transistors using laser chemical vapor deposition,** J. Shi, Y. S. Zhou, Y. Lu, Y. S. Lin, S. Liou, Univ. of Nebraska/Lincoln . . . . . [6459-27]

12:00 pm: **Nanoscale characterization with tip-enhanced near-field Raman spectroscopy,** K. Yi, Y. Lu, J. Shi, Y. S. Zhou, Univ. of Nebraska/Lincoln . . . . . [6459-28]

12:20 pm: **Precision laser bending of thin precious metal alloys,** R. C. Campbell, B. R. Campbell, T. M. Lehecka, The Electro-Optics Ctr.; J. A. Palmer, G. A. Knorovsky, Sandia National Labs. . . . . [6459-29]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 7

Room: Conv. Ctr. Room J4 . . . . . Tues. 1:40 to 3:30 pm

Thin Films

1:40 pm: **Laser-assisted maskless fabrication of flexible electronics** *(Invited Paper)*, C. P. Grigoropoulos, S. H. Ko, H. Pan, Univ. of California/Berkeley; D. Poulikakos, ETH Zürich (Switzerland) . . . . . [6459-30]

2:10 pm: **Laser deposition and laser structuring of laser active planar waveguides of Er:ZBLAN, Nd:YAG and Nd:GGG for integrated waveguide lasers,** J. Gottmann, RWTH Aachen (Germany) . . . . . [6459-31]

2:30 pm: **Deposition of functionalized nanoparticles in multilayer thin-film structures by resonant infrared laser ablation,** M. R. Papantonakis, Naval Research Lab.; E. Herz, Cornell Univ.; D. Simonson, Naval Research Lab.; U. Wiesner, Cornell Univ.; R. F. Haglund, Jr., Vanderbilt Univ. . . . . [6459-32]

2:50 pm: **CO_2 laser-assisted combustion-flame deposition of diamond films,** H. Ling, Y. Han, Y. Lu, Univ. of Nebraska/Lincoln . . . . . [6459-33]

3:10 pm: **Synthesis of diamond on WC-Co substrates using a KrF excimer laser in combination with a combustion flame,** Y. Han, H. Ling, Y. Lu, Univ. of Nebraska/Lincoln . . . . . [6459-34]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **CNT-BLU fabrication by laser-induced local material transfer,** C. Cheng, Industrial Technology Research Institute (Taiwan) . . . . . [6459-35]

✔ **Microstructure devices generation by selective laser melting,** J. J. Brandner, E. Anurjew, E. Hansjosten, W. Pfleging, K. Schubert, Forschungszentrum Karlsruhe (Germany) . . . . . [6459-36]

✔ **Femtosecond laser writing of Bragg gratings using a single-pulse processing,** C. K. Min, Information and Communications Univ. (South Korea) . . . . . [6459-37]

Sunday-Thursday 21-25 January 2007 • Proceedings of SPIE Vol. 6460

Commercial and Biomedical Applications of Ultrafast Lasers VII

Conference Chairs: **Joseph Neev**, FemtoSurge, Inc.; **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany); **Alexander Heisterkamp**, Laser Zentrum Hannover e.V. (Germany); **Christopher B. Schaffer**, Cornell Univ.

Program Committee: **James E. Carey III**, Harvard Univ.; **Donald J. Harter**, IMRA America, Inc.; **Daniel J. Kane**, Southwest Sciences, Inc.; **Milutin Kovacev**, Institute of Electronic Structure and Laser FORTH (Greece); **Eric Mazur**, Harvard Univ.; **Nozomi Nishimura**, Cornell Univ.; **Minoru Obara**, Keio Univ. (Japan); **Andreas Ostendorf**, Laser Zentrum Hannover e.V. (Germany); **Brent C. Stuart**, Lawrence Livermore National Lab.; **Alexander Szameit**, Friedrich-Schiller-Univ. Jena (Germany); **Philbert S. Tsai**, Univ. of California/San Diego; **Alfred Vogel**, Medizinisches Laserzentrum Lübeck GmbH (Germany)

Sunday 21 January

Opening Welcome Remarks

Conv. Ctr. Room A6 . . . . . Sun. 10:25 to 10:30 am

Christopher B. Schaffer, Cornell Univ.

SESSION 1

Room: Conv. Ctr. Room A6 . . . . . Sun. 10:30 am to 12:40 pm

Ultrafast Lasers in Cell Biology and Microscopy

Chair: **Christopher B. Schaffer**, Cornell Univ.

10:30 am: **Laser scissors in cell biology: then and now** *(Invited Paper)***,** M. W. Berns, Univ. of California/Irvine . . . . . [6460-01]

11:00 am: **Probing cell mechanics with femtosecond laser pulses** *(Invited Paper)***,** I. Z. Maxwell, Harvard Univ.; A. Heisterkamp, Laser Zentrum Hannover e.V. (Germany); E. Mazur, Harvard Univ. . . . . [6460-02]

11:30 am: **Attenuation of molecular function by multiphoton excitation-evoked chromophore-assisted laser inactivation (MP-CALI) using green fluorescent protein** *(Invited Paper)***,** T. Takamatsu, Kyoto Prefectural Univ. of Medicine (Japan) . . . . . [6460-03]

12:00 pm: **Femtosecond laser synthesis and size control of colloidal nanoparticles for biomedical applications,** S. Besner, P. M. Boyer, D. Rioux, A. V. Kabashin, M. Meunier, École Polytechnique de Montréal (Canada) [6460-04]

12:20 pm: **A compact ultrafast laser microscope for imaging and processing of biological samples,** A. Heisterkamp, J. Baumgart, Laser Zentrum Hannover e.V. (Germany); A. Ngezahayo, Univ. Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6460-05]

Lunch/Exhibition Break . . . . . 12:40 to 1:40 pm

SESSION 2

Room: Conv. Ctr. Room A6 . . . . . Sun. 1:40 to 3:20 pm

Ultrafast Lasers in Life Sciences

Chair: **Alexander Heisterkamp**, Laser Zentrum Hannover e.V. (Germany)

1:40 pm: **Laser microtome: all optical preparation of thin tissue samples** *(Invited Paper)***,** F. G. Will, Rowiak GmbH (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany); T. Block, P. Menne, Rowiak GmbH (Germany) . . . . . [6460-06]

2:10 pm: **Protein crystallization and processing using femtosecond laser and all solid state 193 nm laser** *(Invited Paper)***,** Y. Mori, K. Takano, H. Adachi, T. Inoue, Graduate School of Engineering (Japan) and CREST JST (Japan) and SOSHO Inc. (Japan); S. Murakami, The Institute of Scientific and Industrial Research (Japan) and CREST JST (Japan) and SOSHO Inc. (Japan); H. Matsumura, Graduate School of Engineering (Japan) and CREST JST (Japan) and SOSHO Inc. (Japan); M. Kashii, Graduate School of Medicine (Japan); H. Y. Yoshikawa, S. Maki, T. Kitatani, CREST JST (Japan); S. Okada, SOSHO Inc. (Japan); T. Sasaki, Graduate School of Engineering (Japan) and SOSHO Inc. (Japan) . . . . . [6460-07]

2:40 pm: **Structuring of fused silica glass by means of femtosecond laser pulses for biochips applications,** R. Osellame, V. A. Maselli, R. Martinez, R. Ramponi, P. Laporta, G. Cerullo, Politecnico di Milano (Italy) . . . . . [6460-08]

3:00 pm: **Femtosecond laser-induced nanocavitation,** N. Linz, S. Freidank, Univ. zu Lübeck (Germany); G. Paltauf, Karl-Franzens-Univ. Graz (Austria); A. Vogel, Univ. zu Lübeck (Germany) . . . . . [6460-09]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 3

Room: Conv. Ctr. Room A6 . . . . . Sun. 3:50 to 5:40 pm

Application of Ultrafast Lasers in Medicine

Chair: **Joseph Neev**, FemtoSurge, Inc.

3:50 pm: **Novel oral applications of ultra-short laser pulses** *(Invited Paper)***,** E. Wintner, Technische Univ. Wien (Austria) . . . . . [6460-10]

4:20 pm: **Generation of smooth continuum centered at 1.15 um for ultrahigh resolution OCT,** H. Wang, A. M. Rollins, Case Western Reserve Univ. [6460-11]

4:40 pm: **Femtosecond laser pulse processing of transparent corneal-like material,** D. Yu, V. Kohli, A. Y. Elezzabi, Univ. of Alberta (Canada) . . . [6460-12]

5:00 pm: **New developments in femtosecond laser corneal refractive surgery,** R. Le Harzic, Fraunhofer-Institut für Biomedizinische Technik (Germany); C. Wullner, D. Christoph, Wavelight Laser Technologie AG (Germany); K. König, Fraunhofer-Institut für Biomedizinische Technik (Germany) . . . . . [6460-13]

5:20 pm: **Characterization of the extent of damage in tissue ablation,** F. Bourgeois, A. Crawley, A. Ben-Yakar, The Univ. of Texas/Austin . . . [6460-14]

Monday 22 January

SESSION 4

Room: Conv. Ctr. Room A6 . . . . . Mon. 8:30 to 10:10 am

Novel Ultrafast Laser Sources

Chair: **Donald J. Harter**, IMRA America, Inc.

8:30 am: **Development of industrial Ti:sapphire femtosecond lasers and its industrial micro/nano machining** *(Invited Paper)*, K. Takasago, T. Sumiyoshi, T. Imahoko, N. Inoue, K. Yoshida, M. Kamata, H. Sekita, Cyber Laser Inc. (Japan) . . . . . [6460-15]

9:00 am: **High-energy, high-repetition rate diode-pumped femtosecond amplifier,** E. P. Mottay, C. Hönninger, A. Courjaud, Amplitude Systemes (France); I. B. Manek-Hönninger, M. Delaigue, Univ. Bordeaux I (France) . . . . . [6460-16]

9:20 am: **MicroJoule level diode-pumped femtosecond oscillator,** E. P. Mottay, C. Hönninger, Amplitude Systemes (France) . . . . . [6460-17]

9:40 am: **High average power cryo-cooled ultrafast lasers** *(Invited Paper)*, S. Backus, Kapteyn-Murnane Labs., Inc. . . . . [6460-18]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 5

Room: Conv. Ctr. Room A6 . . . . . Mon. 10:40 am to 12:40 pm

Characterization and Generation of Femtosecond Laser Pulses

Chair: **Brent C. Stuart**, Lawrence Livermore National Lab.

10:40 am: **New methods of characterization and control of femtosecond pulses focused with high numerical aperture objectives** *(Invited Paper)*, J. A. Squier, W. Amir, C. G. Durfee III, J. Field, R. Huff, Colorado School of Mines; S. Kane, HORIBA Jobin Yvon Inc.; T. Planchon, D. Schaffer, Colorado School of Mines . . . . . [6460-19]

11:10 am: **High-speed characterization for optical telecommunication signals** *(Invited Paper)*, C. Dorrer, Lucent Technologies . . . . . [6460-20]

11:40 am: **Autonomous, flexible and reliable ultra-short pulse laser at 1552 nm,** L. Vaissie, Raydiance, Inc.; K. Kim, College of Optics & Photonics/ Univ. of Central Florida; J. F. Brennan III, M. M. Mielke, Raydiance, Inc. . . . . [6460-21]

12:00 pm: **High-power, ultra-short pulses from fiber laser pumped optical parametric amplifier,** T. V. Andersen, NKT Research & Innovation A/S (Denmark); C. Aguergaray, Univ. Bordeaux I (France); F. Röser, K. Rademaker, J. Limpert, Friedrich-Schiller-Univ. Jena (Germany); E. Cormier, Univ. Bordeaux I (France); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) and Fraunhofer Institute for Applied Optics and Precision Engineering, Jena (Germany) . . . . . [6460-22]

12:20 pm: **High-average-power ps-UV-lasers for advanced micromachining,** A. Nebel, A. J. Weis, T. Herrmann, B. Henrich, R. Knappe, Lumera Laser GmbH (Germany) . . . . . [6460-23]

Lunch Break . . . . . 12:40 to 1:40 pm

SESSION 6

Room: Conv. Ctr. Room A6 . . . . . Mon. 1:40 to 3:10 pm

Special Session: Trends in Attosecond Physics I

Chair: **Milutin Kovacev**, Univ. Hannover (Germany)

1:40 pm: **Strong field physics using mid-infrared lasers** *(Invited Paper)*, G. Doumy, C. Blaga, F. Catoire, R. Chirla, P. Colosimo, I. M. Lachko, A. March, E. F. Sistrunk, J. Tate, J. Wheeler, L. F. DiMauro, P. Agostini, The Ohio State Univ. . . . . [6460-24]

2:10 pm: **Characterization of attosecond pulse trains** *(Invited Paper)*, K. Midorikawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6460-25]

2:40 pm: **Attosecond pulses generated by two color laser fields** *(Invited Paper)*, T. Ruchon, E. Gustafsson, J. Mauritsson, P. Johnsson, Lunds Univ. (Sweden); M. Swoboda, Lunds Univ. (Germany); T. Remetter, Lunds Univ. (Sweden); R. López-Martens, P. Balcou, École Nationale Supérieure de Techniques Avancées (France); A. L'Huillier, Lunds Univ. (France) . . . . [6460-26]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 7

Room: Conv. Ctr. Room A6 . . . . . Mon. 3:40 to 5:10 pm

Special Session: Trends in Attosecond Physics II

Chair: **Eric Mazur**, Harvard Univ.

3:40 pm: **Attosecond pulses in atoms and molecules** *(Invited Paper)*, H. Merdji, CEA (France) . . . . . [6460-27]

4:10 pm: **Metrology and applications of isolated XUV attosecond pulses** *(Invited Paper)*, E. Goulielmakis, R. Kienberger, M. Uiberacker, Max-Planck-Institut für Quantenoptik (Germany); A. Baltuska, Max-Planck-Institut für Quantenoptik (Germany) and Technische Univ. Wien (Austria); M. Drescher, Univ. Hamburg (Germany) . . . . . [6460-28]

4:40 pm: **Applications with attosecond pulses** *(Invited Paper)*, G. G. Paulus, Max-Planck-Institut für Quantenoptik (Germany) . . . . . [6460-29]

Tuesday 23 January

SESSION 8

Room: Conv. Ctr. Room A6 . . . . . Tues. 8:00 to 10:10 am

Optical Waveguides I

Joint Session with Conference 6458A

Chairs: **Stefan Nolte**, Friedrich-Schiller-Univ. Jena (Germany); **Alfred Vogel**, Univ. zu Lübeck (Germany)

8:00 am: **Ultrastrong photosensitivity in chalcogenide waveguides for on-chip filter applications** *(Invited Paper)*, B. J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6458A-18]

8:30 am: **Coupling management of fs laser written waveguides**, A. Szameit, F. Dreisow, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany)[6460-30]

8:50 am: **Optical and structural properties of waveguides in $LiNbO_3$ fabricated by ultrashort laser pulses**, J. Burghoff, H. Hartung, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tünnermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6460-31]

9:10 am: **Inscription of optical waveguides in Z-cut lithium niobate by circularly polarized 1.0-ps laser pulses**, A. H. Nejadmalayeri, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6458A-19]

9:30 am: **Deep-subsurface waveguides with circular-mode symmetry by direct laser writing with astigmatically shaped beams at low-numerical aperture**, J. Siegel, V. Diez-Blanco, J. Solis, Consejo Superior de Investigaciones Cientificas (Spain) . . . . . [6460-32]

9:50 am: **Thermal annealing of fused silica after and during fs-laser waveguide writing**, J. J. Witcher, Univ. of California/Davis; W. J. Reichman, Lawrence Livermore National Lab. and Univ.of California/Davis; D. M. Krol, Univ. of California/Davis . . . . . [6458A-20]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 9

Room: Conv. Ctr. Room A6 . . . . . Tues. 10:40 am to 12:10 pm

Optical Waveguides II

Joint Session with Conference 6458A

Chair: **Benjamin J. Eggleton**, The Univ. of Sydney (Australia)

10:40 am: **Formation of silicon structures in silicate glass by femtosecond laser** *(Invited Paper)*, K. Miura, Y. Shimotsuma, M. Sakakura, S. Kanehira, K. Hirao, Kyoto Univ. (Japan) . . . . . [6458A-21]

11:10 am: **Type II ultrafast-laser writing of Bragg grating waveguides in bulk glass**, H. Zhang, S. M. Eaton, S. Ho, M. L. Ng, J. Li, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6460-33]

11:30 am: **Inscribing fiber Bragg gratings using IR-fs pulses and a phase-mask scanning technique: potential and applications**, E. Wikszak, J. Thomas, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6460-34]

11:50 am: **Direct written Bragg grating structures in optical waveguides**, G. D. Marshall, M. Ams, N. Jovanovic, A. Fuerbach, J. A. Piper, M. J. Withford, Macquarie Univ. (Australia) . . . . . [6458A-22]

Lunch/Exhibition Break . . . . . 12:10 to 1:10 pm

LASE

SESSION 10

Room: Conv. Ctr. Room A6 . . . . . Tues. 1:10 to 3:10 pm

Fundamentals of Laser Material Interactions

Joint Session with Conference 6458A

Chair: **Alexander Szameit**, Friedrich-Schiller-Univ. Jena (Germany)

1:10 pm: **X-ray diffraction studies of ultrafast bond softening** *(Invited Paper)*, D. A. Reis, Univ. of Michigan . . . . . [6458A-23]

1:40 pm: **Effect of amplified spontaneous emission pedestal on femtosecond laser pulse interaction** *(Invited Paper)*, V. V. Semak, The Pennsylvania State Univ. . . . . [6458A-24]

2:10 pm: **Modeling of ultrashort pulse propagation and nonlinear plasma formation in transparent Kerr media using realistic initial conditions**, C. L. Arnold, Laser Zentrum Hannover e.V. (Germany); W. Ertmer, Univ. Hannover (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) . . . . . [6460-35]

2:30 pm: **Nonlinear response in optical materials using ultrashort laser technology**, D. Ashkenasi, Laser-und Medizin-Technologie GmbH (Germany) . . . . . [6458A-25]

2:50 pm: **Luminescent high-energy density femtosecond plasmas in bulk materials**, A. Vogel, N. Linz, S. Freidank, Univ. zu Lübeck (Germany); G. Paltauf, Karl-Franzens-Univ. Graz (Austria) . . . . . [6460-36]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 11

Room: Conv. Ctr. Room A6 . . . . . Tues. 3:40 to 6:00 pm

Nanoscale Machining and Joining

Joint Session with Conference 6458A

Chairs: **Vladimir V. Semak**, The Pennsylvania State Univ.; **David Ashkenasi**, Laser-und Medizin-Technologie GmbH (Germany)

3:40 pm: **Femtosecond laser nanomachining of silicon wafers and two-photon nanolithography**, K. König, F. Bauerfeld, D. Sauer, H. Schuck, T. Velten, S. Schenkl, Fraunhofer-Institut für Biomedizinische Technik (Germany); R. LeHarzic, JenLab GmbH (Germany) . . . . . [6460-37]

4:00 pm: **Femtosecond lasers: combining 5-D microscopy and 3-D nanoprocessing**, J. Li, P. R. Herman, H. Zhang, S. M. Eaton, A. H. Nejadmalayeri, A. Hosseini, Univ. of Toronto (Canada) . . . . . [6460-38]

4:20 pm: **Ultrafast pulsed laser ablation for synthesis of nanocrystals**, B. Liu, Y. Che, Z. Hu, IMRA America, Inc.; Y. Chen, X. Pan, Univ. of Michigan . . . . . [6460 39]

4:40 pm: **An ultrashort pulse laser lathe for axisymmetric micromachining of explosives**, J. A. Palmer, E. J. Welle, Sandia National Labs. . . . . [6460-40]

5:00 pm: **High-repetition rate micromachining results**, G. Matras, Univ. Jean Monnet Saint-Etienne (France) and Univ. Jean Monnet/ Lab. TSI (France); N. Huot, E. Audouard, Univ. Jean Monnet Saint-Etienne (France) . . . [6458A-26]

5:20 pm: **Welding of transparent materials with high repetition rate femtosecond lasers**, J. M. Bovatsek, Spectra-Physics; J. Nguyen, B. Chen, Cornell Univ.; F. Yoshino, IMRA America, Inc.; L. Bonassar, Cornell Univ.; A. Y. Arai, IMRA America, Inc.; C. B. Schaffer, Cornell Univ. . . . . [6460-41]

5:40 pm: **Joining of transparent materials by femtosecond laser pulses**, W. Watanabe, National Institute of Advanced Industrial Science and Technology (Japan); S. Onda, T. Tamaki, K. Itoh, Osaka Univ. (Japan) . . . . . [6460-42]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Laser microwelding of silicon and borosilicate glass using nonlinear absorption effect induced by 1558-nm femtosecond fiber laser pulses,** T. Tamaki, Osaka Univ. (Japan); W. Watanabe, National Institute of Advanced Industrial Science and Technology (Japan); K. Itoh, Osaka Univ. (Japan) . . . . . [6460-43]

✔ **Femtosecond laser nanostructured substrates for surface-enhanced Raman scattering,** E. D. Diebold, E. Mazur, Harvard Univ. . . . . [6460-44]

✔ **Plasmonics mediated nanohole fabrication on various substrates with femtosecond laser excitation,** T. Miyanishi, N. N. Nedyalkov, M. Obara, Keio Univ. (Japan) . . . . . [6460-45]

✔ **Femtosecond-laser microstructuring of silicon for novel photovoltaic devices,** B. R. Tull, M. T. Winkler, E. Mazur, Harvard Univ. . . . . [6460-46]

✔ **Visualization of light propagation in fs written waveguide arrays,** F. Dreisow, A. Szameit, S. Nolte, Friedrich-Schiller-Univ. Jena (Germany); A. Tuennermann, Fraunhofer Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6460-47]

✔ **Hollow waveguide for femtosecond pump-probe experiments in the gas phase,** V. N. Krylov, A. Kushnarenko, E. Miloglyadov, M. Quack, G. Seyfang, ETH Zürich (Switzerland) . . . . . [6460-48]

Wednesday-Thursday 24-25 January 2007 • Proceedings of SPIE Vol. 6461

Laser Cooling of Solids

Conference Chairs: **Richard I. Epstein**, Los Alamos National Lab.; **Mansoor Sheik-Bahae**, The Univ. of New Mexico

Program Committee: **Rolf H. Binder**, The Univ. of Arizona; **Steve Bowman**, Naval Research Lab.; **Zameer U. Hasan**, Temple Univ.; **Jacob B. Khurgin**, Johns Hopkins Univ.; **Gary L. Mills**, Ball Aerospace & Technologies Corp.; **Yong-Hang Zhang**, Arizona State Univ.

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. Room F1 . . . . . Wed. 8:30 to 10:10 am

Cooling with Rare Earths I

Chair: **Kent L. Miller**, Air Force Office of Scientific Research

8:30 am: **Anti-Stokes laser cooling in erbium-doped low-phonon materials** *(Invited Paper)*, J. M. Fernández, A. J. Garcia-Adeva, R. Balda, Univ. del Pais Vasco (Spain) . . . . . [6461-01]

9:00 am: **Ultrapure ZBLAN glass for optical refrigerators,** M. P. Hehlen, R. I. Epstein, Los Alamos National Lab. . . . . [6461-02]

9:20 am: **Laser cooling using cavity enhanced pump absorption,** D. V. Seletskiy, M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab. . . . . [6461-03]

9:40 am: **Differential luminescence thermometry applied to laser cooling of Yb-ZBLAN** *(Invited Paper)*, S. R. Greenfield, J. Thiede, R. I. Epstein, Los Alamos National Lab. . . . . [6461-04]

Coffee Break . . . . . 10:10 to 10:30 am

LASE Plenary Session

Room: Montgomery Theater · Wed. 10:30 am to 12:30 pm

The Laser: from Invention, to solving Mysteries, to instilling Precision in manufacturing

10:30 am: **Welcome and Introductions**

10:40 am: **The Laser: Its Origin, Development, and Possible Future**
Charles H. Townes, Univ. of California/Berkeley

11:20 am: **Lasers: Astrophysics to Particle Physics**
Robert L. Byer, Stanford Univ.

11:50 am: **Optical Technologies: Engine for Innovations in Industrial Applications of Lasers**
Hans-Juergen Kahlert, JENOPTIK Laser, Optik, Systeme GmbH (Germany)

12:20 pm: **Closing Remarks**

See p. 16 for more information

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 2

Room: Conv. Ctr. Room F1 . . . . . Wed. 1:30 to 3:00 pm

Cooling with Semiconductors I

Chair: **Yong-Hang Zhang**, Arizona State Univ.

1:30 pm: **Observation of photoluminescence upconversion** *(Invited Paper)*, Y. J. Ding, Lehigh Univ. . . . . [6461-05]

2:00 pm: **Effect of high carrier density in laser cooling of semiconductors,** M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab. . . . . [6461-06]

2:20 pm: **Phase fluorometry for semiconductor lifetime measurement,** A. R. Albrecht, R. B. Laghumavarapu, Ctr. for High Technology Materials; B. Imangholi, M. Sheik-Bahae, The Univ. of New Mexico; K. J. Malloy, Ctr. for High Technology Materials . . . . . [6461-07]

2:40 pm: **Investigations of surface defects on semiconductor fluorescence lifetime,** D. A. Bender, M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico . . . . . [6461-08]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 3

Room: Conv. Ctr. Room F1 . . . . . Wed. 3:30 to 5:40 pm

Cooling with Rare Earths II

Chair: **Jacob B. Khurgin**, Johns Hopkins Univ.

3:30 pm: **Ultralow-loss ion beam sputtered optical coatings on highly polished ZBLAN for laser cooling applications** *(Invited Paper)*, R. P. Shimshock, L. Lling, MLD Technologies, LLC . . . . . [6461-09]

4:00 pm: **Differential luminescence thermometry in laser cooling of solids,** W. M. Patterson, E. Soto, M. Fleharty, M. Sheik-Bahae, The Univ. of New Mexico . . . . . [6461-10]

4:20 pm: **Electron-lattice interactions of severely localized electrons and solid state optical cooling** *(Invited Paper)*, D. Emin, The Univ. of New Mexico . . . . . [6461-11]

4:50 pm: **Optical cooling of Raman lasers using CARS,** N. Vermeulen, C. Debaes, H. Thienpont, Vrije Univ. Brussel (Belgium) . . . . . [6461-12]

5:10 pm: **Single fluoride crystals as materials for laser cooling applications** *(Invited Paper)*, S. Bigotta, Univ. di Pisa (Italy); A. Di Lieto, Scuola Normale Superiore di Pisa (Italy) and Univ. di Pisa (Italy); L. Bonelli, Univ. di Pisa (Italy); D. Parisi, Univ. di Pisa (Italy) and Scuola Normale Superiore di Pisa (Italy); A. Toncelli, M. Tonelli, Univ. di Pisa (Italy) . . . . . [6461-13]

Thursday 25 January

SESSION 4

Room: Conv. Ctr. Room F1 . . . . . Thurs. 8:30 to 10:00 am

Cooling with Semiconductors II

Chair: **Joaquin M. Fernández**, Univ. del Pais Vasco (Spain)

8:30 am: **Improving the light extraction efficiency for optical refrigeration of solids** *(Invited Paper)*, J. B. Khurgin, Johns Hopkins Univ. . . . . [6461-14]

9:00 am: **Heterostructure design optimization for laser cooling of GaAs,** B. Imangholi, M. Fleharty, C. Wang, D. A. Bender, The Univ. of New Mexico; N. Nuntawong, Ctr. for High Technology Materials; M. P. Hasselbeck, M. Sheik-Bahae, The Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab. . . . . [6461-15]

9:20 am: **Nanogap experiments in laser cooling,** R. P. Martin, K. J. Malloy, A. Stintz, CHTM/The Univ. of New Mexico; R. I. Epstein, Los Alamos National Lab.; M. Sheik-Bahae, M. P. Hasselbeck, B. Imangholi, The Univ. of New Mexico . . . . . [6461-16]

9:40 am: **The relation between light absorption and luminescence in laser cooling of two-dimensional semiconductor systems,** N. Kwong, G. Rupper, R. H. Binder, The Univ. of Arizona . . . . . [6461-17]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room F1 . . . . . Thurs. 10:30 am to 12:50 pm

Cooling with Semiconductors III

Chair: **David Emin**, The Univ. of New Mexico

10:30 am: **Semiconductor electroluminescence refrigeration** *(Invited Paper)***,** Y. Zhang, S. Yu, D. Ding, J. Wang, S. R. Johnson, N. A. Rider, Arizona State Univ. . . . . [6461-18]

11:00 am: **Thermally assisted electroluminescence: a viable means to generate electricity from solar or waste heat?,** B. Heeg, MetroLaser, Inc.; J. Wang, Arizona State Univ.; B. D. Buckner, A. I. Khizhnyak, MetroLaser, Inc.; Y. Zhang, Arizona State Univ. . . . . [6461-19]

11:20 am: **Determination of internal quantum efficiency in semiconductors suitable for luminescence refrigeration,** J. Wang, D. Ding, S. Yu, S. R. Johnson, Y. Zhang, Arizona State Univ. . . . . [6461-20]

11:40 am: **Growth and characterization of GaAs/InGaP heterostructure for semiconductor laser cooling,** R. B. Laghumavarapu, N. Nuntawong, D. L. Huffaker, The Univ. of New Mexico . . . . . [6461-21]

12:00 pm: **Competing physical effects in semiconductor laser cooling: from excitonic correlations to parasitic absorptions** *(Invited Paper)***,** G. Rupper, N. Kwong, R. H. Binder, The Univ. of Arizona . . . . . [6461-22]

12:30 pm: **Optimal bandgap energy for optical refrigeration in semiconductors,** S. R. Johnson, D. Ding, S. Yu, J. Wang, Y. Zhang, Arizona State Univ. . . . . [6461-23]

M. Edward Motamedi, *Chair*
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SPIE Photonics WEST

MOEMS-MEMS 2007

Micro & Nanofabrication

20–25 January 2007

San Jose Convention Center • San Jose, California USA

Symposium Chair:

Rajeshuni Ramesham,
Jet Propulsion Lab.

Symposium Co-Chair:

Albert K. Henning,
Aquarian Microsystems

Micro/Nanofabrication

Devices/Applications/Reliability

MOEMS-MEMS Daily Conference Schedule

Saturday 20 January	Sunday 21 January	Monday 22 January	Tuesday 23 January	Wednesday 24 January	Thursday 25 January

Micro/Nanofabrication

6462A **Micromachining and Microfabrication Process Technology XII** *(Maher, Stewart, Chiao)* p. 161

6462B **Micromachining Technology for Micro-Optics and Nano-Optics V** *(Suleski, Johnson, Nordin)* p. 162

MOEMS-MEMS Plenary Session
9:00 am to 12:00 pm

Devices/Applications/Reliability

6463 **Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS VI** *(Hartzell, Ramesham)* p. 164

6464 **MEMS/MOEMS Components and Their Applications IV Special Focus Topics: Transducers at the Micro-Nano Interface** *(Tadigadapa, Ghodssi, Henning)* p. 166

6466 **MOEMS and Miniaturized Systems VI** *(Dickensheets, Gogoi, Schenk)* p. 170

6465 **Microfluidics, BioMEMS, and Medical Microsystems V** *(Papautsky, Wang)* p. 168

6467 **MEMS Adaptive Optics** *(Olivier, Bifano, Kubby)* p. 172

Special Events

Saturday 20 January	Sunday 21 January	Monday 22 January	Tuesday 23 January	Wednesday 24 January	Thursday 25 January

Biomedical Optics Exhibition
San Jose Convention Center, Exhibition Hall 1
1:00 to 5:00 pm | 10:00 am to 4:00 pm

MOEMS-MEMS Plenary Session 9:00 am to 12:00 pm, p. 18

Welcome Reception, Fairmont Hotel, Imperial Ballroom, 6:00 to 7:30 pm, p. 10

Panel Discussion: **Progress and Prospects in Microfluidics,** 7:30 to 9:30 pm, p. 19

Photonics West Exhibition
San Jose Convention Center, Exhibition Hall 1–3, Exhibit Foyer and South Hall
10:00 am to 5:00 pm | 10:00 am to 5:00 pm | 10:00 am to 4:00 pm

Attend the SPIEWorks Career Fair!
Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance
11:00 am to 3:00 pm | 11:00 am to 3:00 pm

Round Table Discussion: **Optical Microsystems for Biomedical Applications**, 7:30 to 9:00 pm, p. 19

OPTO, LASE, MOEMS-MEMS Poster Session, Parkside Hall, Civic Auditorium Complex, 6:00 to 7:30 pm

LASE papers of related interest: 6458A-10, 6458A-43, 6458A-45, 6459-1, and 6459-16

Monday-Wednesday 22-24 January 2007 • Part of Proceedings of SPIE Vol. 6462

Micromachining and Microfabrication Process Technology XII

Conference Chairs: **Mary-Ann Maher**, SoftMEMS; **Harold D. Stewart**, Sandia National Labs.; **Jung-Chih Chiao**, The Univ. of Texas at Arlington

Program Committee: **Mu Chiao**, The Univ. of British Columbia (Canada); **Debabani Choudhury**, HRL Labs., LLC; **Eric Donzier**, Schlumberger Cambridge Research (United Kingdom); **Sanjay Krishna**, The Univ. of New Mexico; **Tamal Mukherjee**, Carnegie Mellon Univ.; **Jeongsik Sin**, The Univ. of Texas at Arlington; **Yu-Chuan Su**, National Tsing Hua Univ. (Taiwan); **Kazuyoshi Tsuchiya**, Tokai Univ. (Japan); **T. C. Yih**, The Univ. of Texas at San Antonio

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

SESSION 1

Room: Hilton Hotel: San Carlos Room . . . . . Mon. 1:00 to 2:20 pm

Lasers

1:00 pm: **Pulse-width dependency of the fabricating resolution of the two-photon absorption photo-polymerization,** H. J. Kong, S. W. Yi, D. Yang, Korea Advanced Institute of Science and Technology (South Korea); K. Lee, Hannam Univ. (South Korea); J. Kim, T. Lim, S. Kim, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6462A-01]

1:20 pm: **Small-scaled and microfeatured functional prototypes by laser sintered polyetheretherketone,** T. Rechtenwald, H. Krauss, Bayerisches Laserzentrum GmbH (Germany); D. Phole, Univ. of Erlangen (Germany); M. H. M. Schmidt, Bayerisches Laserzentrum GmbH (Germany) . . . [6462A-02]

1:40 pm: **Characterization of femtosecond laser ablation and deposition through spectral interferometry,** S. Bera, A. J. Sabbah, J. M. Yarbrough, C. G. Allen, B. Winters, C. G. Durfee, J. A. Squier, Colorado School of Mines . . . . . [6462A-03]

2:00 pm: **Increasing femtosecond laser processing efficiency by hybridization with nanosecond laser,** J. S. Yahng, B. H. Chon, C. H. Kim, Korea Research Institute of Standards and Science (South Korea); H. R. Kim, Bicronix Co., Ltd. (South Korea); S. C. Jeoung, Korea Research Institute of Standards and Science (South Korea) . . . . . [6462A-04]

SESSION 2

Room: Hilton Hotel: San Carlos Room . . . . . Mon. 2:20 to 4:50 pm

High Aspect Ratio Devices and Etching Techniques

2:20 pm: **Microfabricated 3D polymeric structure with SU-8,** S. W. Yi, H. J. Kong, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6462A-05]

2:40 pm: **A new UV-lithography photoresist for fabrication of high-aspect-ratio microstructures** *(Presentation Only)***,** R. Yang, S. A. Soper, W. Wang, Louisiana State Univ. . . . . [6462A-06]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Setting new standards in MEMS,** M. K. Rimskog, Silex Microsystems Inc. . . . . [6462A-51]

3:50 pm: **Plasma etching of positively sloped silicon structures,** S. Lai, K. D. Mackenzie, D. J. Johnson, R. J. Westerman, Oerlikon USA Inc. [6462A-07]

4:10 pm: **Processing parameters for the development of glass/ceramic MEMS,** J. A. Stillman, Univ. of California/Los Angeles and The Aerospace Corp.; J. W. Judy, Univ. of California/Los Angeles; H. Helvajian, The Aerospace Corp. . . . . [6462A-09]

4:30 pm: **Use of silane-based primer on silicon wafers to enhance adhesion of edge-protective coatings during wet etching: application of TALON™ wrap process,** J. Dalvi-Malhotra, G. Brand, X. Zhong, Brewer Science, Inc. . . . . [6462A-10]

SESSION 3

Room: Hilton Hotel: San Carlos Room . . . . . Mon. 4:50 to 5:50 pm

Devices

4:50 pm: **New emerging MEMS applications,** E. Mounier, Yole Dévelopment (France) . . . . . [6462A-11]

5:10 pm: **Design of high-sensitive acoustic sensor using PMN-PT single crystal,** S. Q. Lee, H. Kim, K. H. Park, Electronics and Telecommunications Research Institute (South Korea); K. S. Moon, Y. K. Hong, San Diego Stage Univ. . . . . [6462A-12]

5:30 pm: **Fabrication technology of Si microfluidic devices for microbial cell trapping,** R. M. Badam, R. Nagarajan, L. Zhu, C. Y. Teo, X. Peh, H. Feng, N. Balasubramanian, W. Liu, Institute of Microelectronics (Singapore) . [6462A-13]

✔ Posters-Wednesday

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✔ **Theoretical and experimental studies of a condenser-type miniature microphone with a flexure hinge diaphragm,** H. Kim, S. Q. Lee, K. H. Park, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6462A-14]

✔ **Verification of thin film processes in a virtual fabrication environment,** T. Schmidt, Univ. Siegen (Germany); D. Ortloff, Cavendish Kinetics B.V. (Netherlands); K. Hahn, R. Brueck, Univ. Siegen (Germany); A. Hoessinger, SILVACO Technology Ctr. (United Kingdom) . . . . . [6462A-16]

✔ **Replication technology as a means of implementing the polymer MOEMS,** J. Kim, J. J. Ju, S. Park, S. K. Park, M. Kim, M. Lee, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6462A-15]

✔ **The silicon mold fabrication of a kind of micro-optical resonator and coupler,** H. Ju, Wakayama Univ. (Japan) . . . . . [6462A-08]

Tuesday-Wednesday 23-24 January 2007 • Part of Proceedings of SPIE Vol. 6462

Micromachining Technology for Micro-optics and Nano-optics V

Conference Chairs: **Thomas J. Suleski**, The Univ. of North Carolina at Charlotte; **Eric G. Johnson**, The Univ. of North Carolina at Charlotte; **Gregory P. Nordin**, Brigham Young Univ.

Program Committee: **John M. Ballato**, Clemson Univ.; **Gregg T. Borek**, MEMS Optical, Inc.; **Matthew A. Davies**, Univ. of North Carolina/Charlotte; **Erez Hasman**, Technion - Israel Institute of Technology (Israel); **Tsing-hua Her**, The Univ. of North Carolina at Charlotte; **Alan D. Kathman**, Digital Optics Corp.; **Shanalyn A. Kemme**, Sandia National Labs.; **Pieter G. Kik**, College of Optics and Photonics/Univ. of Central Florida; **Ernst-Bernhard Kley**, Friedrich-Schiller-Univ. Jena (Germany); **Stephen M. Kuebler**, College of Optics and Photonics/Univ. of Central Florida; **Dwayne L. LaBrake**, Molecular Imprints, Inc.; **Patrick P. Naulleau**, SUNY/Univ. at Albany; **Luiz G. Neto**, Univ. de São Paulo (Brazil); **Fredrik K. Nikolajeff**, Uppsala Univ. (Sweden); **Yuzo Ono**, Ritsumeikan Univ. (Japan); **Dennis W. Prather**, Univ. of Delaware; **John A. Rogers**, Univ. of Illinois at Urbana-Champaign; **Markus Rossi**, Heptagon Oy (Switzerland); **Winston V. Schoenfeld**, College of Optics and Photonics/Univ. of Central Florida; **Jian Jim Wang**, NanoOpto Corp.; **Michael P. C. Watts**, Impattern Solutions

Monday 22 January

MOEMS-MEMS Plenary Session
Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm
See page 18 for more information

Tuesday 23 January

SESSION 5
Room: Hilton Hotel: San Carlos Room . . . . . Tues. 8:30 to 10:00 am

Micro- and Nanoreplication: Templates

Chair: **Thomas J. Suleski**, The Univ. of North Carolina at Charlotte

8:30 am: **Nanoscale pattern transfer for MEMS and nano-optics** *(Invited Paper)*, D. L. Olynick, Lawrence Berkeley National Lab. . . . . [6462B-17]

9:00 am: **Grinding aspheric and freeform micro-optical molds** *(Invited Paper)*, Y. E. Tohme, Moore NanoTechnology Systems LLC . . . . . [6462B-18]

9:30 am: **Focused ion beam applied to photonics and nano-imprinting** *(Invited Paper)*, S. Cabrini, Lawrence Berkeley National Lab. . . . . [6462B-19]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6
Room: Hilton Hotel: San Carlos Room . . . . . Tues. 10:30 am to 12:10 pm

Nanoimprint Lithography: Applications

Chair: **Jian Jim Wang**, NanoOpto Corp.

10:30 am: **Optical meta-materials fabricated by nano-imprint lithography** *(Invited Paper)*, W. Wu, Hewlett-Packard Labs.; E. Kim, Y. Liu, Univ. of California/Berkeley; E. Ponizovskaya, Z. Yu, A. M. Bratkovski, Hewlett-Packard Labs.; P. Chaturvedi, N. X. Fang, Univ. of Illinois at Urbana-Champaign; R. Shen, X. Zhang, Univ. of California/Berkeley; S. Wang, R. S. Williams, Hewlett-Packard Labs. . . . . [6462B-20]

11:00 am: **The value, solutions, and costs of patterning LED's,** M. P. C. Watts, Impattern Solutions; M. E. Zoorob, J. McKenzie, Mesophotonics Ltd. (United Kingdom) . . . . . [6462B-21]

11:20 am: **Combined nano-imprint and photolithography (CNP) of integrated polymer optics,** M. B. Christiansen, M. Schøler, A. Kristensen, Danmarks Tekniske Univ. (Denmark) . . . . . [6462B-22]

11:40 am: **Application of nano-imprint lithography to nano-optics: wire grid polarizer and photonic crystal LED** *(Invited Paper)*, K. Lee, LG Electronics Institute of Technology (South Korea) . . . . . [6462B-23]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7
Room: Hilton Hotel: San Carlos Room . . . . . Tues. 1:30 to 3:00 pm

Nanofabrication I

Chair: **Eric G. Johnson**, The Univ. of North Carolina at Charlotte

1:30 pm: **Polarization engineering through nano-engineered morphology** *(Invited Paper)*, A. Lakhtakia, The Pennsylvania State Univ. . . . . [6462B-24]

2:00 pm: **Fabrication of photonic crystals using chemical lithography,** P. Yao, M. Murakowski, L. M. Prather, G. J. Schneider, J. A. Murakowski, D. W. Prather, Univ. of Delaware . . . . . [6462B-25]

2:20 pm: **Holographic optical elements for the extreme-ultraviolet regime,** P. P. Naulleau, SUNY/Univ. at Albany and Lawrence Berkeley National Lab.; F. H. Salmassi, E. M. Gullikson, E. H. Anderson, Lawrence Berkeley National Lab. . . . . [6462B-26]

2:40 pm: **Deposition of periodic tungsten nanoripples induced by a single femtosecond laser beam,** M. Tang, H. Zhang, J. McCoy, T. Her, The Univ. of North Carolina at Charlotte . . . . . [6462B-27]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8
Room: Hilton Hotel: San Carlos Room . . . . . Tues. 3:30 to 5:10 pm

Microfabrication

Chair: **Stephen M. Kuebler**, College of Optics & Photonics/Univ. of Central Florida

3:30 pm: **Advances in integrated hollow waveguides for on-chip sensors** *(Invited Paper)*, A. R. Hawkins, E. J. Lunt, M. Holmes, B. Phillips, Brigham Young Univ.; D. Yin, M. I. Rudenko, H. Schmidt, Univ. of California/Santa Cruz . . . . . [6462B-28]

4:00 pm: **High-efficiency waveguide bends in Perfluorocyblobutyl (PFCB) waveguides and stress reduction with polyimide substrates,** Y. Lin, The Univ. of Alabama in Huntsville; S. Kim, G. P. Nordin, Brigham Young Univ. . . . . [6462B-29]

4:20 pm: **Pulsed laser ablation for volume fabrication of micro-optical arrays on large-area substrates,** J. E. A. Pedder, Imperial College London (United Kingdom); K. L. Boehlen, R. M. Allott, Exitech Ltd. (United Kingdom); A. S. Holmes, Imperial College London (United Kingdom) . . . . . [6462B-31]

4:40 pm: **Challenging micro-optical applications demand diverse manufacturing solutions** *(Invited Paper)*, G. T. Borek, J. A. Shafer, MEMS Optical, Inc.; P. W. Weißbrodt, M. Schrenk, W. Hill, JENOPTIK Laser, Optik, Systeme GmbH (Germany) . . . . . [6462B-32]

Wednesday 24 January

SESSION 9

Room: Hilton Hotel: San Carlos Room . . . . . Wed. 9:00 to 10:20 am

3-D Nanofabrication I

Chair: **Gregory P. Nordin**, Brigham Young Univ.

9:00 am: **Complex three-dimensional materials for photonics** *(Invited Paper)*, G. von Freymann, Forschungszentrum Karlsruhe (Germany) and Univ. Karlsruhe (Germany); M. Deubel, M. Hermatschweiler, A. Ledermann, Univ. Karlsruhe (Germany); S. Linden, Forschungszentrum Karlsruhe (Germany); M. Thiel, Univ. Karlsruhe (Germany); S. Wong, Forschungszentrum Karlsruhe (Germany); N. Tétreault, Univ of Toronto (Canada); L. Cademartiri, G. A. Ozin, S. John, Univ. of Toronto (Canada); D. S. Wiersma, Univ. degli Studi di Firenze (Italy); M. Wegener, Forschungszentrum Karlsruhe (Germany) . . . . . [6462B-33]

9:30 am: **Biologically inspired optics: beetle exoskeleton,** K. N. Buhl, P. Srinivasan, J. D. Brown, A. Mehta, E. G. Johnson, College of Optics & Photonics/Univ. of Central Florida . . . . . [6462B-34]

9:50 am: **Soft-lithographic replication of 3D polymeric microstructures created with MAP** *(Invited Paper)*, J. T. Fourkas, C. N. LaFratta, L. Li, Univ. of Maryland/College Park . . . . . [6462B-35]

Coffee Break . . . . . 10:20 to 10:50 am

SESSION 10

Room: Hilton Hotel: San Carlos Room . . . . . Wed. 10:50 am to 12:00 pm

3-D Nanofabrication II

Chair: **Aaron R. Hawkins**, Brigham Young Univ.

10:50 am: **Crystalline colloidal arrays: applications from sensors to organic lasers** *(Invited Paper)*, S. H. Foulger, Clemson Univ. . . . . [6462B-36]

11:20 am: **Production of 3D photonic components with ultrafast micromachining,** M. Boyle, A. Neumeister, R. V. Kiyan, C. Reinhardt, U. Stute, B. N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [6462B-37]

11:40 am: **Silvered three-dimensional polymeric photonic crystals having a large mid-infrared stop band,** S. M. Kuebler, A. Tal, Y. Chen, R. C. Rumpf, E. G. Johnson, College of Optics & Photonics/Univ. of Central Florida . . . . . [6462B-38]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 11

Room: Hilton Hotel: San Carlos Room . . . . . Wed. 1:30 to 3:10 pm

Nanofabrication II

Chair: **Tsing-hua Her**, The Univ. of North Carolina at Charlotte

1:30 pm: **Plasmonics: a route to nanoscale imaging optical systems** *(Invited Paper)*, H. A. Atwater, California Institute of Technology . . . . [6462B-39]

2:00 pm: **Dielectric and metallic plasmonic components,** C. Reinhardt, R. V. Kiyan, S. Passinger, B. N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [6462B-40]

2:20 pm: **SiO2 phase gratings fabricated by UV laser ablation patterning,** J. Ihlemann, J. Klein-Wiele, J. Békési, P. Simon, Laser-Lab. Goettingen e.V. (Germany) . . . . . [6462B-41]

2:40 pm: **Aluminum nanowire polarizing grids: fabrication and analysis** *(Invited Paper)*, V. Pelletier, Princeton Univ.; K. Asakawa, Toshiba Corp. (Japan); M. W. Wu, D. H. Adamson, R. A. Register, P. M. Chaikin, Princeton Univ. . . . . [6462B-42]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Fabrication of microlens arrays by negative copying of honeycomb-like microporous films,** H. Yabu, Hokkaido Univ. (Japan) and FRS, RIKEN (Japan); M. Tanaka, Hokkaido Univ. (Japan); M. Shimomura, Hokkaido Univ. (Japan) and FRS, RIKEN (Japan) and CREST JST (Japan) . . . . . [6462B-43]

✔ **Cantilever-based thermolithography for micro- and nanomanufacturing,** D. Lee, Y. Choi, Chonnam National Univ. (South Korea) . . . . . [6462B-44]

✔ **Fabrication of thermally durable subwavelength periodic structures upon hybrid materials by nano-imprinting method,** D. Kang, B. Bae, Korea Advanced Institute of Science and Technology (South Korea); J. Nishii, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6462B-45]

✔ **Polarization hologram,** M. Okada, Nalux Co., Ltd. (Japan) . . . . . [6462B-46]

✔ **Three-dimensional diffractive micro- and nano-optical elements fabricated by electron-beam lithography,** I. B. Divliansky, E. G. Johnson, College of Optics & Photonics/Univ. of Central Florida . . . . . [6462B-47]

✔ **Implementation of far-field phase-shift lithography using diffractive optical elements,** W. Hsu, Y. Su, National Taipei Univ. of Technology (Taiwan) . . . . . [6462B-48]

✔ **Simplified fabrication process of 3-D photonic crystal optical transmission filter,** A. Mehta, R. C. Rumpf, Z. Roth, E. G. Johnson, College of Optics & Photonics/Univ. of Central Florida . . . . . [6462B-49]

✔ **Diffractive optical elements fabricated by precise pressing of glass,** H. Vogt, B. Wölfing, E. Pawlowski, SCHOTT AG (Germany) . . . . . [6462B-50]

Tuesday-Wednesday 23-24 January 2007 • Proceedings of SPIE Vol. 6463

Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS VI

Conference Chairs: **Allyson L. Hartzell**, Exponent Inc.; **Rajeshuni Ramesham**, Jet Propulsion Lab.

Program Committee: **Susanne Arney**, Lucent Technologies/Bell Labs.; **Peter Basque**, Analog Devices, Inc.; **Enakshi Bhattacharya**, Indian Institute of Technology Madras (India); **Jason O. Clevenger**, Exponent Inc.; **Christopher K. Harrison**, Schlumberger Ltd.; **Albert K. Henning**, Aquarian Microsystems; **John S. McKillop**, TeraVicta Technologies, Inc.; **Marco Moraja**, SAES Getters S.p.A. (Italy); **Leslie M. Phinney**, Sandia National Labs.; **Olivier N. Pierron II**, Qualcomm MEMS Technologies; **David T. Read**, National Institute of Standards and Technology; **Herbert R. Shea**, Swiss Federal Institutes of Technology (Switzerland); **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.; **Danelle M. Tanner**, Sandia National Labs.; **James L. Zunino III**, U.S. Army Armament Research, Development and Engineering Ctr.

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

Tuesday 23 January

SESSION 1

Room: Hilton Hotel: Almaden I . . . . . Tues. 8:30 to 10:00 am

Sensors: Applications and Reliability Methodology

Chair: **Enakshi Bhattacharya**,
Indian Institute of Technology Madras (India)

Keynote Presentation

8:30 am: **Receptor free nanomechanical sensing,** T. G. Thundat, Oak Ridge National Lab. and Univ. of Tennessee . . . . . [6463-01]

9:10 am: **New techniques for detecting and monitoring corrosion using nanostructures** *(Invited Paper)***,** C. Muller, W. England, Purafil, Inc. . . [6463-02]

9:40 am: **Hybrid approach to MEMS reliability assessment,** J. L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr.; D. R. Skelton, U.S. Army Research, Development and Engineering Command; W. Han, R. J. Pryputniewicz, Worcester Polytechnic Institute . . . . . [6463-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Hilton Hotel: Almaden I . . . . . Tues. 10:30 am to 11:40 am

RF MEMS and Related Failure Mechanisms

Chair: **Olivier N. Pierron II**, Qualcomm MEMS Technologies

10:30 am: **Metal contact reliability of RF MEMS switches** *(Invited Paper)***,** Q. Tran, Mentor Graphics Corp.; J. Heck, T. A. Chou, Intel Corp.; H. Bar, Intel Electronics Ltd. (Israel); R. Kant, Stanford Univ.; Q. Ma, Intel Corp. . . [6463-04]

11:00 am: **Effects of V additions on the mechanical behavior of Au thin films for MEMS contact switches,** T. Bannuru, W. L. Brown, R. P. Vinci, Lehigh Univ.; S. Narksitipan, Chiang Mai Univ. (Thailand) . . . . . [6463-05]

11:20 am: **Mechanics of thin film adhesion-delamination subjected to residual stress and interfacial adhesion: application to MEMS-RF-switch,** M. F. Wong, K. T. Wan, Univ. of Missouri/Rolla . . . . . [6463-06]

Lunch/Exhibition Break . . . . . 11:40 am to 1:15 pm

SESSION 3

Room: Hilton Hotel: Almaden I . . . . . Tues. 1:15 to 3:05 pm

MEMS Materials Properties

Chair: **Christopher K. Harrison**, Schlumberger Ltd.

1:15 pm: **Fatigue of silicon structural films for MEMS applications** *(Invited Paper, Presentation Only)***,** R. O. Ritchie, D. H. Alsem, Univ. of California/Berkeley; E. A. Stach, Purdue Univ. . . . . [6463-08]

1:45 pm: **A novel technique for extraction of material properties through measurement of pull-in voltage and off-capacitance of beams,** J. Sharma, A. DasGupta, Indian Institute of Technology Madras (India) . . . . . [6463-09]

2:05 pm: **Cyclic thin film flexible strain sensor testing,** H. C. Lim, J. F. Federici, New Jersey Institute of Technology; J. L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr. . . . . [6463-10]

2:25 pm: **Self-sensing and actuation of CNF and Ni nanowire/polymer composites using electromicromechanical test,** J. Park, Gyeongsang National Univ. (South Korea) and The Univ of Utah; S. Kim, Gyeongsang National Univ. (South Korea); D. Yoon, Korea Research Institute of Standard and Science (South Korea); G. Hansen, Metal Matrix Composites Co.; K. L. DeVries, The Univ. of Utah . . . . . [6463-11]

2:45 pm: **Critical comparison of metrology techniques for MEMS,** M. G. Da Silva, Exponent Inc.; S. Bouwstra, MEMS TC (Netherlands) . . . . . [6463-12]

Coffee Break . . . . . 3:05 to 3:35 pm

SESSION 4

Room: Hilton Hotel: Almaden I . . . . . Tues. 3:35 to 4:25 pm

MEMS Reliability

Chair: **Jason O. Clevenger**, Exponent Inc.

3:35 pm: **MEMS reliability assessment program-progress to date** *(Invited Paper)***,** J. L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr.; D. R. Skelton, U.S. Army Research, Development and Engineering Command . . . . . [6463-13]

4:05 pm: **Development of a model for predicting dry stiction in microelectromechanical systems (MEMS),** A. Hariri, J. Zu, R. Ben Mrad, Univ. of Toronto (Canada) . . . . . [6463-14]

Panel Discussion

MEMS Reliability

Hilton Hotel: Almaden I . . . . . Tues. 4:25 to 5:25 pm

Moderator: **Jason Clevenger,** Exponent Inc.

Panelists: **Peter Basque,** Analog Devices;
Bill Cummings, Qualcomm;
Charles King, Akustica;
Danelle Tanner, Sandia Labs;
Jim Aberson, Colibrys

Wednesday 24 January

SESSION 6

Room: Hilton Hotel: Almaden I . . . . . Wed. 8:30 to 10:00 am

Optical MEMS: Design for Reliability and Characterization Techniques

Chair: **Danelle M. Tanner**, Sandia National Labs.

8:30 am: **Optical MEMS: designing for reliability** *(Invited Paper)*, S. Bhattacharya, Indian Institute of Technology Madras Chapter (India) . . . . . [6463-15]

9:00 am: **Process engineering and failure analysis of MEMS and MOEMS,** Y. Emery, F. Montfort, E. Cuche, F. Marquet, N. Aspert, Lyncée Tec SA (Switzerland); P. P. Marquet, Ctr. Hospitalier Univ. Vaudois (Switzerland); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6463-16]

9:20 am: **Performance and reliability test of MEMS optical scanners,** S. Kurth, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); C. Kaufmann, R. Hahn, Technische Univ. Chemnitz (Germany); J. Mehner, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany); W. Doetzel, Technische Univ. Chemnitz (Germany); T. Gessner, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) . . . . . [6463-17]

9:40 am: **White-light interferometric profile measurement system using spectral coherence,** G. Chang, Y. Lin, C. Su, National Taiwan Normal Univ. (Taiwan) . . . . . [6463-18]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 7

Room: Hilton Hotel: Almaden I . . . . . Wed. 10:30 to 11:30 am

Special Topics in MEMS I

Chair: **Peter Basque**, Analog Devices, Inc.

10:30 am: **Charging effects in spatial light modulators based on micromirrors,** U. A. Dauderstädt, T. Bakke, P. Dürr, I. Jankowski, M. Wagner, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6463-20]

10:50 am: **On the reliability of thermopneumatic actuators with silicon membranes,** A. K. Henning, Aquarian Microsystems . . . . . [6463-21]

11:10 am: **Reliability of MEMS materials in liquid environments,** T. P. Kuehn, S. M. Ali, S. C. Mantell, E. K. Longmire, Univ. of Minnesota . . . . . [6463-22]

Lunch/Exhibition Break . . . . . 11:30 am to 1:00 pm

SESSION 8

Room: Hilton Hotel: Almaden I . . . . . Wed. 1:00 to 2:50 pm

Special Topics in MEMS II

Chair: **Herbert R. Shea**,
Swiss Federal Institutes of Technology (Switzerland)

1:00 pm: **Wafer capping of MEMS with fab-friendly metals** *(Invited Paper)*, J. Martin, Analog Devices, Inc. . . . . [6463-23]

1:30 pm: **Simple measurement technique for resonance frequency of micromachined cantilevers,** S. Bhat, E. Bhattacharya, Indian Institute of Technology Madras (India) . . . . . [6463-24]

1:50 pm: **Analytical model of a single-stage compliant mechanism with a flexible lever arm,** P. A. Hassanpour, W. L. Cleghorn, Univ. of Toronto (Canada); E. Esmailzadeh, Univ. of Ontario Institute of Technology (Canada); J. K. Mills, Univ. of Toronto (Canada) . . . . . [6463-25]

2:10 pm: **A fast model-order reduction algorithm for microelectromechanical devices,** R. Zhang, G. A. Jullien, Univ. of Calgary (Canada) . . . . . [6463-26]

2:30 pm: **Development of integrated wireless SAW microsensors for pressure-temperature monitoring and ID tag applications,** K. Lee, W. Wang, S. S. Yang, Ajou Univ. (South Korea) . . . . . [6463-27]

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MEMS/MOEMS Components and Their Applications IV Special Focus Topics: Transducers at the Micro-Nano Interface

Conference Chairs: **Srinivas A. Tadigadapa**, The Pennsylvania State Univ.; **Reza Ghodssi**, Univ. of Maryland/College Park; **Albert K. Henning**, Aquarian Microsystems

Program Committee: **Hongrui Jiang**, Univ. of Wisconsin/Madison; **Rudra Pratap**, Indian Institute of Science (India); **Marcel W. Pruessner**, Naval Research Lab.; **Mohammed T. Saif**, Univ. of Illinois at Urbana-Champaign; **Wanjun Wang**, Louisiana State Univ.; **Huikai Xie**, Univ. of Florida; **Christian A. Zorman**, Case Western Reserve Univ.

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

SESSION 1

Room: Hilton Hotel: Almaden II . . . . . Mon. 1:30 to 3:20 pm

Micro/Nanotechnology and Biology

Keynote Presentation

1:30 pm: **Nanoelectronic technology for bioscience** *(Invited Paper)*, A. N. Cleland, Univ. of California/Santa Barbara . . . . . [6464-01]

2:10 pm: **Drosophila as an unconventional substrate for microfabrication** *(Invited Paper)*, A. J. Shum, B. A. Parviz, Univ. of Washington . . . . . [6464-02]

2:40 pm: **Integrated biophotonic hybridization sensor based on chitosan-mediated biomolecule assembly,** V. Badilita, M. Powers, S. T. Koev, H. Yi, G. Payne, R. Ghodssi, Univ. of Maryland/College Park . . . . . [6464-03]

3:00 pm: **Self assembled monolayer and protein adsorption studies on micromachined quartz crystal balances,** P. Kao, A. Goyal, D. L. Allara, S. A. Tadigadapa, The Pennsylvania State Univ. . . . . [6464-04]

Coffee Break . . . . . 3:20 to 4:00 pm

Panel Discussion

Micro-nano interface and its role in micro- and nanoscale transducers

Hilton Hotel: Almaden II . . . . . Mon. 4:00 to 5:00 pm

Tuesday 23 January

SESSION 3

Room: Hilton Hotel: Almaden II . . . . . Tues. 8:00 to 10:00 am

Nanotechnology

8:00 am: **Nanomechanical cantilever arrays for low-power and low-voltage embedded nonvolatile memory applications** *(Invited Paper)*, C. G. Smith, Univ. of Cambridge (United Kingdom); R. Van Kampen, J. Pop, Cavendish Kinetics B.V. (Netherlands); D. Lacey, M. Renault, Cavendish Kinetics Inc. . . . . [6464-05]

8:30 am: **Nanoelectromechanical systems as single electron switches and field emitters** *(Invited Paper)*, R. H. Blick, Univ. of Wisconsin/Madison [6464-06]

9:00 am: **Electrically insulated scanning thermal microscopy,** N. Duarte, S. A. Tadigadapa, The Pennsylvania State Univ. . . . . [6464-07]

9:20 am: **Electrical and optical properties of supported n-graphene layer films,** P. Joshi, A. Gupta, P. C. Eklund, S. A. Tadigadapa, The Pennsylvania State Univ. . . . . [6464-08]

9:40 am: **Micromachined silicon grids for direct TEM and Raman characterization of CVD grown carbon nanotubes,** Y. Choi, A. Ural, Univ. of Florida . . . . . [6464-09]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 4

Room: Hilton Hotel: Almaden II . . . . . Tues. 10:30 am to 12:30 pm

Nanomechanics and Resonators

10:30 am: **Mechanical properties of ZnO nanowires** *(Invited Paper)*, M. A. Haque, Penn State Univ. . . . . [6464-10]

11:00 am: **MEMS-based testing stage to study electrical and mechanical properties of nanocrystalline metal films,** J. Han, J. Rajagopalan, T. Saif, Univ. of Illinois at Urbana-Champaign . . . . . [6464-11]

11:20 am: **All-optical micromechanical chemical sensors** *(Invited Paper)*, T. H. Stievater, W. S. Rabinovich, M. S. Ferraro, N. A. Papanicolaou, J. B. Boos, R. A. McGill, J. L. Stepnowski, Naval Research Lab. . . . . [6464-12]

11:50 am: **Integrated nanomechanical motion detection by evanescent light-wave coupling,** I. De Vlaminck, J. Roels, D. Taillaert, Univ. Gent (Belgium) and IMEC (Belgium); D. Van Thourhout, Univ. Gent (Belgium); L. Lagae, IMEC (Belgium); R. Baets, Univ. Gent (Belgium); G. Borghs, IMEC (Belgium) [6464-13]

12:10 pm: **Experimental study of fluid damping in microdevices with flow ranging from continuum to molecular regime,** A. K. Pandey, R. Pratap, Indian Institute of Science (India); F. S. Chau, National Univ. of Singapore (Singapore) . . . . . [6464-14]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 5

Room: Hilton Hotel: Almaden II . . . . . Tues. 1:30 to 3:20 pm

Microelectromechanical Systems I

1:30 pm: **Measuring biological mass with microchannel resonators** *(Invited Paper)*, K. Babcock, Affinity Biosensors; S. R. Manalis, Massachusetts Institute of Technology . . . . . [6464-15]

2:00 pm: **Development of amorphous SiC for MEMS-based microbridges,** J. B. Summers, Case Western Reserve Univ.; M. C. Scardelletti, NASA Glenn Research Ctr.; C. A. Zorman, Case Western Reserve Univ. . . . . [6464-16]

2:20 pm: **Fabrication of comb-drive micro-actuators based on UV lithography of SU-8 and electroless plating technique,** W. Dai, W. Wang, Louisiana State Univ. . . . . [6464-17]

2:40 pm: **On-chip integration of a microfluidic valve and pump for sample acquisition and movement,** S. S. Sridharamurthy, L. Dong, H. Jiang, Univ. of Wisconsin/Madison . . . . . [6464-18]

3:00 pm: **Design and microfabrication of integrated fiber bundle couplers with imbedded microlens arrays** *(Presentation Only)*, R. Yang, S. A. Soper, W. Wang, Louisiana State Univ. . . . . [6464-20]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 6

Room: Hilton Hotel: Almaden II . . . . . Tues. 3:50 to 6:00 pm

Microelectromechanical Systems II

3:50 pm: **IR detectors with adaptive responsivity and wavelength** *(Invited Paper)*, W. Song, J. J. Talghader, Univ. of Minnesota . . . . . [6464-21]

4:20 pm: **LVD micromirror for rapid reference scanning in optical coherence tomography,** A. Jain, X. Feng, H. Xie, Univ. of Florida . . . . . [6464-22]

4:40 pm: **Process development, fabrication, and characterization of high-finesse micromachined optical Fabry-Perot microcavities,** M. W. Pruessner, T. H. Stievater, W. S. Rabinovich, Naval Research Lab. . . . . [6464-23]

5:00 pm: **Silicon/porous silicon composite membrane for high-sensitivity pressure sensor,** S. L. Narayanan, E. Bhattacharya, Indian Institute of Technology Madras (India) . . . . . [6464-24]

5:20 pm: μ**Microphone piezorestitive type,** A. H. Heredia-Jimenez, M. Gonzalez-Perez, L. Castro, Univ. Popular Autonoma del estado de Puebla (Mexico) . . . . . [6464-25]

5:40 pm: **Stereolithography as a meso-structure for input force reduction to a capacitive force MEMS sensor,** H. K. Chu, W. L. Cleghorn, J. K. Mills, Univ. of Toronto (Canada) . . . . . [6464-26]

Monday-Tuesday 22-23 January 2007 • Proceedings of SPIE Vol. 6465

Microfluidics, BioMEMS, and Medical Microsystems V

Conference Chairs: **Ian Papautsky**, Univ. of Cincinnati; **Wanjun Wang**, Louisiana State Univ.

Cochair: **Claude Vauchier**, CEA-LETI (France)

Program Committee: **Holger Becker**, Microfluidic ChipShop GmbH (Germany); **Hyoung J. Cho**, Univ. of Central Florida; **Jin-Woo Choi**, Louisiana State Univ.; **Bruce K. Gale**, Univ. of Utah; **Yu-Cheng Lin**, National Cheng Kung Univ. (Taiwan); **Anne Pepin**, CNRS/LPN (France); **Albert van den Berg**, Univ. Twente (Netherlands); **Bernhard H. Weigl**, MicroPlumbers Microsciences LLC

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

Welcome Remarks

Hilton Hotel: Santa Clara Room . . . . . Mon. 1:25 to 1:30 pm

SESSION 1

Room: Hilton Hotel: Santa Clara Room . . . . . Mon. 1:30 to 3:10 pm

Lab-on-a-Chip I

Chair: **Wanjun Wang**, Louisiana State Univ.

1:30 pm: **Methods and instruments for continuous-flow PCR on a chip** *(Invited Paper)*, C. Gaertner, R. Klemm, H. Becker, Microfluidic ChipShop GmbH (Germany) . . . . . [6465-01]

2:10 pm: **Microdevice for rapid separation of particulate-ladden fluids for use in micro total-analysis systems,** I. Gregoratto, C. J. McNeil, M. W. Reeks, Univ. of Newcastle Upon Tyne (United Kingdom) . . . . . [6465-02]

2:30 pm: **Thermal gradient PCR in a continuous-flow microchip,** N. D. Crews, C. Wittwer, B. K. Gale, The Univ. of Utah . . . . . [6465-03]

2:50 pm: **A complete, self-contained, optical biochip with live-cell imaging capability** *(Presentation Only)*, I. A. Pope, P. R. Barber, K. Skouridou, B. Vojnovic, Gray Cancer Institute (United Kingdom); A. D. Goater, Univ. of Wales, Bangor (United Kingdom); D. J. Morris, J. P. H. Burt, Prifysgol Cymru Bangor (United Kingdom); D. R. Matthews, H. D. Summers, K. L. Njoh, S. Chappell, R. J. Errington, P. Smith, Cardiff Univ. (United Kingdom) . . . . . [6465-04]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 2

Room: Hilton Hotel: Santa Clara Room . . . . . Mon. 3:40 to 5:40 pm

Microfluidics I

Chair: **Claude Vauchier**, CEA-LETI (France)

3:40 pm: **Digital microfluidics platform for lab-on-a-chip applications** *(Invited Paper, Presentation Only)*, Y. Fouillet, Lab. d'Electronique de Technologie de l'Information (France) . . . . . [6465-05]

4:20 pm: **Diffusion dynamics in microfluidic dye lasers,** S. Balslev, N. A. Mortensen, A. Kristensen, Danmarks Tekniske Univ. (Denmark) . [6465-06]

4:40 pm: **A novel electrolysis-bubble-actuated micropump,** C. Cheng, C. Liu, National Tsing Hua Univ. (Taiwan) . . . . . [6465-07]

5:00 pm: **Using a CD-like microfluidic platform for uniform calcium alginate micro-drug carrier generation,** Y. Lin, National Cheng Kung Univ. (Taiwan) . . . . . [6465-08]

5:20 pm: **Set-up of a biological monitoring module realized in LTCC technology,** W. Smetana, B. Balluch, L. Musiejovsky, Technische Univ. Wien (Austria); E. Gaubitzer, M. Edetsberger, G. Köhler, Univ. Wien (Austria) [6465-09]

Tuesday 23 January

SESSION 3

Room: Hilton Hotel: Santa Clara Room . . . . . Tues. 8:30 to 10:10 am

Sensors

Chair: **Ian Papautsky**, Univ. of Cincinnati

8:30 am: **Assembly and testing of microparticle and microcapsule 'smart tattoo' materials** *(Invited Paper)*, M. J. McShane, Texas A&M Univ. . . [6465-10]

9:10 am: **An integrated microsystem for multiplex processing of encoded silicon microbeads,** M. G. Loughran, Tyndall National Institute (Ireland) . . . . . [6465-11]

9:30 am: **Lasing droplets in a microfabricated channel,** M. M. Tanyeri, R. M. Perron, I. M. Kennedy, Univ. of California/Davis . . . . . [6465-12]

9:50 am: **Hybrid microfluidic systems - combining a polymer microfluidic toolbox with biosensors,** C. Gaertner, S. Kirsch, B. Anton, H. Becker, Microfluidic ChipShop GmbH (Germany) . . . . . [6465-13]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 4

Room: Hilton Hotel: Santa Clara Room . . . . . Tues. 10:40 am to 12:00 pm

Lab-on-a-Chip II

Chair: **Yves Fouillet**, Lab. d'Electronique de Technologie de l'Information (France)

10:40 am: **Nanoparticle analysis using microscale field flow fractionation** *(Invited Paper)*, B. K. Gale, The Univ. of Utah . . . . . [6465-14]

11:20 am: **Three-dimensional integrated circuits for lab-on-chip dielectrophoresis of nanometer scale particles,** S. J. Dickerson, D. M. Chiarulli, S. P. Levitan, A. J. Noyola, Univ. of Pittsburgh . . . . . [6465-15]

11:40 am: **Integration of red VCSEL in a versatile microchip for encoding and subsequent detection of encoded beads,** M. G. Loughran, Tyndall National Institute (Ireland) . . . . . [6465-16]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 5

Room: Hilton Hotel: Santa Clara Room . . . . . Tues. 1:30 to 3:10 pm

Fabrication Technologies

Chair: **Bruce K. Gale**, Univ. of Utah

1:30 pm: **Nanoimprinting for micro- and nano-fluidics** *(Invited Paper, Presentation Only)*, J. Pong, Nanonex Corp. . . . . [6465-18]

2:10 pm: **Creation of embedded channels in SU-8 using two distinct exposure wavelengths,** G. H. Chapman, D. K. Poon, J. M. Dykes, J. T. K. Tsui, C. Choo, Y. Tu, J. Wang, Simon Fraser Univ. (Canada) . . . . . [6465-19]

2:30 pm: **Two-photon polymerization for fabrication of biomedical devices,** A. Ovsianikov II, Laser Zentrum Hannover e.V. (Germany); A. Doraiswamy, R. Narayan, Univ. of North Carolina; B. N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [6465-20]

2:50 pm: **Mechanically assembled polymer interconnects with dead volume analysis for microfluidic systems,** S. Jaffer, O. A. Lui, B. L. Gray, Simon Fraser Univ. (Canada) . . . . . [6465-21]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 6

Room: Hilton Hotel: Santa Clara Room . . . . . Tues. 3:40 to 5:40 pm

Microfluidics II

Chair: **Holger Becker**, Microfluidic ChipShop GmbH (Germany)

3:40 pm: **Concepts for micropneumatic and microhydraulic logic gates** *(Invited Paper)*, A. K. Henning, Aquarian Microsystems . . . . . [6465-22]

4:20 pm: **Squeeze film damping with a vibrating plate: implications and measurements for microfluidics,** C. K. Harrison, A. Goodwin, K. Hsu, |E. Tavernier, E. Donzier, Schlumberger Ltd.; F. Marty, B. Mercier, Group ESIEE (France) . . . . . [6465-23]

4:40 pm: **Visualization of turbid two-fluid flows inside microfluidic conduits,** Y. Ahn, W. Jung, Z. Chen, Univ. of California/Irvine . . . . . [6465-24]

5:00 pm: **Numerical simulation of transient nonlinear behaviors of electric-sensitive hydrogel membrane under an external electric field,** Z. Yuan, Univ. of Florida and National Univ.of Singapore (Singapore); L. Yin, H. Jiang, Univ. of Florida . . . . . [6465-25]

5:20 pm: **Stochastic time-of-flight flow rate measurement for microfluidic applications,** D. E. Angelescu, J. Jundt, Schlumberger Ltd.; J. Durivault, T. Desbarbieux, École Polytechnique (France); B. Mercier, Groupe ESIEE (France) . . . . . [6465-26]

Round Table Discussion

Optical Microsystems for Biomedical Applications

Fairmont Hotel, Atherton . . . . . 7:30 to 9:00 pm

Chair: **Scot S. Olivier**, Lawrence Livermore National Lab.

See page 19 for datails.

Wednesday 24 January

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Specific immobilization of human immunoglobulin G on gold-coated silicon microcantilever array,** S. K. Vashist, R. S. Dahiya, Univ. of Genoa (Italy) . . . . . [6465-28]

✔ **A simple planar micromixer with low-pressure drop for disposable lab-on-a-chip (LOC) systems,** A. A. S. Bhagat, E. T. K. Peterson, I. Papautsky, Univ. of Cincinnati . . . . . [6465-29]

✔ **Structural and electrical properties of conducting polymeric-aligned nanofibers via electrospinning,** J. H. Lee, Univ. at Albany . . . . . [6465-30]

✔ **Optimization of COC hot embossing with soft PDMS tools,** K. Zhou, I. Papautsky, Univ. of Cincinnati . . . . . [6465-32]

✔ **A simple passive micromixer using recombinant multiple flow streams,** J. S. Shim, I. Nikcevic, M. J. Rust, A. A. S. Bhagat, I. Papautsky, Univ. of Cincinnati . . . . . [6465-33]

✔ **A recyclable real-time DNA computing system based on surface plasmon resonance,** T. Chang, C. Lin, National Taiwan Univ. (Taiwan); C. Lin, National Sun Yat-Sen Univ. (Taiwan); C. Yang, I-Shou Univ. (Taiwan) . . . . . [6465-34]

✔ **Initial investigation of SU-8 photopolymer as a material for noninvasive endothelial cell research platforms,** S. M. Westwood, Simon Fraser Univ. (Canada); A. Gojova, Univ. of California/Davis; D. A. Cheng, Simon Fraser Univ. (Canada); A. I. Barakat, Univ. of California/Davis; B. L. Gray, Simon Fraser Univ. (Canada) . . . . . [6465-35]

✔ **Numerical simulations and analysis of a micropump actuated by traveling plane waves,** S. Yesilyurt, A. F. Tabak, Sabanci Univ. (Turkey) . . . . . [6465-36]

✔ **Fabrication and characterization of SiO_2 microcantilever for high sensitive moisture sensor,** Q. Chen, Louisiana Tech Univ. . . . . [6465-37]

✔ **Water-soluble (MUA-coated) quantum dots: physicochemical characterization and application,** Y. Lin, National Cheng Kung Univ. (Taiwan) . . . . . [6465-38]

✔ **Fabrication of a microfluidic system with integrated electrochemical pump and valves,** D. E. Lee, S. A. Soper, W. Wang, Louisiana State Univ. . . . . [6465-39]

✔ **Cross-polarization scheme for fluorescence detection for biochip and biomedical applications,** A. Pais, A. Banerjee, E. T. K. Peterson, H. Mu, I. Papautsky, D. J. Klotzkin, Univ. of Cincinnati . . . . . [6465-44]

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MOEMS and Miniaturized Systems VI

Conference Chairs: **David L. Dickensheets**, Montana State Univ.-Bozeman; **Bishnu P. Gogoi**, Evigia Systems, Inc.; **Harald Schenk**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

Program Committee: **Susanne Arney**, Lucent Technologies/Bell Labs.; **Christiaan Baert**, IMEC (Belgium); **Edwin T. Carlen**, Charles Stark Draper Lab., Inc.; **Claire Divoux**, CEA-LETI (France); **Jean-Christophe Eloy**, Yole Développment (France); **Kazuhiro Hane**, Tohoku Univ. (Japan); **Joseph J. Talghader**, Univ. of Minnesota; **Hakan Ürey**, Koç Univ. (Turkey)

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

Wednesday 24 January

SESSION 1

Room: Hilton Hotel: Santa Clara Room . . . . . Wed. 8:30 to 10:30 am

Microspectrometers

8:30 am: **Miniaturized FTIR-spectrometer based on an optical MEMS translatory actuator,** T. Sandner, T. Knieling, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); A. Kenda, Carinthian Tech Research AG (Austria); A. Wolter, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-01]

8:50 am: **Uniform tilt-angle micromirror array for multi-object spectroscopy,** S. Waldis, Univ. de Neuchatel (Switzerland); F. Zamkotsian, Lab. d'Astrophysique de Marseille (France); P. Clerc, A. Hugi, W. Noell, M. Zickar, N. F. de Rooij, Univ. de Neuchatel (Switzerland) . . . . . [6466-02]

9:10 am: **Using MEMS technology for cost effective recycling of plastics,** Y. Geller, M. Ramani, Polychromix, Inc. . . . . [6466-03]

9:30 am: **Investigation and characterization of high-efficient NIR-scanning gratings used in NIR microspectrometer,** F. Zimmer, T. Sandner, H. Grueger, A. Heberer, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); A. Kenda, Carinthian Tech Research AG (Austria); H. Schenk, H. K. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-04]

9:50 am: **Tunable infrared detector with integrated micromachined Fabry-Perot filter,** N. Neumann, M. Ebermann, InfraTec GmbH (Germany); K. Hiller, Technische Univ. Chemnitz (Germany); S. Kurth, Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration (Germany) . . . . . [6466-05]

10:10 am: **An indium phosphide-based near-infrared MOEMS microspectrometer for agri-food and environmental monitoring,** M. Garrigues, J. Leclercq, R. Gil-Sobraques, École Centrale de Lyon (France); O. Parillaud, A. Marceaux, Alcatel Research & Innovation (France); M. Crochon, J. Roger, Cemagref (France); O. Amore, B. Vilotitch, Datalink Instruments (France) . . . . . [6466-06]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 2

Room: Hilton Hotel: Santa Clara Room . . . . . Wed. 11:00 am to 12:40 pm

Display Applications

11:00 am: **MEMS compatible illumination and imaging micro-optical systems** *(Invited Paper)***,** A. H. Bräuer, P. Schreiber, J. W. Duparré, B. Höfer, P. Dannberg, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); M. Scholles, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-07]

11:30 am: **The iMoD display: considerations and challenges in fabricating MOEMS on large area glass substrates** *(Invited Paper)***,** C. Chui, Exponent Failure Analysis . . . . . [6466-08]

12:00 pm: **Ultra-compact laser projection systems based on two-dimensional resonant microscanning mirrors,** M. Scholles, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); A. H. Bräuer, Fraunhofer-Institut für Optik und Feinmechanik (Germany); K. Frommhagen, C. Gerwig, H. K. Lakner, H. Schenk, M. Schwarzenberg, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-09]

12:20 pm: **Electrostatic 1D microscanner with vertical combs for HD resolution display,** J. Cho, Y. Park, Y. Ko, S. Kang, S. Chung, Y. Cho, S. Chang, J. Lee, J. Sunu, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6466-10]

Lunch/Exhibition Break . . . . . 12:40 to 1:50 pm

SESSION 3

Room: Hilton Hotel: Santa Clara Room . . . . . Wed. 1:50 to 3:00 pm

High-Resolution Scan Mirrors

1:50 pm: **Electro-optomechanical cantilever-based logic gates,** G. P. Rehder, M. I. Alayo Chavez, H. B. Medina, M. N. P. Carreño, Univ. de São Paulo (Brazil) . . . . . [6466-25]

2:10 pm: **High-performance silicon scanning mirror for laser printing** *(Invited Paper)***,** W. O. Davis, D. Brown, Microvision, Inc.; M. Helsel, North Seattle Community College; R. Sprague, G. Gibson, Microvision, Inc.; A. Yalcinkaya, H. Ürey, Koç Univ. (Turkey) . . . . . [6466-11]

2:40 pm: **Fracture strength of silicon-on-insulator torsional springs in MEMS micromirrors,** S. Hsu, A. Wolter, W. Owe, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Hilton Hotel: Santa Clara Room . . . . . Wed. 3:30 to 6:00 pm

Imaging Applications

3:30 pm: **Liquid-based variable-focus lenses for zoom cameras** *(Invited Paper)*, S. Kuiper, B. H. W. Hendriks, Philips Research Labs. (Netherlands) . . . . . [6466-13]

4:00 pm: **Dual-axes confocal microscopy with a MEMS scanner for reflectance and fluorescence imaging** *(Invited Paper)*, H. Ra, W. Piyawattanametha, Y. Taguchi, D. Lee, O. D. Solgaard, Stanford Univ. [6466-14]

4:30 pm: **High-speed three-dimensional endoscopic OCT using MEMS technology** *(Invited Paper)*, Z. Chen, W. Jung, Univ. of California/Irvine; D. T. McCormick, Univ. of California/Berkeley; N. C. Tien, Case Western Reserve Univ. . . . . [6466-15]

5:00 pm: **A new microlaser camera,** C. Drabe, T. Klose, A. Wolter, H. Schenk, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); R. A. James, Microvision, Inc. . . . . [6466-16]

5:20 pm: **Update on MEMS-based scanned beam imager,** R. A. James, G. Gibson, W. O. Davis, F. Metting, Microvision, Inc.; C. Drabe, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6466-17]

5:40 pm: **Artificial compound eye on a curved basis by laser beam writing,** J. W. Duparré, D. Radtke, A. Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6466-18]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Investigation of motion behavior for the opposite connection micro-optical devices by CMOS-MEMS process,** C. Tsai, Y. Huang, S. Tsai, Ming Hsin Univ. of Science and Technology (Taiwan) . . . . . [6466-26]

✔ **Improved homogenization of fly's eye condenser setups under coherent illumination using chirped microlens arrays,** F. C. Wippermann, P. Dannberg, A. H. Bräuer, Fraunhofer-Institut Angewandte Optik und Feinmechanik (Germany); S. Sinzinger, Technische Univ. Ilmenau (Germany) . . . . . [6466-27]

✔ **Novel modeling approach for multidisciplinary microdomains,** M. Motiee, A. Khajepour, R. R. Mansour, Univ. of Waterloo (Canada) . . . . . [6466-28]

Thursday 25 January

SESSION 6

Room: Hilton Hotel: Santa Clara Room . . . . . Thurs. 8:30 to 10:20 am

MOEMS Components, Systems, and Packaging

8:30 am: **Chip-scale reconfigurable-optical add/drop multiplexer for wavelength routing in telecommunications** *(Invited Paper, Presentation Only)*, J. A. Kubby, Univ. of California/Santa Cruz; J. Chen, J. C. Diehl, K. Feinberg, K. A. German, P. Gulvin, L. Herko, N. Jia, P. Lin, X. Liu, J. Ma, J. Meyers, P. J. Nystrom, Y. R. Wang, Xerox Corp. . . . . [6466-19]

9:00 am: **Fabrication of micromechanical and micro-optical systems by two-photon polymerization,** C. Reinhardt, A. Ovsianikov II, S. Passinger, B. N. Chichkov, Laser Zentrum Hannover e.V. (Germany) . . . . . [6466-20]

9:20 am: **Investigation of a seesaw structure for elevating the micro-optical device by CMOS-MEMS process,** C. Tsai, S. Tsai, Y. Huang, Ming Hsin Univ. of Science and Technology (Taiwan) . . . . . [6466-22]

9:40 am: **Long-term stability of chip-scale atomic clock physics packages,** S. Knappe, V. P. Gerginov, V. Shah, H. G. Robinson, L. W. Hollberg, J. E. Kitching, National Institute of Standards and Technology . . . . . [6466-23]

10:00 am: **Six-axis complaint mechanisms for manipulation of microscale fiber optics components,** S. Chen, M. L. Culpepper, Massachusetts Institute of Technology; S. C. Jordan, Physik Instrumente LP . . . . . [6466-24]

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MEMS Adaptive Optics

Conference Chairs: **Scot S. Olivier**, Lawrence Livermore National Lab.; **Thomas G. Bifano**, Boston Univ.; **Joel A. Kubby**, Univ. of California/Santa Cruz

Program Committee: **William D. Cowan**, Sandia National Labs.; **Christopher Dainty**, National Univ. of Ireland/Galway (Ireland); **Donald T. Gavel**, Univ. of California/Santa Cruz; **Andreas Gehner**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany); **Wenhan Jiang**, Institute of Optics and Electronics (China); **Alexis V. Kudryashov**, Night N (opt) Ltd. (Russia); **Sergio R. Restaino**, Naval Research Lab.; **Ulrich Wittrock**, Fachhochschule Münster (Germany)

SPIE and the organizers gratefully acknowledge the following contributor

Center for Adaptive Optics
An NSF Science and Technology Center

Monday 22 January

MOEMS-MEMS Plenary Session

Conv. Ctr. Room A7/A8 . . . . . Mon. 9:00 am to 12:00 pm

See page 18 for more information

Wednesday 24 January

SESSION 1

Room: Hilton Hotel: Almaden II . . . . . Wed. 8:30 am to 12:10 pm

Applications of MEMS AO

Chairs: **Thomas G. Bifano**, Boston Univ.; **Andreas Gehner**, Fraunhofer-Institut für Photonische Mikrosysteme (Germany)

8:30 am: **MEMS development for astronomical instrumentation at the Lick Observatory Laboratory for Adaptive Optics** *(Invited Paper)*, D. T. Gavel, Univ. of California/Santa Cruz . . . . . [6467-01]

9:00 am: **Retinal imaging of mice with an adaptive optics laser scanning opthalmascope** *(Invited Paper)*, D. P. Biss, R. H. Webb, Schepens Eye Research Institute; Y. Zhou, T. G. Bifano, Boston Univ.; C. P. Lin, Massachusetts General Hospital . . . . . [6467-02]

9:30 am: **Improving two-photon microscope depth penetration with a deformable mirror** *(Invited Paper)*, J. Mertz, A. Leray, Boston Univ. . [6467-03]

10:00 am: **Adaptive optics two-photon fluorescence microscopy,** Y. Zhou, T. G. Bifano, Boston Univ.; C. P. Lin, Massachusetts General Hospital [6467-04]

Coffee Break . . . . . 10:20 to 10:50 am

10:50 am: **Adaptive scanning optical microscope (ASOM): large field of view and high-resolution imaging using a MEMS deformable mirror,** B. M. Potsaid, J. T. Wen, Rensselaer Polytechnic Institute . . . . . [6467-05]

11:10 am: **MEMS membrane mirrors for focus adjustment and aberration correction in endoscopic confocal and OCT imaging instruments** *(Invited Paper)*, D. L. Dickensheets, Montana State Univ./Bozeman . . [6467-06]

11:40 am: **Latest developments in adaptive optics: optical coherence tomography** *(Invited Paper)*, R. J. Zawadzki, Univ. of California/Davis [6467-07]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 2

Room: Hilton Hotel: Almaden II . . . . . Wed. 1:30 to 5:00 pm

MEMS AO Systems and Performance I

Chairs: **Joel A. Kubby**, Univ. of California/Santa Cruz; **William D. Cowan**, Sandia National Labs.

1:30 pm: **MEMS adaptive optics, the NRL program: an update** *(Invited Paper)*, S. R. Restaino, J. R. Andrews, Naval Research Lab.; T. Martinez, Air Force Research Lab.; C. C. Wilcox, Naval Research Lab. . . . . [6467-08]

2:00 pm: **A novel MEMS reflective wavefront sensor,** J. R. Andrews, Naval Research Lab.; S. W. Teare, New Mexico Institute of Mining and Technology; S. R. Restaino, Naval Research Lab.; D. V. Wick, Sandia National Labs.; C. C. Wilcox, Naval Research Lab.; T. Martinez, Air Force Research Lab.; D. M. Payne, Narrascape . . . . . [6467-09]

2:20 pm: **Testbed for the characterization of MEM devices using a liquid crystal aberrator,** C. C. Wilcox, J. R. Andrews, S. R. Restaino, Naval Research Lab.; T. Martinez, Air Force Research Lab.; S. W. Teare, New Mexico Institute of Mining and Technology; D. M. Payne, Naval Research Lab. . . . . [6467-10]

2:40 pm: **MEMS active optics** *(Invited Paper, Presentation Only)*, D. V. Wick, B. E. Bagwell, Sandia National Labs.; T. Martinez, Air Force Research Lab.; S. R. Restaino, Naval Research Lab.; W. D. Cowan, O. B. Spahn, Sandia National Labs. . . . . [6467-11]

Coffee Break . . . . . 3:10 to 3:40 pm

3:40 pm: **Nonmechanical zoom using MEMS mirrors,** B. E. Bagwell, D. V. Wick, O. B. Spahn, W. D. Cowan, Sandia National Labs.; T. Martinez, Air Force Research Lab.; S. R. Restaino, Naval Research Lab. . . . . [6467-12]

4:00 pm: **AO SLM demonstration system and test bed** *(Invited Paper)*, M. Wildenhain, J. Knobbe, A. Gehner, M. Wagner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6467-13]

4:30 pm: **Task-based assessment of deformable mirrors** *(Invited Paper)*, E. M. Daly, E. Dalimier, T. D. Farrell, C. Dainty, National Univ. of Ireland/Galway (Ireland) . . . . . [6467-14]

Thursday 25 January

SESSION 3

Room: Hilton Hotel: Almaden II . . . . . Thurs. 8:30 to 10:10 am

MEMS AO Systems and Performance II

Chairs: **Sergio R. Restaino**, Naval Research Lab.; **Wenhan Jiang**, Institute of Optics and Electronics (China)

8:30 am: **The open-loop control of MEMS - modeling and experimental results,** D. T. Gavel, K. M. Morzinski, Univ. of California/Santa Cruz . . [6467-15]

8:50 am: **Adaptive optics ophthalmologic systems using dual deformable mirrors,** S. M. Jones, S. S. Olivier, Lawrence Livermore National Lab.; S. Joeres, Doheny Eye Institute; D. C. Chen, Lawrence Livermore National Lab.; R. J. Zawadzki, Univ. of California/Davis Medical Ctr.; S. Sadda, Doheny Eye Institute; J. S. Werner, Univ. of California/Davis Medical Ctr.; D. T. Miller, Indiana Univ. . . . . [6467-16]

9:10 am: **Design of a MEMS laser guide star pulse tracker,** O. A. Azucena, Jr., J. A. Kubby, Univ. of California/Santa Cruz . . . . . [6467-17]

9:30 am: **A model-based approach to wavefront sensorless adaptive optics,** M. J. Booth, Univ. of Oxford (United Kingdom) . . . . . [6467-18]

9:50 am: **Closed-loop experiment of double deformable mirrors adaptive optics system for phase compensation,** S. Hu, Institute of Optics and Electronics (China) and Univ. of Electronics Science and Technology of China (China); S. Chen, B. Xu, P. Yang, Institute of Optics and Electronics (China); J. Wu, Univ. of Electronic Science and Technology of China (China); W. Jiang, Institute of Optics and Electronics (China) . . . . . [6467-19]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 4

Room: Hilton Hotel: Almaden II . . . . . Thurs. 10:40 am to 4:00 pm

MEMS AO Devices

Chairs: **Donald T. Gavel**, Univ. of California/Santa Cruz; **Alexis V. Kudryashov**, Night N (opt) Ltd. (Russia); **Ulrich Wittrock**, Fachhochschule Münster (Germany)

10:40 am: **Recent advances in MEMS deformable mirror technology** *(Invited Paper)***,** P. A. Bierden, Boston Micromachines Corp. . . . . [6467-20]

11:10 am: **Piston-tip-tilt positioning of a segmented MEMS deformable mirror** *(Invited Paper)***,** M. A. Helmbrecht, Iris AO, Inc.; T. Juneau, SiTime Corp. . . . . [6467-21]

11:40 am: **First results in application for the MIRAO 52 D a new type of MOEMS deformable mirror** *(Invited Paper)***,** E. Lavergne, X. Levecq, J. Ballesta, S. Bucourt, Imagine Optic (France) . . . . . [6467-22]

Lunch Break . . . . . 12:10 to 1:30 pm

1:30 pm: **Novel development of tiny bimorph mirrors** *(Invited Paper)***,** A. V. Kudryashov, Night N (opt) Ltd. (Russia); V. V. Samarkin, Institute on Laser and Information Technologies (Russia); T. Cherezova, A. S. Sobolev, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6467-23]

2:00 pm: **Electrostatic polymer-based microdeformable mirror for adaptive optics,** F. Zamkotsian, Lab. d'Astrophysique de Marseille (France); V. Conedera, Lab. d'Analyse et d'Architecture des Systèmes (France); A. Liotard, P. Lanzoni, Lab. d'Astrophysique de Marseille (France); N. Fabre, H. Camon, Lab. d'Analyse et d'Architecture des Systèmes (France) . . . . . [6467-24]

2:20 pm: **Compact large-stroke piston tip-tilt actuator and mirror,** W. Noell, Univ de Neuchatel (Switzerland); A. Hugi, S. Waldis, N. F. de Rooij, Univ. de Neuchatel (Switzerland); T. Overstolz, R. P. Stanley, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland) . . . . . [6467-25]

2:40 pm: **CMOS integrable micromirrors with highly improved drift-stability,** J. Schmidt, A. Gehner, J. Knobbe, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6467-26]

3:00 pm: **Nanolaminate deformable mirrors of multiple size-scales,** A. P. Papavasiliou, Lawrence Livermore National Lab. . . . . [6467-27]

3:20 pm: **Design, processing, and materials for large-stroke actuators,** B. R. Fernandez, J. A. Kubby, Univ. of California/Santa Cruz . . . . . [6467-28]

3:40 pm: **Large-stroke self-aligned vertical comb drive actuated micromirror arrays for adaptive optics applications,** E. J. Carr, S. S. Olivier, Lawrence Livermore National Lab.; O. D. Solgaard, Stanford Univ. . . . [6467-29]

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SPIE Photonics WEST

OPTO 2007

Integrated Optoelectronics Devices

20–25 January 2007

San Jose Convention Center • San Jose, California USA

Symposium Chair:
Yakov Sidorin, Photineer Technology Group

Symposium Co-Chair:
Ali Adibi, Georgia Institute of Technology

Optoelectronic Materials and Devices
Program Chair: **James G. Grote,** Air Force Research Lab.

Photonic Integration
Program Chair: **Yakov Sidorin,** Photineer Technology Group

Nanotechnologies in Photonics
Program Chair: **Ali Adibi,** Georgia Institute of Technology

Advanced Optoelectronic Applications
Program Chair: **Zameer U. Hasan,** Temple Univ.

Semiconductor Lasers and LEDs
Program Chair: **Daniel K. Johnstone,** Virginia Commonwealth Univ.

Displays and Holography
Program Chairs: **Liang-Chy Chien,** Kent State Univ.; Ming H. Wu, Hamamatsu Corp.

OPTO Daily Conference Schedule

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Optoelectronic Materials and Devices

Program Chair: **James G. Grote,** Air Force Research Lab.

6468 **Physics and Simulation of Optoelectronic Devices XV** *(Osiński, Henneberger, Arakawa)* p. 178

6469 **Optical Components and Materials IV** *(Jiang, Digonnet)* p. 181

6470 **Organic Photonic Materials and Devices IX** *(Grote, Kajzar, Kim)* p. 183

6471A **Ultrafast Phenomena in Semiconductors and Nanostructure Materials XI** *(Tsen, Song)* p. 186

6472 **Terahertz and Gigahertz Electronics and Photonics VI** *(Linden, Sadwick)* p. 189

6471B **Semiconductor Photodetectors IV** *(Cohen, Estrera)* p. 188

6473 **Gallium Nitride Materials and Devices II** *(Morkoc, Litton)* p. 190

6474 **Zinc Oxide Materials and Devices II** *(Hosseini Teherani, Litton)* p. 193

OPTO Plenary Session
8:30 to 10:00 am

Photonic Integration

Program Chair: **Yakov Sidorin,** Photineer Technology Group

6475 **Integrated Optics: Devices, Materials, and Technologies XI** *(Sidorin, Waechter)* p. 196

6476 **Optoelectronic Integrated Circuits XI** *(Eldada, Lee)* p. 199

6477 **Silicon Photonics II** *(Kubby, Reed)* p. 201

6478 **Photonics Packaging, Integration, and Interconnects** *(Earman, Chen)* p. 204

Nanotechnologies in Photonics

Program Chair: **Ali Adibi,** Georgia Institute of Technology

6479 **Quantum Sensing and Nanophotonic Devices IV** *(Razeghi, Brown)* p. 206

6480 **Photonic Crystal Materials and Devices VI** *(Adibi, Lin, Scherer)* p. 209

6481 **Quantum Dots, Particles, and Nanoclusters IV** *(Eyink, Huffaker, Szmulowicz)* p. 212

Advanced Optoelectronic Applications

Program Chair: **Zameer U. Hasan,** Temple Univ.

6482 **Advanced Optical and Quantum Memories and Computing IV** *(Hasan, Craig, Shahriar, Coufal)* p. 214

6483 **Complex Light and Optical Forces** *(Andrews)* p. 216

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Semiconductor Lasers and LEDs

Program Chair: **Daniel K. Johnstone,** Virginia Commonwealth Univ.

OPTO Plenary Session
8:30 to 10:00 am

6484 **Vertical-Cavity Surface-Emitting Lasers XI** *(Choquette, Guenter)* p. 218

6486 **Light-Emitting Diodes: Research, Manufacturing, and Applications XI** *(Streubel, Jeon)* p. 222

6485 **Novel In-Plane Semiconductor Lasers VI** *(Mermelstein, Bour)* p. 219

6456 **High-Power Diode Laser Technology and Applications V** *(Zediker), p.* 144

6468 **Physics and Simulation of Optoelectronic Devices XV** *(Osiński/Henneberger/Arakawa), p.* 179

6472 **Terahertz and Gigahertz Electronics and Photonics VI** *(Linden/Sadwick)*, p. 189

6473 **Gallium Nitride Materials and Devices II** *(Morkoc/Litton)*, p. 190

Displays and Holography

Program Chairs: **Liang-Chy Chien,** Kent State Univ.; Ming H. Wu, Hamamatsu Corp.

6487 **Emerging Liquid Crystal Technologies II** *(Chien)* p. 224

6488 **Practical Holography XXI: Materials and Applications** *(Lessard, Bjelkhagen)* p. 226

6489 **Projection Displays XII** *(Wu, Lin)* p. 228

Special Events

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
20 January	21 January	22 January	23 January	24 January	25 January

Biomedical Optics Exhibition
San Jose Convention Center, Exhibition Hall 1
1:00 to 5:00 pm | 10:00 am to 4:00 pm

Annual Meeting of the Photonics Society of Chinese American (PSC): **Solid State Lighting Technologies,** 1:00 to 6:00 pm, p. 21

Welcome Reception, Fairmont Hotel, Imperial Ballroom, 6:00 to 7:30 pm, p. 10

Photonics West Exhibition
San Jose Convention Center, Exhibition Hall 1–3, Exhibit Foyer and South Hall
10:00 am to 5:00 pm | 10:00 am to 5:00 pm | 10:00 am to 4:00 pm

Attend the SPIEWorks Career Fair!
Exhibition Level, Convention Center, Almaden Concourse near the Hilton Hotel Entrance
11:00 am to 3:00 pm | 11:00 am to 3:00 pm

Optoelectronics Plenary Session, 8:30 to 10:00 am, p. 20

Technical Group Meeting: **Illumination,** 7:30 to 9:00 pm, p. 20

Technical Group Meeting: **Holography,** 7:30 to 9:00 pm, p. 20

OPTO, LASE, MOEMS-MEMS Poster Session, Parkside Hall, Civic Auditorium Complex, 6:00 to 7:30 pm

Workshop on Building a Nanophotonics Roadmap, 8:30 am to 12:30 pm, Fairmont Hotel, Hillsborough Room, p. 21

Monday-Thursday 22-25 January 2007 • Proceedings of SPIE Vol. 6468

Physics and Simulation of Optoelectronic Devices XV

Conference Chairs: **Marek Osiński**, CHTM/Univ. of New Mexico; **Fritz Henneberger**, Humboldt-Univ. zu Berlin (Germany); **Yasuhiko Arakawa**, Univ. of Tokyo (Japan)

Program Committee: **Michael J. Adams**, Univ. of Essex (United Kingdom); **Hiroshi Amano**, Meijo Univ. (Japan); **Toshihiko Baba**, Yokohama National Univ. (Japan); **Peter Blood**, Cardiff Univ. (United Kingdom); **Weng W. Chow**, Sandia National Labs.; **Shun-Lien Chuang**, Univ. of Illinois at Urbana-Champaign; **Silvano Donati**, Univ. degli Studi di Pavia (Italy); **Keiichi Edamatsu**, Tohoku Univ. (Japan); **Athanasios Gavrielides**, Air Force Research Lab.; **Stephan W. Koch**, Philipps-Univ. Marburg (Germany); **Fumio Koyama**, Tokyo Institute of Technology (Japan); **Nikolai N. Ledentsov**, Technische Univ. Berlin (Germany); **Luigi A. Lugiato**, Univ. degli Studi dell'Insubria (Italy); **Cun-Zheng Ning**, Arizona State Univ.; **Joachim Piprek**, NUSOD Institute; **Paul H. Shen**, Army Research Lab.; **Claude Weisbuch**, Ecole Polytechnique (France)

Monday 22 January

Opening Remarks

Room: Conv. Ctr. Room B4 . . . . . Mon. 9:00 to 9:05 am

Marek Osiński, CHTM/Univ. of New Mexico

SESSION 1

Room: Conv. Ctr. Room B4 . . . . . Mon. 9:05 to 10:25 am

Mid-Infrared Devices

Chair: **Paul H. Shen**, Army Research Lab.

9:05 am: **Small-footprint InGaSb/AlGaAsSb multiple quantum well light-emitting diodes,** N. J. Withers, G. A. Smolyakov, H.-J. Cao, CHTM/Univ. of New Mexico; R. Kaspi, Air Force Research Lab.; M. Osiński, CHTM/Univ. of New Mexico . . . . . [6468-43]

9:25 am: **Design analysis of lattice-matched AlInGaN-GaN quantum wells for optimized intersubband absorption in the mid-IR regime,** R. S. Tummidi, R. A. Arif, Y. Ee, N. Tansu, Lehigh Univ. . . . . [6468-44]

9:45 am: **Intersubband relaxation dynamics in short-wavelength InGaAs/AlAsSb quantum well structures,** C. V.-B. Tribuzy, S. Ohser, S. Winnerl, J. Grenzer, H. Schneider, M. Helm, Forschungszentrum Rossendorf (Germany); J. Neuhaus, T. Dekorsy, Univ. of Konstanz (Germany); K. Biermann, H. Kuenzel, Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH (Germany) [6468-45]

10:05 am: **Microscopic theory of light-intersubband-excitation coupling in semiconductors,** M. F. Pereira, Jr., Sheffield Hallam Univ. (United Kingdom) . . . . . [6468-46]

Coffee Break . . . . . 10:25 to 11:00 am

SESSION 2

Room: Conv. Ctr. Room B4 . . . . . Mon. 11:00 am to 12:00 pm

Modeling and Simulation of Planar Waveguides and Optical Fibers

Chair: **Angela Dyson**, Univ. of Essex (United Kingdom)

11:00 am: **Graphics-processor-units-based accelerated 2D and 3D FDTD solvers,** J. R. Humphrey, D. K. Price, J. P. Durbano, E. J. Kelmelis, R. Martin, EM Photonics, Inc. . . . . [6468-05]

11:20 am: **Simulation of various configurations of single-pump dispersion-compensating Raman/EDFA hybrid amplifiers,** M. A. P. M. Andrade, J. M. M. M. Almeida, J. M. d. S. Anacleto, Univ. de Trás-os-Montes e Alto Douro (Portugal) . . . . . [6468-06]

11:40 am: **Simplified gain calculation in erbium-doped $LiNbO_3$ waveguides,** E. K. Sharma, G. Jain, A. Kapoor, Univ. of Delhi (India) . . . . . [6468-07]

Lunch Break . . . . . 12:00 to 2:00 pm

SESSION 3

Room: Conv. Ctr. Room B4 . . . . . Mon. 2:00 to 3:20 pm

Physics of Ring Lasers and Diode Laser Frequency Stabilization

Chair: **Silvano Donati**, Univ. degli Studi di Pavia (Italy)

2:00 pm: **Influence of refraction dispersion on the Sagnac effect in semiconductor ring lasers,** P. G. Eliseev, M. Osiński, CHTM/Univ. of New Mexico . . . . . [6468-08]

2:20 pm: **Rb-saturated-absorption-profile-based enhancement of semiconductor laser frequency stability,** K. Nakano, S. Maehara, Y. Sekiya, M. Yanagisawa, T. Sato, M. Ohkawa, T. Maruyama, Niigata Univ. (Japan); S. Kawamura, National Astronomical Observatory of Japan (Japan) . . [6468-09]

2:40 pm: **Laser diode frequency stabilization by means of optical feedback and the magneto-optical effect,** T. Uehara, S. Maehara, T. Nimonji, T. Sato, M. Ohkawa, T. Maruyama, Niigata Univ. (Japan); S. Kawamura, National Astronomical Observatory of Japan (Japan) . . . . . [6468-10]

3:00 pm: **Compact double optical feedback external-cavity diode laser system and its frequency stabilization,** K. Doi, Y. Minabe, T. Sato, T. Maruyama, M. Ohkawa, Niigata Univ. (Japan); T. Tsubokawa, National Astronomical Observatory of Japan (Japan) . . . . . [6468-11]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 4

Room: Conv. Ctr. Room B4 . . . . . Mon. 3:50 to 5:10 pm

Physics and Modeling of Edge-Emitting and Vertical-Cavity Surface-Emitting Lasers

Chair: **Joachim Piprek**, NUSOD Institute

3:50 pm: **Optimization on the design of an ultra-high-power multisection tunable laser gain epilayers,** Y.-P. Zhang, T. M. Benson, C. Christopoulos, Univ. of Nottingham (United Kingdom) . . . . . [6468-21]

4:10 pm: **Gain eigenvalue calculations for antiguided VCSELs and arrays,** B. Klein, Georgia Institute of Technology . . . . . [6468-22]

4:30 pm: **Investigation of optical far-field stability in long-wavelength VCSELs: Thermal and carrier-induced effects,** A. Bäcker, S. Odermatt, ETH Zürich (Switzerland); M. J. Pfeiffer, Synopsys Switzerland AG (Switzerland); F. Römer, R. Santschi, B. Witzigmann, ETH Zürich (Switzerland) . . . . . [6468-23]

4:50 pm: **Size reduction of a semiconductor nanowire laser by using metal coating,** A. V. Maslov, NASA Ames Research Ctr.; C. Ning, Arizona State Univ. . . . . [6468-62]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room B4 . . . . . Tues. 10:30 am to 12:00 pm

Photonic Lattice Devices

Chair: **Shun-Lien Chuang**, Univ. of Illinois at Urbana-Champaign

10:30 am: **Active photonic lattices: The physics of coupled microlaser arrays** *(Invited Paper)***,** S. Riyopoulos, Science Applications International Corp. . . . . [6468-01]

11:00 am: **Optical simulation of photonic crystal patterned layer lasers,** V. Krishnamurthy, B. Klein, Georgia Institute of Technology . . . . . [6468-02]

11:20 am: **Effective index perturbation: Correlations between the photonic bandgap and the donor-like defect mode in photonic crystal slab,** Z.-X. Qiang, W.-D. Zhou, Univ. of Texas/Arlington . . . . . [6468-03]

11:40 am: **Design and simulation of an ultra compact integrated waveplate using 2D photonic crystal slab waveguide,** K. Bayat, S. K. Chadhuri, S. Safavi-Naeini, Univ. of Waterloo (Canada) . . . . . [6468-04]

Lunch/Exhibition Break . . . . . 12:00 to 2:00 pm

SESSION 6

Room: Conv. Ctr. Room B4 . . . . . Tues. 2:00 to 3:00 pm

Wide-Bandgap Lasers and LEDs

Chair: **Weng W. Chow**, Sandia National Labs.

2:00 pm: **Analysis of substrate modes in GaN/InGaN lasers,** B. Witzigmann, V. Laino, F. Roemer, ETH Zürich (Switzerland); C. Lauterbach, U. T. Schwarz, Univ. Regensburg (Germany); C. Rumbolz, M. O. Schillgalies, A. Lell, V. K. Härle, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6468-12]

2:20 pm: **Comparison of the simulation and experiments of the nitride-based UV-light-emitting diodes,** K. Iida, H. Watanabe, K. Takeda, T. Nagai, K. Nagamatsu, K. Balakrishnan, M. Iwaya, S. Kamiyama, H. Amano, I. Akasaki, Meijo Univ. (Japan); A. Bandoh, Showa Denko K.K. (Japan) . . . . . [6468-13]

2:40 pm: **Comparative study of the crystalline quality and performance of the nitride-based light-emitting diodes with *c*-plane, *a*-plane, and *m*-plane heterostructures,** T. Kawashima, T. Nagai, D. Iida, A. Miura, Y. Tsuchiya, Y. Okadome, M. Iwaya, S. Kamiyama, H. Amano, I. Akasaki, Meijo Univ. (Japan) . . . . . [6468-14]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 7

Room: Conv. Ctr. Room B4 . . . . . Tues. 3:30 to 4:50 pm

Optical Communication Components and Systems

Chair: **Cun-Zheng Ning**, Arizona State Univ.

3:30 pm: **Implications of injection current and active layer length on the performance of reflective semiconductor optical amplifiers,** N. Cheng, L. G. Kazovsky, Stanford Univ. . . . . [6468-24]

3:50 pm: **A simple analytical model to determine gain in 1064-nm pumped Tm-doped 1470-nm amplifier,** P. R. Watekar, S.-M. Ju, W.-T. Han, Gwangju Institute of Science and Technology (South Korea) . . . . . [6468-25]

4:10 pm: **Vertical-illumination InGaAs/InP quasi-unipolar photodetector with high-bandwidth, quantum efficiency, and resistance to bandwidth collapse,** P. D. Yoder, Georgia Institute of Technology; E. J. Flynn, CyOptics, Inc. [6468-26]

4:30 pm: **Tailoring the transmission spectrum of the long period fiber gratings by variation in the length of the grating,** R. Singh, E. K. Sharma, Univ. of Delhi (India) . . . . . [6468-27]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room B4 . . . . . Wed. 8:00 to 10:00 am

Nonlinear Dynamics and Chaos in Semiconductor Lasers

Chair: **Athanasios Gavrielides**, Air Force Research Lab.

8:00 am: **Comparative analysis on the observed non-linear dynamics between single diode lasers and lateral coupled diode lasers,** R. Santos, H. Lamela, Univ. Carlos III de Madrid (Spain) . . . . . [6468-29]

8:20 am: **Radio-over-fiber transmission from an optically injected semiconductor laser in period-one state,** S.-C. Chan, Univ. of California/Los Angeles; S.-K. Hwang, National Chung Cheng Univ. (Taiwan); J.-M. Liu, Univ. of California/Los Angeles . . . . . [6468-30]

8:40 am: **All-optical noninvasive chaos control of a semiconductor laser,** S. Schikora, H.-J. Wünsche, F. Henneberger, Humboldt-Univ. zu Berlin (Germany) . . . . . [6468-31]

9:00 am: **Excitability of chaotic transients in a semiconductor laser,** O. V. Ushakov, M. Radziunas, H.-J. Wünsche, F. Henneberger, Humboldt-Univ. zu Berlin (Germany) . . . . . [6468-32]

9:20 am: **Excitability in a quantum dot semiconductor laser with optical injection,** D. Goulding, S. P. Hegarty, S. Melnik, M. Hartnett, Tyndall National Institute (Ireland); J. G. McInerney, National Univ. of Ireland/Cork (Ireland); G. Huyet, Tyndall National Institute (Ireland) . . . . . [6468-33]

9:40 am: **A secure encryption scheme using chaotic self-pulsating laser diodes,** P. Rees, Univ. of Wales Swansea (United Kingdom) . . . . . [6468-34]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 9

Room: Conv. Ctr. Room B4 . . . . . Wed. 10:20 am to 12:20 pm

Physics of Quantum Dot Lasers

Chair: **Fritz Henneberger**, Humboldt-Univ. zu Berlin (Germany)

10:20 am: **Quantum kinetic approach to electron-LO-phonon relaxation: Is there a phonon bottleneck problem in optoelectronic devices?** *(Invited Paper)***,** P. Gartner, J. Seebeck, F. Jahnke, Univ. Bremen (Germany) . . . . . [6468-35]

10:50 am: **Maximizing the gain: Optimizing the carrier distribution in InGaAs quantum dot lasers** *(Invited Paper)***,** P. M. Smowton, I. C. Sandall, Cardiff Univ. (United Kingdom); D. J. Mowbray, H. Liu, M. Hopkinson, Univ. of Sheffield (United Kingdom) . . . . . [6468-36]

11:20 am: **A microscopic theory for optical gain in semiconductor quantum dots,** M. Lorke, Univ. Bremen (Germany); W. W. Chow, Sandia National Labs.; J. Seebeck, P. Gartner, F. Jahnke, Univ. Bremen (Germany) . . . . . [6468-37]

11:40 am: **Multi-section gain-lever quantum dot lasers,** Y. Li, N. A. Naderi, C. M. Dziak, Y.-C. Xin, L. F. Lester, CHTM/Univ. of New Mexico . . . . . [6468-38]

12:00 pm: **Lateral mode dynamics in high-power wide-aperture quantum dot laser,** J. Mukherjee, Tyndall National Institute (Ireland) and Univ. College Cork (Ireland); J. G. McInerney, National Univ. of Ireland/Cork (Ireland) [6468-39]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 10

Room: Conv. Ctr. Room B4 . . . . . Wed. 1:30 to 3:20 pm

Physics and Simulation of Low-Dimensional Structures and Devices

Chair: **Yasuhiko Arakawa**, Univ. of Tokyo (Japan)

1:30 pm: **Pattern formation in multistacked-quantum-dot-based microcavities: Modelization and role of gain asymmetries in the alpha factor** *(Invited Paper)*, M. Brambilla, T. Maggipinto, Politecnico e Univ. di Bari (Italy); S. Barbay, R. Kuszelewicz, Lab. de Photonique et Nanostructures/CNRS (France) . . . . . [6468-16]

2:00 pm: **Quantum-confined Stark effects in interdiffused semiconductor quantum dots,** Y. Wang, D. E. Negro, H. S. Djie, B.-S. Ooi, Lehigh Univ. . . . . [6468-17]

2:20 pm: **Quantum 3D finite-difference-time-domain (Q-FDTD) analysis of InGaAs-GaAsP and InN-GaN quantum-dot nanostructures,** Y. Ee, Y. P. Gupta, R. A. Arif, N. Tansu, Lehigh Univ. . . . . [6468-18]

2:40 pm: **Simulation of *p-n* junction properties of nanowires and nanowire arrays,** J. Hu, Univ. of California/Santa Cruz; Y. Liu, Stanford Univ.; A. V. Maslov, NASA Ames Research Ctr.; C.-Z. Ning, Arizona State Univ.; R. W. Dutton, Stanford Univ.; S.-M. Kang, Univ. of California/Santa Cruz . . . . . [6468-19]

3:00 pm: **Solution of the 3D Schrödinger equation with tensor effective mass based on perfectly matched layer and spectral element methods,** C.-D. Cheng, J.-H. Lee, K.-H. Lim, H. Z. Massoud, Q. H. Liu, Duke Univ. . . . . [6468-20]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 11

Room: Conv. Ctr. Room B4 . . . . . Wed. 3:50 to 5:20 pm

Photonics with Single-Quantum-Dot Devices

Chair: **Keiichi Edamatsu**, Tohoku Univ. (Japan)

3:50 pm: **Quantum light generation with a semiconductor quantum dot** *(Invited Paper)*, A. J. Shields, R. Young, M. Stevenson, A. J. Bennett, D. Ellis, Toshiba Research Europe Ltd. (United Kingdom); P. Atkinson, D. A. Ritchie, Univ. of Cambridge (United Kingdom) . . . . . [6468-40]

4:20 pm: **Optical manipulation of semiconductor quantum dots in superfluid helium** *(Invited Paper)*, M. Ashida, K. Inaba, T. Itoh, Graduate School of Engineering Science/Osaka Univ. (Japan) and CREST/Japan Science and Technology Agency (Japan) . . . . . [6468-41]

4:50 pm: **Advances in GaN-based quantum dots and photonic crystals for nanophotonic devices** *(Invited Paper)*, Y. Arakawa, Univ. of Tokyo (Japan) . . . . . [6468-42]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Optical and electrical investigations of junction temperature effects in green InGaN/GaN multiple-quantum-well light-emitting diodes,** W.-J. Chen, D.-C. Kuo, C.-W. Hung, C.-C. Ke, H.-T. Shen, J.-C. Wang, Y.-F. Wu, T.-E. Nee, Chang Gung Univ. (Taiwan) . . . . . [6468-15]

✔ **Analysis of power harmonic content and relaxation resonant frequency of a diode laser,** H. Zandi, M. Bavafa, M. Chamanzar, S. Khorasani, Sharif Univ. of Technology (Iran) . . . . . [6468-54]

✔ **New results of InGaN LED simulation,** O. I. Rabinovich, Moscow State Institute of Steel and Alloys/Technological Univ. (Russia); S. G. Nikiforov, ATV Outdoor Systems (Russia); V. P. Sushkov, Moscow State Institute of Steel and Alloys/Technological Univ. (Russia) and Acol Technologies S.A. (Switzerland); A. V. Shishov, Acol Technologies S.A. (Switzerland) . . . . . [6468-55]

✔ **Optimization of GaAs PIN diodes for neutron detection,** A. V. Thompson, E. M. Lee, J. W. Mares, H. P. Seigneur, W. V. Schoenfeld, College of Optics & Photonics/Univ. of Central Florida . . . . . [6468-56]

✔ **A novel approach for the analysis of Ti-PE:LiNbO$_3$ distributed parameter waveguides,** G. Bou Abboud, B.-E. Benkelfat, Institut National des Télécommunications (France); N. Grossard, Photline Technologies (France) . . . . . [6468-57]

✔ **Optical properties of subwavelength nanoholes in metal films,** V. N. Minasyan, K. Adamyan, Yerevan State Univ. (Armenia) . . . . . [6468-58]

✔ **Discrimination characteristics of a wire-grid polarizer for polarimetric detection of multiple polarized beams,** D. Kim, S. Moon, Yonsei Univ. (South Korea) . . . . . [6468-59]

✔ **Solitons in multicomponent dense media,** O. K. Khasanov, Institute of Solid State and Semiconductor Physics (Belarus); S. V. Sazonov, Immanuel Kant State Univ. of Russia (Russia); D. V. Gorbach, Belarusian State Univ. (Belarus); O. M. Fedotova, Institute of Solid State and Semiconductor Physics (Belarus); A. A. Afanasiev, State Higher Certification Committee (Belarus); E. Makarov, National Academy of Sciences of Belarus (Belarus) . . . . . [6468-60]

Thursday 25 January

SESSION 12

Room: Conv. Ctr. Room B4 . . . . . Thurs. 9:00 to 10:00 am

Mode-Locked Devices

Chair: **Nikolai N. Ledentsov**, Technische Univ. Berlin (Germany)

9:00 am: **Monolithic passively mode-locked lasers using quantum-dot or quantum-well materials grown on GaAs substrates,** Y.-C. Xin, A. Stintz, H.-J. Cao, CHTM/Univ. of New Mexico; L. Zhang, A. L. Gray, Zia Laser, Inc.; S. R. Bank, Stanford Univ.; M. Osiński, CHTM/Univ. of New Mexico; J. S. Harris, Jr., Stanford Univ.; L. F. Lester, CHTM/Univ. of New Mexico . . . . . [6468-51]

9:20 am: **Experimental and theoretical analysis of stable operation in monolithic quantum dot passively mode-locked lasers,** K. C. Brown, V. I. Kovanis, D. Murrell, M. L. Fanto, Air Force Research Lab.; Y. C. Xin, L. F. Lester, CHTM/Univ. of New Mexico . . . . . [6468-52]

9:40 am: **If EM fields do not operate on each other, why do we need many modes and large gain bandwidth to generate short pulses?,** C. Roychoudhuri, Univ. of Connecticut and Femto Macro Continuum [6468-53]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 13

Room: Conv. Ctr. Room B4 . . . . . Thurs. 10:30 am to 12:20 pm

Ultrafast Devices

Chair: **Peter Blood**, Cardiff Univ. (United Kingdom)

10:30 am: **Novel concepts for ultrahigh-speed quantum-dot VCSELs and edge-emitters** *(Invited Paper)*, N. N. Ledentsov, Technische Univ. Berlin (Germany) . . . . . [6468-47]

11:00 am: **Femtosecond carrier transport analysis of terahertz radiation from InAs and InN,** P. H. Shen, G. D. Chern, E. D. Readinger, M. Wraback, Army Research Lab. . . . . [6468-48]

11:20 am: **Investigation of photodetector structures for THz emission by photomixing using numerical simulation,** A. Dyson, I. Henning, M. J. Adams, Univ. of Essex (United Kingdom) . . . . . [6468-49]

11:40 am: **Generation of terahertz radiation using semiconductor heterostructures,** S. W. Koch, M. Kira, Philipps-Univ. Marburg (Germany); M. R. Hofmann, Ruhr-Univ. Bochum (Germany); J. V. Moloney, L. Fan, M. Fallahi, College of Optical Sciences/The Univ. of Arizona . . . . . [6468-61]

12:00 pm: **Optimum design of nonlinear-optical-loop mirrors for compression of low power gain-switching pulses,** C. de Dios Fernández, H. Lamela, Univ. Carlos III de Madrid (Spain) . . . . . [6468-50]

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6469

Optical Components and Materials IV

Conference Chairs: **Shibin Jiang**, NP Photonics, Inc.; **Michel J. F. Digonnet**, Stanford Univ.

Program Committee: **Jean-Luc Adam**, Univ. de Rennes I (France); **John M. Ballato**, Clemson Univ.; **Robert Dahlgren**, Silicon Valley Photonics, Ltd.; **J. Gary Eden**, Univ. of Illinois at Urbana-Champaign; **Simon C. Fleming**, The Univ. of Sydney (Australia); **François Gonthier**, ITF Optical Technologies, Inc. (Canada); **Jong Heo**, Pohang Univ. of Science and Technology (South Korea); **Animesh Jha**, Univ. of Leeds (United Kingdom); **Steven T. Johns**, Air Force Research Lab.; **Jacques Lucas**, Univ. de Rennes I (France); **Barrett G. Potter, Jr.**, The Univ. of Arizona; **David Pureur**, HighWave Optical Technologies (France); **Kathleen A. Richardson**, Clemson Univ.; **Giancarlo C. Righini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Stan M. Smith**, U.S. Army Space and Missile Defense Command; **Feng Song**, Nankai Univ. (China); **Setsuhisa Tanabe**, Kyoto Univ. (Japan); **Ji Wang**, Corning Inc.; **John M. Zavada**, U.S. Army Research Office

Monday 22 January

SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Mon. 8:10 to 10:00 am

Thin-Film Components

8:10 am: **Plasmonic metamaterials and devices** *(Invited Paper)*, X. Zhang, Univ. of California/Berkeley . . . . . [6469-01]

8:40 am: **Design of wideband optical polarizing films for visible region using oblique metal island films,** K. Baba, Y. Kakinuma, Sendai National College of Technology (Japan) . . . . . [6469-02]

9:00 am: **Optical switching with a thermochromic film,** L. Men, Q. Chen, Memorial Univ. of Newfoundland (Canada) . . . . . [6469-03]

9:20 am: **Time dependence of internal stress and optical characteristics of SiO_2 optical thin film,** H. Murotani, K. Arai, M. Wakaki, Tokai Univ. (Japan) . . . . . [6469-04]

9:40 am: **Active resonant subwavelength grating for scannerless range imaging sensors,** S. A. Kemme, R. R. Boye, Sandia National Labs. . [6469-05]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Mon. 10:20 am to 12:40 pm

Ceramics and Nanocrystals

10:20 am: **Challenges in the fabrication of transparent laser ceramics** *(Invited Paper)*, R. Gaume, J. A. Wisdom, R. K. Route, R. L. Byer, Stanford Univ. . . . . [6469-06]

10:50 am: **Novel photonics materials for broadband lightwave processing** *(Invited Paper)*, Y. Ohishi, Toyota Technological Institute (Japan) . . . . . [6469-07]

11:20 am: **Ceramization of erbium activated planar waveguides by bottom up technique,** Y. Jestin, Univ. degli Studi di Trento (Italy); C. Arfuso-Duverger, Univ. du Maine (France); C. Armellini, Univ. degli Studi di Trento (Italy); B. Boulard, Univ. du Maine (France); A. Chiappini, A. Chiasera, M. Ferrari, E. Moser, Univ. degli Studi di Trento (Italy); G. Nunzi-Conti, S. Pelli, Instituto di Fisica Applicata Nello Carrara (Italy); O. Peron, Univ. du Maine (France); G. Righini, Instituto di Fisica Applicata Nello Carrara (Italy) . . . . . [6469-08]

11:40 am: **Spectroscopic studies and AFM analysis of Ho^{3+} and Tm^{3+} doped yttrium oxide nanoparticles,** D. N. Patel, C. C. Perry, S. Kennedy, Oakwood College . . . . . [6469-09]

12:00 pm: **A hybrid sol-gel reverse-mesa waveguide using lanthanide phosphate nanoparticles for optical amplification,** H. Gan, L. Li, C. T. DeRose, R. A. Norwood, C. R. De Silva, Z. Zheng, N. N. Peyghambarian, The Univ. of Arizona . . . . . [6469-10]

12:20 pm: **2.6-watt average-power mode-locked ceramic Nd:YAG laser,** J. A. Wisdom, D. Hum, M. J. F. Digonnet, M. M. Fejer, R. L. Byer, Stanford Univ.; A. Ikesue, Poly-Techno Co., Ltd. (Japan) . . . . . [6469-11]

Lunch Break . . . . . 12:40 to 2:00 pm

SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Mon. 2:00 to 3:20 pm

Exotic Glasses

2:00 pm: **Concentration dependence of the fluorescence decay profile in transition metal doped chalcogenide glass,** M. A. Hughes, D. W. Hewak, Univ. of Southampton (United Kingdom); R. J. Curry, Univ. of Surrey (United Kingdom) . . . . . [6469-12]

2:20 pm: **Mid-infrared fiber laser application: Er^{3+} doped chalcogenide glasses,** V. Moizan, V. Nazabal, F. Smektala, P. Houizot, J. Troles, J. Adam, Univ. de Rennes I (France); J. Cariou, ONERA (France); J. Doualan, R. Moncorgé, ENSICAEN (France) . . . . . [6469-13]

2:40 pm: **Recent advances in laser-induced cooling in rare-earth doped low phonon materials,** J. M. Fernández, R. Balda, A. J. Garcia-Adeva, Univ. del Pais Vasco (Spain) . . . . . [6469-14]

3:00 pm: **Systematic and material independent variation of electrical, optical, and chemical properties of Ln-materials over the Ln-series (Ln=La,Ce,Pr,..,Lu),** E. van der Kolk, P. Dorenbos, Technische Univ. Delft (Netherlands) . . . . . [6469-15]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Mon. 3:40 to 5:40 pm

Lasers and Amplifiers

3:40 pm: **Fiber design for high power fiber lasers** *(Invited Paper)*, M. J. Li, X. Chen, J. Wang, A. Liu, S. Gray, D. T. Walton, A. B. Ruffin, J. DeMeritt, L. A. Zenteno, Corning Inc. . . . . [6469-16]

4:10 pm: **Power budget of Er-doped fiber evaluated with integrating sphere** *(Invited Paper)*, S. Tanabe, D. Zhang, Kyoto Univ. (Japan) . . . . . [6469-17]

4:40 pm: **Advanced waveguide lasers fabricated by femtosecond laser writing in an Er:Yb-doped phosphate glass,** G. Della Valle, R. Osellame, S. Taccheo, N. Chiodo, G. Galzerano, G. Cerullo, R. Ramponi, P. Laporta, Politecnico di Milano (Italy); U. Morgner, Univ. Hannover (Germany); A. Rozhin, V. Scardaci, A. C. Ferrari, Univ. of Cambridge (United Kingdom) . . . . . [6469-18]

5:00 pm: **Ultra-broadband Raman gain media for photonics device applications,** R. Jose, Y. Ohishi, Toyota Technological Institute (Japan) [6469-19]

5:20 pm: **Yb-doped phosphate fiber laser,** Y. Lee, Stanford Univ. . . [6469-20]

Tuesday 23 January

Optoelectronics
Plenary Presentation
8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Tues. 10:30 am to 12:10 pm

Bulk Components

10:30 am: **Large aperture tunable ultra narrow band Fabry-Perot-Bragg filter,** J. H. Lumeau, L. B. Glebov, College of Optics and Photonics/Univ. of Central Florida; V. I. Smirnov, OptiGrate; F. Lemarchand, M. Lequime, Institut Fresnel (France) . . . . . [6469-21]

10:50 am: **A diffractive lens for matter-wave beams,** R. R. Letfullin, Rose-Hulman Institute of Technology; T. F. George, Univ. of Missouri/ St. Louis . . . . . [6469-22]

11:10 am: **A single crystal photo-elastic-modulator,** F. Bammer, B. Holzinger, T. Schumi, Technische Univ. Wien (Austria) . . . . . [6469-23]

11:30 am: **Semiconductor saturable absorbers with recovery time controlled by lattice mismatch,** M. Guina, Tampere Univ. of Technology (Finland) and RefleKron Ltd. (Finland); S. Suomalainen, T. Hakulinen, O. G. Okhotnikov, Tampere Univ. of Technology (Finland); S. Marcinkevicius, Kungliga Tekniska Högskolan (Sweden) . . . . . [6469-24]

11:50 am: **Low-loss, low-voltage, AlGaAs/GaAs high speed optical switch with doping and composition graded heterojunction interfaces,** L. Sun, J. Noad, D. Coulas, S. Cao, R. James, G. Lovell, E. Higgins, Communications Research Ctr. Canada (Canada) . . . . . [6469-25]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Tues. 1:30 to 4:30 pm

Fiber Components

1:30 pm: **Fiber AOTF with record large FSR and its application as an NIR spectrometer,** Q. Li, S. X. Wang, B&W Tek, Inc. . . . . [6469-26]

1:50 pm: **A novel optical tuning technology,** N. Miron, ROCTEST Ltd. (Canada) . . . . . [6469-27]

2:10 pm: **Nonlinear mixing in nanowire subwavelength waveguides,** C. J. Barrelet, H. Park, Y. Wu, C. M. Lieber, Harvard Univ. . . . . [6469-28]

2:30 pm: **Development of soft-glasses photonic crystal fibers made by stacking-and-draw technique,** E. F. Chillcce, R. S. Ramos, B. Z. Honório, C. M. B. Cordeiro, C. H. Brito Cruz, G. J. Jacob, E. Rodriguez, C. L. Cesar, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . . . [6469-29]

2:50 pm: **Star cross section polymer open photonic crystal fibers,** E. F. Chillcce, W. M. Faustino, G. J. Jacob, E. Rodriguez, W. L. Moreira, C. L. Cesar, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . . . [6469-30]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Photosensitivity of optical fiber gratings and sensing applications,** Q. Chen, P. Lu, L. Men, Memorial Univ. of Newfoundland (Canada) . . [6469-31]

3:50 pm: **Electric-arc-induced long period fiber gratings for gain equalization of erbium-doped optical amplifiers,** I. Cacciari, S. Berneschi, M. Brenci, R. Falciai, G. Nunzi COnti, S. Pelli, G. C. Righini, Instituto di Fisica Applicata Nello Carrara (Italy) . . . . . [6469-32]

4:10 pm: **A study of silver-film ion-exchanged glass waveguides in phosphate glass,** S. E. Yliniemi, Helsinki Univ. of Technology (Finland); J. Albert, Carleton Univ. (Canada); S. Honkanen, College of Optical Sciences/ The Univ. of Arizona . . . . . [6469-49]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Characterization of light scattering and film structure of TiO_2 thin film,** H. Murotani, T. Kudo, M. Wakaki, Tokai Univ. (Japan) . . . . . [6469-34]

✔ **Simple chromatic dispersion measurement method using a spectral interferometer,** J. Lee, I. H. Shin, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6469-36]

✔ **Graded porous silicon optical filter fabricated with the aid of diffusion-limited etch,** K. Hwang, Y. Park, H. Jeon, Seoul National Univ. (South Korea) . . . . . [6469-37]

✔ **Codoped materials for high power fiber lasers: diffusion behaviour and optical properties,** S. Unger, A. Schwuchow, J. Dellith, J. Kirchhof, Institut für Physikalische Hochtechnologie e.V. (Germany) . . . . . [6469-38]

✔ **Stable system technique for measuring the refractive index profile of an optical fiber by modified fiber-type confocal microscope method,** S. B. Cho, Y. Youk, D. Y. Kim, Gwangju Institute of Science and Technology (South Korea) . . . . . [6469-39]

✔ **Effects of CsCl to enhance the thermal stability range of tellurite glasses for Er^{3+} doped optical fiber drawing,** L. C. Barbosa, C. R. Eyzaguirre, E. F. Chillcce, E. Rodriguez, G. J. Jacob, S. P. A. Osorio, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6469-40]

✔ **Equilibrium-state emission of electron-trapping material thin-film for applications in nonlinear-dynamics,** R. Pashaie, N. H. Farhat, Univ. of Pennsylvania . . . . . [6469-41]

✔ **A reconsideration of the birefringent interleaver,** C. Cheng, Miami Univ. . . . . [6469-44]

✔ **Rare earth doped tellurite glasses for fiber lasers in the 2-micron wavelength region,** D. Milanese, M. Vota, G. Liao, M. Ferraris, Politecnico di Torino (Italy); N. Coluccelli, S. Taccheo, Politecnico di Milano (Italy) [6469-45]

✔ **Analysis into different multi-photon processes participating in upconversion luminescence of Er: NaY (WO4) 2 crystal,** F. Song, K. Zhang, L. Han, J. Su, J. Tian, Nankai Univ. (China) . . . . . [6469-47]

✔ **A miniature electro-optic switch array,** X. Lu, Univ. of Massachusetts/ Lowell; M. Li, PICC Property and Casualty Co., Ltd. (China) . . . . . [6469-48]

Sunday-Wednesday 21-24 January 2007 • Proceedings of SPIE Vol. 6470

Organic Photonic Materials and Devices IX

Conference Chairs: **James G. Grote**, Air Force Research Lab.; **Francois Kajzar**, CEA Saclay (France); **Nakjoong Kim**, Hanyang Univ. (South Korea)

Program Committee: **Chantal Andraud**, École Normale Supérieure de Lyon (France); **Werner J. Blau**, The Univ. of Dublin, Trinity College (Ireland); **Sophie Brasselet**, École Normale Supérieure de Cachan (France); **Christoph Bubeck**, Max-Planck Institute for Polymer Research (Germany); **Darnell E. Diggs**, Air Force Research Lab.; **Alain F. Fort**, Strasbourg Univ. (France); **Makoto Hikita**, NTT Advanced Technology Corp. (Japan); **F. Kenneth Hopkins**, Air Force Research Lab.; **Alex K. Jen**, Univ. of Washington; **Toshikuni Kaino**, Tohoku Univ. (Japan); **Junji Kido**, Yamagata Univ. (Japan); **Jang-Joo Kim**, Seoul National Univ. (South Korea); **Isabelle N. Ledoux-Rak**, École Normale Supérieure de Cachan (France); **Charles Y. C. Lee**, Air Force Office of Scientific Research; **Kwang-Sup Lee**, Hannam Univ. (South Korea); **Misoon Mah**, Asian Office of Aerospace Research and Development (Japan); **Seth R. Marder**, Georgia Institute of Technology; **Robert A. Norwood**, College of Optical Sciences/The Univ. of Arizona; **Jean-Michel Nunzi**, Univ. d'Angers (France); **Susanna Orlic**, Technische Univ. Berlin (Germany); **Devanand K. Shenoy**, Defense Advanced Research Projects Agency (DARPA); **Kenneth D. Singer**, Case Western Reserve Univ.; **Donald J. Smith**, European Office of Aerospace Research and Development (EOARD) (United Kingdom); **Rebecca E. Taylor**, Lockheed Martin Corp.; **Toshiyuki Watanabe**, Sumiden Opcom (Japan); **Jeong Weon Wu**, Ewha Womans Univ. (South Korea)

Sunday 21 January

Opening Remarks

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . . Sun. 8:50 to 9:00 am

SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . Sun. 9:00 to 10:15 am

Biophotonics I

Chair: **James G. Grote**, Air Force Research Lab.

Keynote Presentation

9:00 am: **Nonlinear optics for nanophotonics and biophotonics,** P. N. Prasad, Univ. at Buffalo . . . . . [6470-01]

9:45 am: **New organic molecular nanoprobes for in vivo two-photon fluorescence microscopy** *(Invited Paper)***,** P. L. Baldeck, Univ. Joseph Fourier (France); C. Andraud, École Normale Supérieure de Lyon (France); A. Attias, Ctr. National de la Recherche Scientifique (France); C. Barsu, École Normale Supérieure de Lyon (France); J. Bernard, Univ. Joseph Fourier (France); F. Bolze, Institut de Physique et Chimie des Matériaux de Strasbourg (France); Y. Bretonnière, F. Darbour, École Normale Supérieure de Lyon (France); A. Duperray, A. Grichine, Institut Albert Bonniot (France); A. Hayek, Institut de Physique et Chimie des Matériaux de Strasbourg (France); T. Huault, Univ. Joseph Fourier (France); D. Kréher, Ctr. National de la Recherche Scientifique (France); G. Lemercier, École Normale Supérieure de Lyon (France); F. Mathevet, Ctr. National de la Recherche Scientifique (France); O. Maury, École Normale Supérieure de Lyon (France); J. Nicoud, Institut de Physique et Chimie des Matériaux de Strasbourg (France); C. Ricard, B. P. J. van der Sanden, Inst. Nat'l de la Santé et de la Recherche Médicale (France); O. Stephan, L. Vurth, J. A. Vial, Univ. Joseph Fourier (France) . . . . . [6470-03]

Coffee Break . . . . . 10:15 to 10:30 am

SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . Sun. 10:30 am to 12:10 pm

Biophotonics II

Chair: **Bong Rae Cho**, Korea Univ. (South Korea)

10:30 am: **Nonlinear microscopy of collagen fibers** *(Invited Paper)***,** M. Strupler, A. Pena, M. Hernest, École Polytechnique (France) and CNRS (France) and INSERM (France); P. Tharaux, INSERM (France); A. Fabre, INSERM (France) and AP-HP (France) and Univ. Paris 7 (France); J. Marchal-Somme, INSERM (France) and AP-HP (France); B. Crestani, INSERM (France) and AP-HP (France) and Univ. Paris 7 (France); D. Débarre, École Polytechnique (France) and CNRS (France) and INSERM (France); J. Martin, E. Beaurepaire, École Polytechnique (France) and INSERM (France) and CNRS (France); M. Schanne-Klein, École Polytechnique (France) . . . . . [6470-04]

11:00 am: **Organic nanofibers from thiophenes, phenylenes and thiophene-phenylenes,** F. Balzer, Humboldt-Univ. zu Berlin (Germany); M. Schiek, Carl von Ossietzky Univ. Oldenburg (Germany); A. Lützen, Univ. Bonn (Germany); K. H. B. Al-Shamery, Carl von Ossietzky Univ. Oldenburg (Germany); H. Rubahn, Syddansk Univ. (Denmark) . . . . . [6470-05]

11:20 am: **Development and study of hybrid organic: colloidal quantum dot systems,** K. N. Bourdakos, D. M. N. M. Dissanayake, R. J. Curry, Univ. of Surrey (United Kingdom) . . . . . [6470-06]

11:40 am: **Molecular design for two-photon absorption: from the visible to telecommunication wavelengths** *(Invited Paper)***,** C. Barsu, C. Girardot, École Normale Supérieure de Lyon (France); P. Bouitt, A. Picot, Ecole normale supérieure de Lyon (France); Y. Bretonnière, G. Lemercier, O. Maury, C. Andraud, École Normale Supérieure de Lyon (France); J. Vial, P. L. Baldeck, J. Chauvin, Univ. Joseph Fourier (France); J. Vicat, R. Kahn, UMR CNRS (France); A. Grichine, Univ. Joseph Fourier (France); D. Riehl, Delegation Generale pour l'Armement (France); P. Feneyrou, Thales Research & Technology (France) . . . . . [6470-42]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . . Sun. 1:30 to 3:10 pm

Biophotonics III

Chair: **Alex K. Y. Jen**, Univ. of Washington

1:30 pm: **Using DNA to organize organic nonlinear optic chromophores** *(Invited Paper)***,** B. H. Robinson, Univ. of Washington . . . . . [6470-08]

2:00 pm: **Photoelectric effect and current-voltage characteristics in DNA-metal Schottky barriers** *(Invited Paper)***,** D. Zang, IPITEK, Inc. . . . . [6470-09]

2:30 pm: **DNA biotronics,** J. G. Grote, Air Force Research Lab. . . . . [6470-10]

2:50 pm: **Dielectric and electrical transport properties of DNA-CTMA thin-films,** C. M. Bartsch, Univ. of Dayton . . . . . [6470-11]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . . Sun. 3:30 to 5:40 pm

Nonlinear Optics I

Chair: **Patrice L. Baldeck**, Univ. Joseph Fourier (France)

3:30 pm: **New paradigm for ultrahigh electro-optic activity: through supramoleculars self-assembly and novel lattice hardening** *(Invited Paper)***,** A. K. Y. Jen, Univ. of Washington . . . . . [6470-12]

4:00 pm: **Nonlinear optical properties of functionalized DNA thin films,** O. Krupka, R. Czaplicki, A. El-Ghayoury, B. Sahraoui, Univ. d'Angers (France); F. Kajzar, CEA Saclay (France); J. G. Grote, Air Force Research Lab.; I. Rau, Univ. d_Angers (France) . . . . . [6470-13]

4:20 pm: **Optical modulation from an electro-optic polymer based hybrid Fabry-Perot etalon using transparent conducting oxides,** H. Gan, H. Zhang, C. T. DeRose, R. A. Norwood, M. Fallahi, The Univ. of Arizona; J. Luo, A. K. Y. Jen, Univ. of Washington; B. Liu, S. Ho, Northwestern Univ.; N. N. Peyghambarian, The Univ. of Arizona . . . . . [6470-14]

4:40 pm: **Improvement of electro-optic effect and novel waveguide structure in hybrid polymer/sol-gel modulators** *(Invited Paper)***,** Y. Enami, C. T. DeRose, C. L. Loychik, D. L. Mathine, R. A. Norwood, The Univ. of Arizona; J. Luo, A. K. Y. Jen, Univ. of Washington; N. N. Peyghambarian, The Univ. of Arizona . . . . . [6470-15]

5:10 pm: **Highly efficient organic thin films for second order nonlinear optics** *(Invited Paper)***,** R. Zamboni, S. Caria, E. Da Como, M. Muccini, M. Murgia, Istituto per lo Studio dei Materialo Nanostrutturati (Italy); I. Rãu, F. Kajzar, Commissariat à l'Energie Atomique (France); G. Barbarella, L. Favaretto, Istituto per la Sintesi Organica e la Fotoreattivi (Italy) . . . [6470-16]

OPTO

Monday 22 January

SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . Mon. 8:20 to 10:15 am

Optical Signal Processing

Chair: **Alain F. Fort**, Institut de Physique et Chimie des Matériaux de Strasbourg (France)

Keynote Presentation

8:20 am: **Photonics polymer for fiber to-the-display,** Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency, ERATO-SORST (Japan) . . . . . [6470-17]

9:05 am: **Hard and flexible optical printed circuit board** *(Invited Paper)***,** E. Lee, Inha Univ. (South Korea) . . . . . [6470-18]

9:35 am: **Preparation of graded-index plastic optical fiber by co-extrusion process,** R. Hirose, M. Asai, Keio Univ. (Japan) and Japan Science and Technology Agency, ERATO-SORST (Japan); A. Kondo, Keio Univ. (Japan); Y. Koike, Keio Univ. (Japan) and Japan Science and Technology Agency, ERATO-SORST (Japan) . . . . . [6470-19]

9:55 am: **Perfluorinated polymer based multi-core polymer optical fiber,** A. Kondo, Keio Univ. (Japan); T. Onishi, C. Tanaka, M. Naritomi, Asahi Glass Co., Ltd. (Japan); Y. Koike, Keio Univ. (Japan) . . . . . [6470-20]

Coffee Break . . . . . 10:15 to 10:30 am

SESSION 6

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . Mon. 10:30 am to 12:15 pm

Nonlinear Optics II

Chair: **Yasuhiro Koike**, Keio Univ. (Japan)

Keynote Presentation

10:30 am: **Polymers with unprecedented NLO response,** N. N. Peyghambarian, Optical Sciences Ctr./The Univ. of Arizona [6470-21]

11:15 am: **Styrylpyridine derivatives as lego building blocks for electroluminescence and two photon processes** *(Invited Paper)***,** A. Attias, D. Kréher, F. Mathevet, Univ. Pierre et Marie Curie (France); N. Lemaître, B. Geffroy, Commissariat à l'Energie Atomique (France); P. L. Baldeck, Univ. Joseph Fourier (France) . . . . . [6470-22]

11:45 am: **Observation of optical dispersion effects in metallic nanostructures fabricated by laser illumination of an organic polymer matrix doped with metallic salts** *(Invited Paper)***,** G. Vitrant, Ecole Nationale Superieure d'Electronique et de Radioelectricite de Grenoble (France); N. Tosa, T. Rosenzveig, O. Stephan, P. L. Baldeck, Univ. Joseph Fourier (France) . . . . . [6470-23]

Lunch Break . . . . . 12:15 to 1:30 pm

SESSION 7

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . Mon. 1:30 to 3:20 pm

Nonlinear Optics III

Chair: **Kwang-Sup Lee**, Hannam Univ. (South Korea)

1:30 pm: **Liquid crystal frequency selective surfaces for tunable negative-zero index optical materials and devices** *(Invited Paper)***,** I. Khoo, D. H. Werner, A. Diaz, The Pennsylvania State Univ. . . . . [6470-24]

2:00 pm: **On the importance of rotational contributions to cubic susceptibility in catenanes and rotaxanes** *(Invited Paper)***,** I. Rău, R. Czaplicki, A. Humeau, B. Sahraoui, G. Boudebs, O. Krupka, Univ. d'Angers (France); D. A. Leigh, J. Berna Canovas, Univ. of Edinburgh (United Kingdom); F. Kajzar, CEA Saclay (France) . . . . . [6470-25]

2:30 pm: **Resonance enhancement of two-photon cross section for optical storage in the presence of hot band absorption,** N. S. Makarov, A. Rebane II, M. A. Drobizhev, Montana State Univ./Bozeman; H. Wolleb, H. Spahni, Ciba Specialty Chemicals (Switzerland) . . . . . [6470-26]

2:50 pm: **Theoretical and experimental approaches to enhanced two-photon absorption** *(Invited Paper)***,** K. Kamada, K. Ohta, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6470-27]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 8

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . Mon. 3:40 to 4:50 pm

LEDs and OPV

Chair: **Alain F. Fort**, Institut de Physique et Chimie des Matériaux de Strasbourg (France)

3:40 pm: **Aggregation- and crystallization-induced light emission** *(Invited Paper)***,** Y. Hong, Y. Dong, H. Tong, Z. Li, M. Häussler, J. W. Y. Lam, B. Z. Tang, Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6470-28]

4:10 pm: **Cantilevers with integrated organic LEDs for scanning probe microscopy,** K. H. An, Y. Zhao, B. O_Connor, W. Loh, K. P. Pipe, M. Shtein, Univ. of Michigan . . . . . [6470-29]

4:30 pm: **Stimulated emission of sulforhodamine 640 doped DNA distributed feedback laser device,** Z. Yu, Univ. of Cincinnati; J. G. Grote, Air Force Research Lab.; A. J. Steckl, Univ. of Cincinnati . . . . . [6470-30]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 9

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . Tues. 10:30 to 11:40 am

Nonlinear Optics IV

Chair: **Francois Kajzar**, Commissariat à l'Energie Atomique (France)

10:30 am: **Pentacene-quantum dot polymeric nanocomposite for infrared photodetection** *(Invited Paper)***,** K. Lee, Hannam Univ. (South Korea) [6470-32]

11:00 am: **Submicron patterning of conductive polymers for use in infrared polarizers,** R. R. Boye, S. A. Kemme, D. R. Wheeler, S. M. Dirk, Sandia National Labs.; S. Samora, L&M Technologies; C. M. Washburn, M. L. Thomas, Sandia National Labs. . . . . [6470-33]

11:20 am: **Photobleaching microfabrication of polymer microring resonators,** A. L. Pyajt, J. Zhou, A. Chen, J. Luo, S. K. Hau, A. K. Y. Jen, L. R. Dalton, Univ. of Washington . . . . . [6470-34]

Lunch/Exhibition Break . . . . . 11:40 am to 1:00 pm

SESSION 10

Room: Marriott Hotel: San Jose Ballroom Salon V-VI . . . . Tues. 1:00 to 2:30 pm

Nonlinear Optics V

Chair: **James G. Grote**, Air Force Research Lab.

1:00 pm: **Optical storage through second harmonic signals in organic films** *(Invited Paper)***,** A. F. Fort, A. Barsella, L. Mager, D. Gindre, G. Taupier, K. D. Dorkenoo, Institut de Physique et Chimie des Matériaux de Strasbourg (France) . . . . . [6470-35]

1:30 pm: **Charge carrier transport and trapping in disordered organic materials** *(Invited Paper)***,** V. Kazukauskas, Vilnius Univ. (Lithuania) . . [6470-36]

2:00 pm: **Light induced processes in thin films of indandione type organic molecules** *(Invited Paper)***,** I. Muzikante, M. A. Rutkis, E. Fonavs, Latvijas Univ. (Latvia); B. Stiller, D. Neher, Univ. Potsdam (Germany); V. Kampars, P. Pastors, Riga Technical Univ. (Latvia) . . . . . [6470-37]

Wednesday 24 January

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6471A

Ultrafast Phenomena in Semiconductors and Nanostructure Materials XI

Conference Chairs: **Kong-Thon Tsen**, Arizona State Univ.; **Jin-Joo Song**, Univ. of California/San Diego

Program Committee: **Markus Betz**, Technische Univ. München (Germany); **Weimin M. Chen**, Linköpings Univ. (Sweden); **Chan-Kyung Choi**, Xepix Corp.; **Yujie J. Ding**, Lehigh Univ.; **Abdulhakem Y. Elezzabi**, Univ. of Alberta (Canada); **Jan A. Gaj**, Univ. Warszawski (Poland); **Hongxing Jiang**, Kansas State Univ.; **Jingyu Lin**, Kansas State Univ.; **Chi-Kuang Sun**, National Taiwan Univ. (Taiwan); **Fabrice Vallee**, Univ. Bordeaux I (France); **Chih-Chung Yang**, National Taiwan Univ. (Taiwan)

Monday 22 January

SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Mon. 8:30 to 10:00 am

Ultrafast Dynamics in Quantum Dots and Nano-Particles I

Chair: **Markus Betz**, Technische Univ. München (Germany)

8:30 am: **Ultrafast carrier dynamics in self-organized InGaAs quantum dots** *(Invited Paper)*, M. Betz, Technische Univ. München (Germany) and Univ. of Toronto (Canada); M. Wesseli, C. Ruppert, S. Trumm, Technische Univ. München (Germany) . . . . . [6471A-01]

9:00 am: **Ultrafast near-field microscopy of single gold nanoparticles** *(Invited Paper)*, K. Imura, H. Okamoto, Institute for Molecular Science (Japan) . . . . . [6471A-02]

9:30 am: **Quantum light emission of two lateral tunnel-coupled (In,Ga)As/GaAs quantum dots controlled by a tunable static electric field** *(Invited Paper)*, P. Michler, G. Beirne, C. Hermannstädter, Univ. Stuttgart (Germany); L. Wang, A. Rastelli, O. G. Schmidt, Max-Planck-Institut für Festkörperforschung (Germany) . . . . . [6471A-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon I . . Mon. 10:30 am to 12:00 pm

Ultrafast Dynamics in Quantum Dots and Nano-Particles II

Chair: **Markus Betz**, Technische Univ. München (Germany)

10:30 am: **Pulse duration dependence of the third order optical nonlinearity of a cadmium sulfide dendrimer nanocomposite** *(Invited Paper)*, R. Dorsinville, M. Etienne, A. D. Walser, M. J. Potasek, City College/CUNY . . . . . [6471A-05]

11:00 am: **Extreme ultrafast dynamics at metal and semiconductor surfaces** *(Invited Paper)*, H. Petek, Univ. of Pittsburgh . . . . . [6471A-06]

11:30 am: **Metallic colloids and their plasmonic properties** *(Invited Paper)*, M. Liu, The Univ. of Chicago; M. A. Pelton, Argonne National Lab.; N. F. Scherer, P. Guyot-Sionnest, The Univ. of Chicago . . . . . [6471A-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Mon. 1:30 to 3:00 pm

Ultrafast Carrier and Exciton Dynamics I

Chair: **Chih-Chung Yang**, National Taiwan Univ. (Taiwan)

1:30 pm: **Ultrafast dynamics of photoexcited charge and spin currents in semiconductor nanostructures** *(Invited Paper)*, T. Meier, Philipps-Univ. Marburg (Germany); H. T. Duc, Institute of Physics (Vietnam); Q. T. Vu, Univ. of Natural Sciences (Vietnam); B. Pasenow, Philipps-Univ. Marburg (Germany); H. Haug, Johann Wolfgang Goethe-Univ. (Germany); S. W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [6471A-08]

2:00 pm: **Quantum complementarity of microcavity polaritons** *(Invited Paper)*, W. W. Langbein, Cardiff Univ. (United Kingdom) . . . . [6471A-09]

2:30 pm: **Ultrafast pump-probe spectroscopy with an extremely broad probe spectrum for studying the exciton relaxation process in an InGaN thin film** *(Invited Paper)*, Y. Lu, H. Wang, C. Chen, C. Yang, National Taiwan Univ. (Taiwan) . . . . . [6471A-10]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Mon. 3:30 to 5:00 pm

Ultrafast Carrier and Exciton Dynamics II

Chair: **Kong-Thon Tsen**, Arizona State Univ.

3:30 pm: **Extra enhancement of luminance decay rate near the boundary of a silver thin-film region on an InGaN/GaN quantum well through the resonance coupling of surface plasmon polariton** *(Invited Paper)*, C. Chen, D. Yeh, C. Huang, Y. Lu, C. Yang, National Taiwan Univ. (Taiwan) . . . [6471A-11]

4:00 pm: **Ultrafast spatio-temporal dynamics of polariton condensates in semiconductor microcavities** *(Invited Paper)*, J. J. Baumberg, A. Grundy, G. Baldassarri, P. G. Lagoudakis, Univ. of Southampton (United Kingdom) . . . . . [6471A-12]

4:30 pm: **Fast carrier dynamics in GaAs deep-centers for novel high-efficiency light-emitters for 1.3um-1.5um fiber optics** *(Invited Paper)*, J. L. Pan, Yale Univ. . . . . [6471A-36]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon I . . Tues. 10:30 am to 12:15 pm

Ultrafast Spin Dynamics I

Chair: **Jan A. Gaj**, Univ. Warszawski (Poland)

Keynote Presentation

10:30 am: **Generating and manipulating spins in semiconductors,** D. D. Awschalom, Univ. of California/Santa Barbara . . . . . [6471A-14]

11:15 am: **Spin-dependent dynamics of individual CdTe/ZnTe quantum dot states studied by correlation spectroscopy** *(Invited Paper)*, J. Suffczynski, T. Kazimierczuk, M. Goryca, B. Piechal, A. Trajnerowicz, K. P. Kowalik, P. Kossacki, A. Golnik, K. P. Korona, M. Nawrocki, J. A. Gaj, Univ. Warszawski (Poland); G. Karczewski, Instytut Fizyki (Poland) . . . . . [6471A-15]

11:45 am: **Coherent nuclear spin dynamics in n-GaAs quantum wells probed by an optical pump-probe technique** *(Invited Paper)*, Y. Ohno, Tohoku Univ. (Japan) . . . . . [6471A-16]

Lunch/Exhibition Break . . . . . 12:15 to 1:30 pm

SESSION 6
Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Tues. 1:30 to 3:00 pm

Ultrafast Spin Dynamics II

Chair: **Jan A. Gaj**, Univ. Warszawski (Poland)

1:30 pm: **Coherence control of electron spin currents in semiconductors** *(Invited Paper)*, H. M. van Driel, J. E. Sipe, Univ. of Toronto (Canada); A. L. Smirl, The Univ. of Iowa . . . . . [6471A-17]

2:00 pm: **Ultrafast spin injection into self-assembled quantum dots** *(Invited Paper)*, A. Murayama, Tohoku Univ. (Japan) . . . . . [6471A-18]

2:30 pm: **Charging and spin-polarization effects in InGaAs quantum dots under bipolar carrier injection** *(Invited Paper)*, A. I. Tartakovskii, The Univ. of Sheffield (United Kingdom) . . . . . [6471A-19]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 7
Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Tues. 3:30 to 5:00 pm

Ultrafast Dynamics in Wide Bandgap Semiconductors

Chair: **Jin-Joo Song**, Univ. of California/San Diego

3:30 pm: **Optical properties of n- and p-type doped ZnO films grown by laser molecular-beam epitaxy** *(Invited Paper)*, T. Makino, Univ. of Hyogo (Japan) . . . . . [6471A-20]

4:00 pm: **Ultrafast multiphoton absorption spectroscopy of wide-gap materials** *(Invited Paper)*, W. Ji, J. He, H. I. Elim, Y. Qu, National Univ. of Singapore (Singapore) . . . . . [6471A-21]

4:30 pm: **High field transport in GaN and AlGaN/GaN heterojunctions** *(Invited Paper)*, S. Yamakawa, Arizona State Univ.; M. Saraniti, Illinois Institute of Technology; S. M. Goodnick, Arizona State Univ. . . . . [6471A-22]

Wednesday 24 January

SESSION 8
Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Wed. 8:00 to 11:00 am

THz Spectroscopy

Chair: **Abulhakem Y. Elezzabi**, Univ. of Alberta (Canada)

8:00 am: **Terahertz isotropic photonic magnetoresistance** *(Invited Paper)*, C. A. Baron, K. J. Chau, A. Y. Elezzabi, Univ. of Alberta (Canada) . . . [6471A-23]

8:30 am: **Ultrafast terahertz spectroscopy of electronic correlations: from exciton gases to cooper-pair condensates** *(Invited Paper)*, R. A. Kaindl, Lawrence Berkeley National Lab. and Univ. of California/Berkeley . . [6471A-24]

9:00 am: **Ultrafast terahertz electric field polarization dynamics in metallic metastructures** *(Invited Paper)*, A. Y. Elezzabi, K. J. Chau, Univ. of Alberta (Canada) . . . . . [6471A-25]

9:30 am: **Probing transient photoconductivity in nanostructured materials using time-resolved terahertz spectroscopy** *(Invited Paper)*, C. A. Schmuttenmaer, J. B. Baxter, Yale Univ. . . . . [6471A-26]

Coffee Break . . . . . 10:00 to 10:30 am

10:30 am: **Interaction of THZ radiation with semiconductor lasers** *(Invited Paper)*, M. R. Hofmann, C. Brenner, S. Hoffmann, Ruhr-Univ. Bochum (Germany); M. A. Salhi, M. Koch, Technische Univ. Braunschweig (Germany) . . . . . [6471A-27]

SESSION 9
Room: Marriott Hotel: San Jose Ballroom Salon I . . Wed. 11:00 am to 12:30 pm

Ultrafast Applications

Chair: **Jin-Joo Song**, Univ. of California/San Diego

11:00 am: **Ultrafast laser nanoprocessing and intreactions with semiconductor nanostructures** *(Invited Paper)*, C. P. Grigoropoulos, D. J. Hwang, N. Misra, Univ. of California/Berkeley . . . . . [6471A-28]

11:30 am: **Autocorrelation measurements of the FELBE free-electron laser and photocurrent saturation study in two-photon QWIPs** *(Invited Paper)*, H. Schneider, O. Drachenko, S. Winnerl, M. Helm, Forschungszentrum Rossendorf (Germany); M. Walther, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6471A-29]

12:00 pm: **Near-field microwave diagnostics with nonlinear-optical sensors** *(Invited Paper)*, J. Whitaker, Univ. of Michigan . . . . . [6471A-30]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 10
Room: Marriott Hotel: San Jose Ballroom Salon I . . . . . Wed. 1:30 to 4:30 pm

Ultrafast Phonon Dynamics and Manipulations

Chair: **Yujie J. Ding**, Lehigh Univ.

1:30 pm: **Removal of laser-induced non-equilibrium longitudinal-optical phonons** *(Invited Paper)*, Y. J. Ding, Lehigh Univ. . . . . [6471A-31]

2:00 pm: **Non-equilibrium optical phonon dynamics in bulk and low-dimensional semiconductors** *(Invited Paper)*, G. P. Srivastava, The Univ. of Exeter (United Kingdom) . . . . . [6471A-32]

2:30 pm: **Studies of LO phonons in GaN by subpicosecond time-resolved Raman spectroscopy** *(Invited Paper)*, K. Tsen, Arizona State Univ.; J. G. Kiang, Walter Reed Army Institute of Research; D. K. Ferry, Arizona State Univ.; H. Morkoc, Virginia Commonwealth Univ. . . . . [6471A-33]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Mitigating hot phonons in high power optoelectronic devices based on wide gap semiconductors** *(Invited Paper)*, J. B. Khurgin, Johns Hopkins Univ. . . . . [6471A-34]

4:00 pm: **Hot-phonon effects in III-V nitride heterostructure devices** *(Invited Paper)*, D. Jena, K. A. Wang, J. Simon, Y. Cao, Univ. of Notre Dame . . . . . [6471A-35]

Wednesday 24 January 2007 • Proceedings of SPIE Vol. 6471B

Semiconductor Photodetectors IV

Conference Chairs: **Marshall J. Cohen**, Sensors Unlimited, Inc.; **Joseph P. Estrera**, Northrop Grumman Corp.

Program Committee: **Joe C. Campbell**, The Univ. of Texas at Austin; **Eustace L. Dereniak**, College of Optical Sciences/The Univ. of Arizona; **Barbara G. Grant**, Lines and Lights Technology; **Nan M. Jokerst**, Duke Univ.; **Kurt J. Linden**, Spire Corp.; **Frederick S. Perry**, Boston Electronics Corp.; **William H. Pinkston**, Electro-Optical Systems Inc.; **M. Selim Unlu**, Boston Univ.

Wednesday 24 January

SESSION 11

Room: Conv. Ctr. Room E . . . . . Wed. 8:30 to 10:30 am

Imaging Techniques

Chair: **Marshall J. Cohen**, Sensors Unlimited, Inc.

8:30 am: **Delta-doped active pixel sensor imaging arrays with high quantum efficiency and 100% fill factor,** M. E. Hoenk, T. J. Cunningham, T. J. Jones, K. W. Newton, S. Nikzad, Jet Propulsion Lab. . . . . [6471B-36]

8:50 am: **Linearity of the photocurrent response with light intensity for silicon PIN photodiode array,** I. O. Goushcha, B. Tabbert, A. O. Goushcha, Semicoa . . . . . [6471B-37]

9:10 am: **Tiled silicon photomultipliers for large area, low light sensing applications,** P. J. Hughes, D. Herbert, A. Stewart, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6471B-38]

9:30 am: **Optical and x-ray characterization of two novel CMOS image sensors,** S. E. Bohndiek, C. D. Arvanitis, G. Segneri, C. Venanzi, G. J. Royle, Univ. College London (United Kingdom); A. Clark, J. Crooks, R. Halsall, M. Key-Charriere, S. Martin, M. L. Prydderch, R. A. D. Turchetta, Rutherford Appleton Lab. (United Kingdom); A. Blue, R. Bates, V. O'Shea, Univ. of Glasgow (United Kingdom); R. D. Speller, Univ. College London (United Kingdom) . . . [6471B-40]

9:50 am: **Design and fabrication of a linear array PIN photodiode for computed mammo-tomography(CmT) system,** S. W. Park, Y. Yi, Korea Univ. (South Korea) . . . . . [6471B-41]

10:10 am: **Improvement of crosstalk on 5M CMOS image sensor with 1.7x1.7μm^2 pixels,** C. Koo, SAMSUNG Electronics Co., Ltd. (South Korea) . . . . . [6471B-42]

Coffee Break . . . . . 10:30 to 11:00 am

SESSION 12

Room: Conv. Ctr. Room E . . . . . Wed. 11:00 am to 11:40 am

Photon Counting

Chair: **Joseph P. Estrera**, Northrop Grumman Corp.

11:00 am: **Fully integrated sub 100ps photon counting platform,** S. J. Buckley, S. J. Bellis, J. C. Jackson, SensL Technologies Ltd. (Ireland) . . . . . [6471B-43]

11:20 am: **High-accuracy and cost-effective photodiode spectral response measurement system,** G. Chang, C. Liao, Y. Lin, National Taiwan Normal Univ. (Taiwan) . . . . . [6471B-44]

SESSION 13

Room: Conv. Ctr. Room E . . . . . Wed. 11:40 am to 12:00 pm

IR/Near-IR Applications

Chair: **Joseph P. Estrera**, Northrop Grumman Corp.

11:40 am: **Delta doped high purity p-channel silicon CCDs with near 100% QE from the UV-NIR,** J. Blacksberg, M. E. Hoenk, S. Nikzad, Jet Propusion Lab.; S. E. Holland, C. J. Bebek, W. F. Kolbe, Lawrence Berkeley National Lab. . . . . [6471B-47]

✔ Posters-Wednesday

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✔ **Estimations on the photo-response characteristics of the non-fully depleted silicon PIN photodiode for near infrared spectral range and its experimental results,** K. Park, J. Park, J. Koo, B. Kim, Electronics and Telecommunications Research Institute (South Korea); K. No, Korea Advanced Institute of Science and Technology (South Korea) . . . [6471B-48]

✔ **Study on metal/p-GaN contacts on p-i-n GaN-based detectors,** X. Li, J. Fang, J. Chen, H. Gong, Shanghai Institute of Technical Physics (China) . . . . . [6471B-50]

Sunday-Monday 21-22 January 2007 • Proceedings of SPIE Vol. 6472

Terahertz and Gigahertz Electronics and Photonics VI

Conference Chairs: **Kurt J. Linden**, Spire Corp.; **Laurence P. Sadwick**, InnoSys, Inc.

Program Committee: **Antao Chen**, Univ. of Washington; **Alexander G. Davies**, Univ. of Leeds (United Kingdom); **R. Jennifer Hwu**, InnoSys, Inc.; **Michael C. Kemp**, Iconal Technology (United Kingdom); **Edmund H. Linfield**, Univ. of Leeds (United Kingdom); **John A. Murphy**, National Univ. of Ireland/Maynooth (Ireland)

Sunday 21 January

SESSION 1

Room: Conv. Ctr. Room M . . . . . Sun. 8:10 to 10:10 am

High Frequency Materials and Physics

Chair: **Kurt J. Linden**, Spire Corp.

8:10 am: **The quasi-optical performance of CMB astronomical telescopes,** C. M. O'Sullivan, J. A. Murphy, V. B. Yurchenko, F. Noviello, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6472-01]

8:30 am: **Studies of the critical electric field and L valley offset of a semiconductor by terahertz radiation,** J. Hwang, H. Lin, C. Chang, L. S. Chang, Y. Lu, National Cheng Kung Univ. (Taiwan) . . . . . [6472-02]

8:50 am: **Comparative analysis of key physical mechanisms limiting the efficiency of intersubband and interband THz lasing nanostrutures,** L. D. Shvartsman, B. Laikhtman, The Hebrew Univ. of Jerusalem (Israel) . . . . . [6472-03]

9:10 am: **Quantum frequency transformer of radiation,** O. V. Kondakov, F. Ndahayo, J. D. Nshimiyimana, National Univ. of Rwanda (South Africa) . . . . . [6472-04]

9:30 am: **Artificial plasmonic materials for THz applications,** A. J. Gallant, M. C. Petty, D. Wood, S. Brand, M. Kaliteevski, J. A. Levitt, Durham Univ. (United Kingdom); G. P. Swift, Durham Univ (United Kingdom); R. A. Abram, Durham Univ. (United Kingdom) . . . . . [6472-05]

9:50 am: **Theory of optical-to-terahertz conversion in a slab of nonlinear zinc-blende material,** M. I. Bakunov, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russia) and Institute of Applied Physics (Russia); A. V. Maslov, NASA Ames Research Ctr.; S. B. Bodrov, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russia) and Institute of Applied Physics (Russia) . . . . . [6472-06]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room M . . . . . Sun. 10:30 am to 2:30 pm

Waveguides, Beams, and Modeling

Chair: **James A. Murphy**, National Univ. of Ireland/Maynooth (Ireland)

10:30 am: **Sub-wavelength THz plastic fibers** *(Invited Paper)***,** C. Sun, J. Lu, H. Chen, L. Chen, National Taiwan Univ. (Taiwan) . . . . . [6472-07]

11:00 am: **Using channel waveguides for efficient THz parametric generation and detection,** Y. J. Ding, Lehigh Univ. . . . . [6472-08]

11:20 am: **Electromagnetic scattering calculations for terahertz sensing,** L. M. Zurk, B. Orlowski, G. Sundberg, Portland State Univ.; D. P. Winebrenner, E. I. Thorsos, A. Chen, Univ. of Washington . . . . . [6472-09]

11:40 am: **Analysis of standing waves in submillimeter-wave optics,** N. A. Trappe, T. J. Finn, J. A. Murphy, National Univ. of Ireland/Maynooth (Ireland); S. Withington, Cavendish Lab. (United Kingdom); W. Jellema, Space Research Organisation Netherlands (Netherlands) . . . . . [6472-10]

Lunch Break . . . . . 12:00 to 1:30 pm

1:30 pm: **Gaussian beam mode analysis of millimeter-wave imaging and detection,** W. P. Lanigan, E. Butler, E. Duffy, I. McAuley, L. Young, R. May, R. J. Mahon, J. A. Murphy, C. M. O'Sullivan, National Univ. of Ireland/Maynooth (Ireland) . . . . . [6472-11]

1:50 pm: **Modelling of the optical performance of millimeter-wave instruments in MODAL,** M. L. Gradziel, C. M. O'Sullivan, National Univ. of Ireland/Maynooth (Ireland); G. Curran, Institute of Technology Blanchardstown (Ireland); J. A. Murphy, G. A. Cahill, National Univ. of Ireland/Maynooth (Ireland); C. Pryke, The Univ. of Chicago; W. K. Gear, Cardiff Univ. (United Kingdom); S. E. Church, Stanford Univ. . . . . [6472-12]

2:10 pm: **High finesse scanning Fabry-Perot filter for millimeter and sub-millimeter wave spectroscopy,** J. W. Cleary, R. E. Peale, C. J. Fredricksen, A. V. Muravjov, M. V. Dolguikh, J. B. Enz, T. W. Du Bosq, Univ. of Central Florida; W. R. Folks, S. Pandey, College of Optics & Photonics/Univ. of Central Florida; G. D. Boreman, Univ. of Central Florida; O. J. Edwards, Zyberwear, Inc. . . . . [6472-13]

SESSION 3

Room: Conv. Ctr. Room M . . . . . Sun. 2:30 to 3:30 pm

Terahertz Emitters and Detectors

Chair: **Antao Chen**, Univ. of Washington

2:30 pm: **Terahertz science and applications based on poled electro-optic polymers,** L. M. Hayden, X. Zheng, C. V. McLaughlin, Univ. of Maryland/ Baltimore County . . . . . [6472-14]

2:50 pm: **Ion-irradiated In0.53Ga0.47As based photoconductive antennas excited at 1.55 μm for THz emission and detection,** J. Mangeney, N. Chimot, L. Meignien, P. Crozat, Univ. Paris-Sud II (France); K. Blary, J. Lampin, Institut d'Electronique de Microélectronique et de Nanotechnologie (France) [6472-15]

3:10 pm: **Widely tuneable ultra stable 1W two colour THz laser source,** S. Stry, J. R. Sacher, Sacher Lasertechnik GmbH (Germany) . . . . . [6472-17]

Monday 22 January

SESSION 4

Room: Conv. Ctr. Room M . . . . . Mon. 8:30 to 10:30 am

Terahertz Detection and Imaging Systems

Chair: **Larry Sadwick**, INNOSYS Inc.

8:30 am: **Compact THz spectrometers,** V. G. Kozlov, W. Hurlbut, Microtech Instruments, Inc. . . . . [6472-19]

8:50 am: **Millimeter-wave imaging system with polymer modulators,** J. A. Grata, M. R. Fetterman, W. L. Kiser, Jr., The Electro-Optics Ctr.; R. Dinu, M. K. Koenig, Lumera Corp. . . . . [6472-20]

9:10 am: **Signature and signal generation in THz time-domain spectroscopy for trace explosives detection,** R. Osiander, M. J. Fitch, M. R. Leahy-Hoppa, Johns Hopkins Applied Physics Lab.; Y. Dikmelik, Johns Hopkins Univ. [6472-21]

9:30 am: **High-speed LiNbO3 modulator for W-band millimeter-wave detection,** C. Huang, C. A. Schuetz, R. Shireen, S. Shi, D. W. Prather, Univ. of Delaware . . . . . [6472-22]

9:50 am: **Terahertz imaging of burned tissue,** W. L. Kiser, Jr., J. P. Dougherty, The Electro-Optics Ctr. . . . . [6472-23]

10:10 am: **Terahertz micro-spectroscopy using a transient mirror technique,** J. A. Levitt, G. P. Swift, A. J. Gallant, J. M. Chamberlain, Durham Univ. (United Kingdom) . . . . . [6472-24]

Monday-Thursday 22-25 January 2007 • Proceedings of SPIE Vol. 6473

Gallium Nitride Materials and Devices II

Conference Chairs: **Hadis Morkoc**, Virginia Commonwealth Univ.; **Cole W. Litton**, Air Force Research Lab.

Cochair: **James G. Grote**, Air Force Research Lab.

Program Committee: **Alison A. Baski**, Virginia Commonwealth Univ.; **Shigefusa F. Chichibu**, Univ. of Tsukuba (Japan); **Jen-Inn Chyi**, National Central Univ. (Taiwan); **Nicolas Grandjean**, École Polytechnique Fédérale de Lausanne (Switzerland); **Izabella Grzegory**, Institute of High Pressure Physics (Poland); **Yong-Tae Moon**, LG Electronics Inc. (South Korea); **Yasushi Nanishi**, Ritsumeikan Univ. (Japan); **Kitt Reinhardt**, Air Force Office of Scientific Research; **Donald J. Silversmith**, Air Force Office of Scientific Research

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room L . . . . . Mon. 8:30 to 9:50 am

Growth

8:30 am: **New possibility of MOVPE-growth in GaN and InN: polarization in GaN and nitrogen-incorporation in InN** *(Invited Paper)***,** T. Matsuoka, Tohoku Univ. (Japan) . . . . . [6473-01]

9:10 am: **Two-step epitaxial lateral overgrowth of (112-0) a-plane GaN by MOCVD,** X. Ni, Ü. Özgür, H. Morko, J. C. Moore, V. P. Kasliwal, A. A. Baski, Virginia Commonwealth Univ.; Z. Liliental-Weber, Lawrence Berkeley National Lab. . . . . [6473-02]

9:30 am: **Low dislocation density GaN grown by MOCVD with SiNx nano-network,** J. Xie, Ü. Özgür, Y. Fu, X. Ni, H. Morkoc, Virginia Commonwealth Univ.; T. Kuan, SUNY/Univ. at Albany; J. V. Foreman, U.S. Army Aviation and Missile Research, Development and Engineering Ctr.; H. O. Everitt, Duke Univ. . . . . [6473-03]

Discussion Session . . . . . Mon. 9:50 to 10:00 am

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 2

Room: Conv. Ctr. Room L . . . . . Mon. 10:20 am to 12:00 pm

Electrical and Optical Characterization

10:20 am: **Enhanced luminescence from $Al_xGa_{1-x}N/Al_yGa_{1-y}N$ quantum wells grown by gas source molecular beam epitaxy with ammonia,** S. A. Nikishin, B. Borisov, Texas Tech Univ.; G. A. Garrett, W. L. Sarney, A. V. Sampath, P. H. Shen, M. Wraback, Army Research Lab.; M. Holtz, Texas Tech Univ. . . . . [6473-04]

10:40 am: **Narrow-width photoluminescence spectra of InGaN quantum wells grown on GaN (0001) substrates with misorientation toward [1-100] direction,** K. Tachibana, H. Nago, S. Nunoue, Toshiba Corp. (Japan) . [6473-05]

11:00 am: **AFM and C-AFM studies of ELO GaN films,** A. A. Baski, V. Kasliwal, X. Ni, J. C. Moore, J. Ortiz, H. Morkoc, Virginia Commonwealth Univ. [6473-06]

11:20 am: **Magneto-transport properties of MOVPE-grown $Al_xGa_{1-x}N$/AlN/GaN heterostructures with high-mobility two-dimensional electron gas,** N. Biyikli, Virginia Commonwealth Univ.; C. Kurdak, Univ. of Michigan; X. F. Ni, Y. Fu, Virginia Commonwealth Univ.; I. Vurgaftman, J. R. Meyer, Naval Research Lab.; H. Morkoc, Virginia Commonwealth Univ.; C. W. Litton, Air Force Research Lab. - retired . . . . . [6473-07]

11:40 am: **Investigation of current voltage characteristics of n-GaN/i-$Al_xGa_{1-x}N$/n-GaN structures,** X. Ni, J. Xie, Y. Fu, H. Morkoc, Virginia Commonwealth Univ.; P. P. Ruden, Univ. of Minnesota; K. Son, Jet Propulsion Lab. . . . . [6473-08]

Discussion Session . . . . . Mon. 12:00 to 12:10 pm

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room L . . . . . Mon. 1:30 to 3:10 pm

Special Topics

1:30 pm: **Wide bandgap semiconductor ultraviolet photodetectors: a short review of devices and applications** *(Invited Paper)***,** F. Omnes, CNRS (France); E. Monroy, Commissariat à l'Energie Atomique (France); E. Muñoz, Univ. Politécnica de Madrid (Spain); J. Reverchon, Thales Research & Technology (France) . . . . . [6473-09]

2:10 pm: **Spontaneous polarizations, electrical properties, and phononic properties of GaN nanostructures and systems** *(Invited Paper)***,** T. Yamanaka, K. Sun, Y. Li, J. Yang, M. Vasudev, M. Dutta, M. A. Stroscio, Univ. of Illinois/Chicago . . . . . [6473-10]

2:50 pm: **Three-dimensional gallium nitride photonic crystals as nonlinear optical materials,** O. A. Aktsipetrov, A. A. Fedyanin, T. V. Murzina, M.V. Lomonosov Moscow State Univ. (Russia); D. A. Kurdyukov, V. G. Golubev, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6473-11]

Discussion Session . . . . . Mon. 3:10 to 3:20 pm

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 4

Room: Conv. Ctr. Room L . . . . . Mon. 3:40 to 5:40 pm

LEDs I

3:40 pm: **High power light emitting diodes: the application to LCD back-light units** *(Invited Paper)***,** J. J. Jung, LG Electronics Inc. (South Korea) . . . . . [6473-12]

4:20 pm: **Reliability of high power GaN vertical light emitting diodes on metal substrate for solid state lighting application** *(Invited Paper)***,** C. A. Tran, SemiLEDs Corp. . . . . [6473-13]

5:00 pm: **Transparent conducting oxide electrodes for GaN-based light-emitting diodes** *(Invited Paper)***,** T. Seong, Korea Univ. (South Korea) [6473-14]

Discussion Session . . . . . Mon. 5:40 to 6:00 pm

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 5

Room: Conv. Ctr. Room L . . . . . Tues. 10:20 am to 12:00 pm

Point Defects

10:20 am: **Simulation of defects and defect microstructure evolution in GaN-based alloys** *(Invited Paper)*, M. Ganchenkova, R. M. Nieminen, Helsinki Univ. of Technology (Finland) . . . . . [6473-15]

11:00 am: **Summary of deep level defect characteristics in GaN and AlGaN** *(Invited Paper)*, D. K. Johnstone, SEMETROL . . . . . [6473-16]

11:40 am: **Interplay of Ga vacancies, C impurities and yellow luminescence in GaN,** F. Tuomisto, F. Reurings, Helsinki Univ. of Technology (Finland); M. Reshchikov, Virginia Commonwealth Univ.; D. C. Look, Wright State Univ. . . . . [6473-17]

\Discussion Session . . . . . Tues. 12:00 to 12:10 pm

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room L . . . . . Tues. 1:30 to 3:30 pm

FETs I

1:30 pm: **Quantum 1/f noise in GaN FETs, HFETs, MODFETs, and their oscillators' phase noise** *(Invited Paper)*, P. H. Handel, A. M. Hall, Univ. of Missouri/St. Louis; H. Morkoc, Virginia Commonwealth Univ. . . . . [6473-19]

2:10 pm: **Accumulation of hot phonons in GaN and related structures** *(Invited Paper)*, A. Matulionis, Puslaidininkiu Fizikos Institutas (Lithuania) . . . . . [6473-20]

2:50 pm: **Subpicosecond time-resolved Raman studies of LO phonons in GaN** *(Invited Paper)*, K. Tsen, Arizona State Univ.; J. G. Kiang, Walter Reed Army Institute of Research; D. K. Ferry, Arizona State Univ.; H. Morkoc, Virginia Commonwealth Univ. . . . . [6473-21]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 7

Room: Conv. Ctr. Room L . . . . . Tues. 3:50 to 5:30 pm

LEDs II

3:50 pm: **InGaN/GaN nanocolumn LEDs emitting from blue to red** *(Invited Paper)*, K. Kishino, A. Kikuchi, H. Sekiguchi, S. Ishizawa, Sophia Univ. (Japan) . . . . . [6473-22]

4:30 pm: **Nitride-based LEDs with p-AlInGaN surface layers prepared at various temperatures,** C. Kuo, C. Chen, C. Kuo, National Central Univ. (Taiwan) . . . . . [6473-23]

4:50 pm: **AlGaN based deep ultraviolet light emitting diodes with reflection layer,** M. Khizar, A. R. Yasin, The Univ. of North Carolina at Charlotte . [6473-24]

5:10 pm: **Prestrained InGaN/GaN quantum-well structures for fabricating orange-red light-emitting diodes,** C. Huang, H. Chen, C. Lu, D. Yeh, T. Tang, J. Huang, W. Shiao, J. Huang, C. Yang, National Taiwan Univ. (Taiwan) [6473-25]

Discussion Session . . . . . Tues. 5:30 to 5:45 pm

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room L . . . . . Wed. 8:20 to 10:00 am

Lasers I

8:20 am: **InGaN laser diode in blue and green wavelength** *(Invited Paper)*, O. Nam, SAMSUNG Advanced Institute of Technology (South Korea) [6473-26]

9:00 am: **Long lifetime CW InGaN laser diodes grown by molecular beam epitaxy** *(Invited Paper)*, M. Kauer, S. E. Hooper, J. Windle, J. Barnes, W. Tan, J. F. Heffernan, Sharp Labs. of Europe, Ltd. (United Kingdom) . . . . . [6473-27]

9:40 am: **Degradation studies of an InGaN/GaN heterostructure laser diode using a Kelvin force microscope,** A. Lochthofen, W. Mertin, G. Bacher, Univ. Duisburg-Essen (Germany); M. Furitsch, G. Brüderl, V. K. Härle, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6473-28]

Discussion Session . . . . . Wed. 10:00 to 10:10 am

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

Room: Conv. Ctr. Room L . . . . . Wed. 10:30 am to 12:30 pm

Defects

10:30 am: **Are the localized impurity/defect states responsible for electrical and optical properties** *(Invited Paper)*, T. Suski, Instytut Wysokich Cisnien (Poland) . . . . . [6473-29]

11:10 am: **Defect studies in HVPE-GaN by positron annihilation spectroscopy** *(Invited Paper)*, F. Tuomisto, Helsinki Univ. of Technology (Finland) . . . . . [6473-30]

11:50 am: **Lanthanide impurity level location in GaN, AlN, and ZnO,** P. Dorenbos, E. van der Kolk, Technische Univ. Delft (Netherlands) . . . [6473-31]

12:10 pm: **Multiscale simulation of ordering processes in GaInN and GaAlN,** M. Ganchenkova, K. Laaksonen, R. M. Nieminen, Helsinki Univ. of Technology (Finland) . . . . . [6473-32]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 10

Room: Conv. Ctr. Room L . . . . . Wed. 1:30 to 3:30 pm

FETs II

1:30 pm: **AlGaN/GaN field-plate FETs for microwave power applications** *(Invited Paper)*, H. Miyamoto, Y. Ando, Y. Okamoto, T. Nakayama, A. Wakejima, T. Inoue, Y. Murase, K. Ota, K. Yamanoguchi, N. Kuroda, A. Tanomura, K. Matsunaga, R&D Association for Future Electron Devices (Japan) . [6473-33]

2:10 pm: **Insulator engineering in GaN-based MIS HFETs for higher device performance** *(Invited Paper)*, N. Maeda, M. Hiroki, N. Watanabe, Y. Oda, H. Yokoyama, T. Yagi, NTT Photonics Labs. (Japan); T. Makimoto, NTT Basic Research Labs. (Japan); T. Enoki, T. Kobayashi, NTT Photonics Labs. (Japan) . . . . . [6473-34]

2:50 pm: **Thermal analysis of AlGaN/GaN HFETs using electro-thermal simulation and micro-raman spectroscopy,** T. Fujishima, Ritsumeikan Univ. (Japan); K. Inoue, R&D Association for Future Electron Devices (Japan); K. Kosaka, A. Hinoki, Ritsumeikan Univ. (Japan); T. Yamada, T. Tsuchiya, J. Kikawa, S. Kamiya, R&D Association for Future Electron Devices (Japan); A. Suzuki, T. Araki, Y. Nanishi, Ritsumeikan Univ. (Japan) . . . . . [6473-35]

3:10 pm: **Epitaxial growth and characterization of AlGaN/GaN HEMT devices on SiC substrates for RF applications,** A. K. Sood, Y. R. Puri, Magnolia Optical Technologies, Inc.; F. W. Clarke, U.S. Army Space and Missile Defense Command; J. C. M. Hwang, Lehigh Univ.; A. M. Khan, Univ. of South Carolina; A. M. Dabiran, P. C. Chow, SVT Associates, Inc.; R. Wesler, Kopin Corp. . . . . [6473-36]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 11

Room: Conv. Ctr. Room L . . . . . Wed. 3:50 to 5:30 pm

LEDs III

3:50 pm: **GaN optoelectronics on Si** *(Invited Paper)*, A. Dadgar, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6473-37]

4:30 pm: **GaN light-emitting diodes integrated with monolithic sidewall deflectors for enhanced surface emission,** J. Lee, J. Lee, S. Kim, H. Jeon, Seoul National Univ. (South Korea) . . . . . [6473-38]

4:50 pm: **Study of interaction between GaN and excimer laser,** R. Chen, C. Liu, National Central Univ. (Taiwan) . . . . . [6473-40]

5:10 pm: **Studies of InGaN heterostructures and LEDs,** O. I. Rabinovich, Moscow State Institute of Steel and Alloys Technological Univ. (Russia); S. G. Nikiforov, ATV Outdoor Systems (Russia); V. P. Sushkov, Moscow State Institute of Steel and Alloys Technological Univ. (Russia) and Acol Technologies S.A. (Russia); A. V. Shishov, Acol Technologies S.A. (Russia); I. G. Ermoshin, Moscow State Institute of Steel and Alloys Technological Univ. (Russia)[6473-39]

Discussion Session . . . . . Wed. 5:30 to 5:50 pm

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Point defect reduction in GaN layers grown with the aid of SiNx nanonet by metalorganic chemical vapor deposition,** S. A. Chevtchenko, J. Xie, Y. Fu, X. Ni, H. Morko, Virginia Commonwealth Univ.; C. W. Litton, Air Force Research Lab. - retired . . . . . [6473-56]

✔ **COD level enhanced single-mode blue-violet laser diodes with selective current injection,** K. Kim, K. Ha, H. Ryu, T. Jang, K. Choi, J. Son, J. Chae, S. Chae, H. Paek, Y. Sung, T. Sakong, H. Kim, Y. Kim, O. Nam, Y. Park, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6473-60]

✔ **AlGaN/GaN MODFET regrown by rf-MBE on MOCVD templates,** J. Xie, Virginia Commonwealth Univ. . . . . [6473-62]

✔ **AlGaN/GaN MOS transistors using crystalline ZrO2 as gate dielectric,** X. Gu, N. Izyumskaya, V. Avrutin, J. Xie, H. Morko, Virginia Commonwealth Univ.; C. W. Litton, Air Force Research Lab. - retired . . . . . [6473-63]

✔ **Dislocation reduction in GaN layers grown on nanoscale columnar SiC substrates by metalorganic vapor phase epitaxy,** Y. Fu, Ü. Özgür, J. Xie, S. A. Chevtchenko, X. Ni, N. Biyikli, H. Morko, Virginia Commonwealth Univ.; Y. Ke, R. P. Devaty, W. J. Choyke, Univ. of Pittsburgh; C. K. Inoki, T. Kuan, SUNY/Univ. at Albany; J. V. Foreman, H. O. Everitt, Duke Univ. . . . [6473-64]

✔ **Polarity control and growth of GaN and AlN grown on carbon-face SiC by metalorganic vapor phase epitaxy,** Y. Fu, J. Xie, S. Chevtchenko, N. Biyikli, X. Ni, Ü. Özgür, H. Morkoc, Virginia Commonwealth Univ.; Y. Ke, R. P. Devaty, W. J. Choyke, Univ. of Pittsburgh; C. K. Inoki, T. Kuan, SUNY/Univ. at Albany . . . . . [6473-65]

✔ **Highly reflectivity ultraviolet distributed Bragg reflectors based on AlGaN/AlGaN multilayer,** R. Shimada, J. Xie, H. Morkoc, Virginia Commonwealth Univ. . . . . [6473-66]

Thursday 25 January

SESSION 12

Room: Conv. Ctr. Room L . . . . . Thurs. 8:20 to 10:00 am

Lasers II

8:20 am: **TM-mode lasing and anisotropic polarization property of AlGaN multiple quantum well lasers in deep-ultraviolet spectral region** *(Invited Paper)***,** H. Kawanishi, M. Senuma, T. Nukui, Kogakuin Univ. (Japan) . . . . . [6473-41]

9:00 am: **Comparison of optical properties of the InGaN/GaN/AlGaN laser structures grown by MOVPE and MBE,** T. Swietlik, R. Czernecki, C. Skierbiszewski, G. Franssen, I. Grzegory, T. Suski, P. Perlin, Instytut Wysokich Cisnien (Poland) . . . . . [6473-42]

9:20 am: **Progress in etched facet technology for GaN and blue lasers,** A. Behfar, A. T. Schremer, J. Hwang, C. Stagaresu, F. Khaja, V. Vainateya, A. J. Morrow, BinOptics Corp. . . . . [6473-43]

9:40 am: **High quality UV AlGaN/AlGaN distributed Bragg reflectors and microcavities,** O. Mitrofanov, S. Schmult, M. Manfra, T. Siegrist, N. Weimann, A. M. Sergent, Lucent Technologies/Bell Labs.; R. Molnar, MIT Lincoln Lab. . . . . [6473-44]

Discussion Session . . . . . Thurs. 10:00 to 10:10 am

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 13

Room: Conv. Ctr. Room L . . . . . Thurs. 10:30 am to 12:10 pm

Extended Defects

10:30 am: **Extended defects in GaN from an atomistic modelling point of view** *(Invited Paper)***,** A. T. Blumenau, Max-Planck-Institut für Eisenforschung GmbH (Germany) . . . . . [6473-45]

11:10 am: **Structural characterization of III-nitrides using electron microscopy** *(Invited Paper)***,** D. J. Smith, L. Zhou, M. R. McCartney, Arizona State Univ. . . . . [6473-46]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 14

Room: Conv. Ctr. Room L . . . . . Thurs. 1:30 to 3:30 pm

FETs III

1:30 pm: **Characterization of transient behaviors of AlGaN/GaN HEMTs** *(Invited Paper)***,** T. Mizutani, Nagoya Univ. (Japan) . . . . . [6473-48]

2:10 pm: **Charge trapping on defects in AlGaN/GaN field effect transistors** *(Invited Paper)***,** O. Mitrofanov, M. Manfra, Lucent Technologies . . . . . [6473-49]

2:50 pm: **Analytical model, simulation and parameter extraction of AlGaN/GaN HEMT for microwave circuit applications,** H. F. Huq, The Univ. of Tennessee . . . . . [6473-50]

3:10 pm: **1/f noise in the dark current of GaN QWIPs,** P. H. Handel, A. M. Hall, Univ. of Missouri/St. Louis . . . . . [6473-51]

Coffee Break . . . . . 3:30 to 3:50 pm

SESSION 15

Room: Conv. Ctr. Room L . . . . . Thurs. 3:50 to 5:30 pm

LEDs IV

3:50 pm: **Light extraction analysis for GaN-based LEDs** *(Invited Paper)***,** T. Lee, K. Kao, T. Chung, C. Sun, National Central Univ. (Taiwan) . . . . [6473-52]

4:30 pm: **Electroluminescence in nitride light-emitting-diodes,** T. Suski, Institiute of High Pressure Physics (Poland); S. Grzanka, TopGaN Ltd. (Poland); G. Franssen, G. Targowski, Institiute of High Pressure Physics (Poland); R. Czernecki, TopGaN Ltd. (Poland); P. Perlin, Institiute of High Pressure Physics (Poland); M. Leszczynski, TopGaN Ltd. (Poland) . . . . . [6473-53]

4:50 pm: **Photoreflectance, electroreflectance and photoluminescence excitation spectroscopic system for characterization of InGaN/GaN multi-quantum well light-emitting diodes,** J. Park, D. Lee, S. Hong, B. Kim, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6473-54]

5:10 pm: **Confocal scanning electroluminescence spectro-microscope for multidimensional light-emitting property analysis,** S. Hong, G. Onushkin, J. Park, B. Kim, D. Lee, A. Fomin, K. Ko, J. W. Kim, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6473-55]

Discussion Session . . . . . Thurs. 5:30 to 5:50 pm

Sunday-Wednesday 21-24 January 2007 • Proceedings of SPIE Vol. 6474

Zinc Oxide Materials and Devices II

Conference Chairs: **Ferechteh Hosseini Teherani**, Nanovation (France); **Cole W. Litton**, Air Force Research Lab. -retired

Program Committee: **Jean-Jacques Delaunay**, The Univ. of Tokyo (Japan); **David C. Look**, Wright State Univ.; **Tatsuo Okada**, Kyushu Univ. (Japan); **Seong-Ju Park**, Gwangju Institute of Science and Technology (South Korea); **Manijeh Razeghi**, Northwestern Univ.; **David Rogers**, Nanovation (France) and Technological Univ. of Troyes (France); **Jin-Joo Song**, Univ. of California/San Diego

Sunday 21 January

Welcome and Opening Remarks . . . . . **Sun. 8:25 am**

SESSION 1

Room: Conv. Ctr. Room A3 . . . . . **Sun. 8:25 to 9:45 am**

Optical Properties

Chairs: **Takafumi Yao**, Tohoku Univ. (Japan);
Alois Krost, Otto-von-Guericke-Univ. Magdeburg (Germany)

8:25 am: **New developments in ZnO materials and devices** *(Invited Paper)*, D. C. Look, Wright State Univ. . . . . [6474-01]

8:55 am: **Analysis of localization dynamics of excitons in ZnO-related quantum wells by Monte-Carlo simulation** *(Invited Paper)*, T. Makino, Univ. of Hyogo (Japan) . . . . . [6474-02]

9:20 am: **Theory of doping and defects in ZnO** *(Invited Paper)*, S. B. Zhang, National Renewable Energy Lab. . . . . [6474-03]

SESSION 2

Room: Conv. Ctr. Room A3 . . . . . **Sun. 9:45 am to 12:10 pm**

ZnO Doping

Chairs: **Cole W. Litton**, Air Force Research Lab.; **Axel Hoffmann**, Technische Univ. Berlin (Germany)

9:45 am: **Metalorganic vapour phase epitaxy of ZnO: towards p-type conductivity** *(Invited Paper)*, A. Krost, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6474-04]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Toward reliable p-type ZnO expitaxial films and devices** *(Invited Paper)*, J. Liu, F. Xiu, L. J. Mandalapu, Z. Yang, Univ. of California/ Riverside . . . . . [6474-05]

10:55 am: **ZnO epilayers doped with nitrogen and phosphorus** *(Invited Paper)*, M. Pan, J. Nause, Cermet, Inc. . . . . [6474-06]

11:20 am: **Characterization of Ag-doped p-type ZnO films** *(Invited Paper)*, G. H. Kim, B. D. Ahn, H. W. Chang, D. L. Kim, S. Y. Lee, Yonsei Univ. (South Korea) . . . . . [6474-07]

11:45 am: **Study of N doping of ZnO thin films** *(Invited Paper)*, D. Rogers, Univ. de Technologie de Troyes (France); F. H. Teherani, Nanovation SARL (France) . . . . . [6474-08]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room A3 . . . . . **Sun. 1:30 to 3:10 pm**

Thin Film Epitaxy and Interfaces

Chairs: **Manijeh Razeghi**, Northwestern Univ.;
Bruno K. Meyer, Justus-Liebig-Univ. Giessen (Germany)

1:30 pm: **Surface and interface engineering in ZnO epitaxy** *(Invited Paper)*, T. Yao, T. Minegishi, S. H. Park, J. S. Park, I. H. Im, T. Hanada, K. Fuji, M. W. Cho, Tohoku Univ. (Japan) . . . . . [6474-09]

1:55 pm: **Expanding thermal plasma-deposited ZnO films: material properties and film growth studies** *(Invited Paper)*, M. C. M. Van De Sanden, Technische Univ. Eindhoven (Netherlands) . . . . . [6474-10]

2:20 pm: **Polarization Management in p-type CdZnO/ZnO and MgZnO/ZnO** *(Invited Paper)*, A. V. Osinsky, SVT Associates, Inc. . . . . [6474-11]

2:45 pm: **Current-transport properties of isotype n-ZnO/n-GaN heterostructures** *(Invited Paper)*, Y. I. Alivov, Virginia Commonwealth Univ.; C. W. Litton, Air Force Research Lab. -retired; H. Morkoc, Virginia Commonwealth Univ. . . . . [6474-12]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room A3 . . . . . **Sun. 3:30 to 5:40 pm**

Thin Film Heterostructures

Chairs: **David C. Look**, Wright State Univ.;
Ferechteh H. Teherani, Nanovation SARL (France)

3:30 pm: **Homoepitaxy of ZnO: from the substrate to epitaxial films** *(Invited Paper)*, B. K. Meyer, N. Volbers, S. Lautenschläger, C. Neumann, J. Sann, Justus-Liebig-Univ. Giessen (Germany); J. Bläsing, A. Kritschl, A. Krost, F. Bertram, J. Christen, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6474-13]

3:55 pm: **P-type nitrogen- and phosphorus-doped ZnO thin films grown by pulsed laser deposition on sapphire substrates** *(Invited Paper)*, J. Mosnier, B. P. Doggett, E. McGlynn, M. O. Henry, Dublin City Univ. (Ireland) . . . [6474-14]

4:20 pm: **Formation of 2D electron gas and enhancement of electron mobility by Zn polar ZnMgO/ZnO heterostructures** *(Invited Paper)*, H. Tampo, H. Shibata, K. Matsubara, A. Yamada, P. Fons, S. Niki, National Institute of Advanced Industrial Science and Technology (Japan); M. Yamagata, H. Kanie, Tokyo Univ. of Science (Japan) . . . . . [6474-15]

4:45 pm: **Microscopic luminescence properties of ZnO and ZnO based heterostructures** *(Invited Paper)*, J. Christen, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [6474-68]

5:10 pm: **Thin films of ZnO and related compounds grown by pulsed-laser deposition for optoelectronic applications** *(Invited Paper)*, E. Millon, Univ. d'Orléans (France); J. Perriere, Univ. Paris VI (France); C. M. Boulmer-Leborgne, Univ. d'Orléans (France) . . . . . [6474-17]

5:25 pm: **Advances in nonpolar ZnO homoepitaxy: 1D surface nanostructure and electron transport** *(Invited Paper)*, H. Matsui, H. Tabata, Osaka Univ. (Japan) . . . . . [6474-18]

Monday 22 January

SESSION 5

Room: Conv. Ctr. Room A3 . . . . . **Mon. 8:30 to 10:10 am**

ZnO Processing and Contact Preparation

Chairs: **Karen J. Nordheden**, The Univ. of Kansas;
Enda McGlynn, Dublin City Univ. (Ireland)

8:30 am: **Inductively coupled plasma etching of ZnO** *(Invited Paper)*, K. J. Nordheden, The Univ. of Kansas . . . . . [6474-19]

8:55 am: **Dry etching of ZnO towards the development of ZnO homostructure LEDs** *(Invited Paper)*, K. Minder, Northwestern Univ.; F. H. Teherani, D. Rogers, Nanovation SARL (France); C. Bayram, R. P. McClintock, P. Kung, M. Razeghi, Northwestern Univ. . . . . [6474-20]

9:20 am: **Ion-beam processing of ZnO** *(Invited Paper)*, S. O. Kucheyev, Lawrence Livermore National Lab.; V. A. Coleman, C. Jagadish, The Australian National Univ. (Australia); J. Zou, The Univ. of Queensland (Australia); J. Williams, H. H. Tan, The Australian National Univ. (Australia) . . . . . [6474-21]

9:45 am: **Schottky barrier and ohmic contact control by subsurface processing** *(Invited Paper)*, L. J. Brillson, The Ohio State Univ. . . . . [6474-22]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Room: Conv. Ctr. Room A3 . . . . . Mon. 10:30 to 11:45 am

ZnO Based Diodes and LEDs

Chairs: **Dave Rogers**, Nanovation SARL (France); **Seong-Ju Park**, Gwangju Institute of Science and Technology (South Korea)

10:30 am: **Review of current issues in ZnO LED** *(Invited Paper)*, S. Park, Gwangju Institute of Science and Technology (South Korea) . . . . . [6474-23]

10:55 am: **Realization of p-type P-doped ZnO and homojunction diodes** *(Invited Paper)*, H. Gong, National Univ. of Singapore (Singapore) . . . . [6474-24]

11:20 am: **Surface plasmon mediated emission from metal/ZnO: an example for the fabrication of high brightness top-emitting light emitting diodes** *(Invited Paper)*, H. C. Ong, D. Y. Lei, W. H. Ni, J. Li, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6474-25]

Lunch Break . . . . . 11:45 am to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room A3 . . . . . Mon. 1:30 to 2:45 pm

ZnO Materials and Properties

Chairs: **Olivier Durand**, Thales Research & Technology (France); **Ken Nakahara**, Tohoku Univ. (Japan)

1:30 pm: **Photonic properties of ZnO epilayers** *(Invited Paper)*, A. Hoffmann, Technische Univ. Berlin (Germany) . . . . . [6474-27]

1:55 pm: **Ultrafast spectroscopy in ZnO** *(Invited Paper)*, A. N. Cartwright, M. C. Cheung, O. W. Akinbode, Univ. at Buffalo; T. Murphy, K. Moazzam, J. D. Phillips, Univ. of Michigan; W. C. T. Lee, P. Miller, The MacDiarmid Institute for Advanced Materials and Nanotechnology (New Zealand); C. Swartz, West Virginia Univ.; S. M. Durbin, R. J. Reeves, The MacDiarmid Institute for Advanced Materials and Nanotechnology (New Zealand); T. H. Myers, West Virginia Univ.; J. W. Dong, A. V. Osinsky, SVT Associates, Inc. . . . . [6474-28]

2:20 pm: **Studies of PLD-made thin ZnO layers by x-ray scattering methods: beyond the too restrictive ZnO(00.2) FWHM figure-of-merit** *(Invited Paper)*, O. Durand, Thales Research & Technology (France); D. Rogers, Nanovation SARL (France) and Univ. de Technologie de Troyes (France); F. H. Teherani, Nanovation SARL (France) . . . . . [6474-29]

SESSION 8

Room: Conv. Ctr. Room A3 . . . . . Mon. 2:45 to 4:35 pm

ZnO Bulk and Photonic Crystals

Chairs: **Hock Chun Ong**, The Chinese Univ. of Hong Kong (Hong Kong China); **Eric Millon**, Univ. d'Orléans (France)

2:45 pm: **A comparative study of free standing zinc oxide substrates** *(Invited Paper)*, M. J. Callahan, L. O. Bouthillette, Air Force Research Lab.; G. Dhanaraj, B. Raghothamachar, M. Dudley, Stony Brook Univ.; B. Wang, Solid State Scientific Corp. . . . . [6474-30]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **The state of the art of ZnO bulk crystal growth** *(Invited Paper)*, T. Fukuda, Tohoku Univ. (Japan) and Fukuda Crystal Lab. (Japan); D. Ehrentraut, Fukuda Crystal Lab. (Japan); Y. Mikawa, Tohoku Univ. (Japan) . . . . . [6474-31]

3:55 pm: **Vacancy defect distributions in bulk ZnO crystals** *(Invited Paper)*, F. Tuomisto, J. Mäki, Helsinki Univ. of Technology (Finland); D. C. Look, Wright State Univ.; A. Mycielski, K. Grasza, Polish Academy of Sciences; A. Zubiaga, F. Plazaola, Univ. del País Vasco (Spain); V. Munoz-San Jose, Univ. de València (Spain) . . . . . [6474-32]

4:15 pm: **UV-modulated one-dimensional ZnO/SiO_2 photonic-crystal resonator for visible lights** *(Invited Paper)*, S. Yang, H. Horng, National Taiwan Normal Univ. (Taiwan); C. Hong, Da-Yeh Univ. (Taiwan); H. Yang, National Taiwan Univ. (Taiwan) . . . . . [6474-33]

SESSION 9

Room: Conv. Ctr. Room A3 . . . . . Mon. 4:35 to 6:40 pm

ZnO Based Thin Film Devices

Chairs: **Leonard J. Brillson**, The Ohio State Univ.; **Hitoshi Tampo**, Consultant (Japan)

4:35 pm: **Surface acoustic wave (SAW) devices** *(Invited Paper)*, C. Müller, A. Nateprov, G. Obermeier, M. Klemm, V. Tsurkan, A. Wixforth, R. Tidecks, S. Horn, Univ. Augsburg (Germany) . . . . . [6474-34]

5:00 pm: **Analysis of the observed longitudinal guided mode surface acoustic waves in ZnO thin films grown by pulsed laser deposition,** M. Zerdali, S. Hamzaoui, Univ. des Sciences et de la Technologie d'Oran (Algeria); D. Rogers, Univ. de Technologie de Troyes (France); F. H. Teherani, Nanovation SARL (France); P. Djemia, Univ. Paris-Nord (France) . . . . . [6474-35]

5:20 pm: **Growth and characterization of doped ZnO films** *(Invited Paper)*, A. K. Pradhan, Norfolk State Univ. . . . . [6474-36]

5:40 pm: **Ga:ZnO based transparent conducting oxides and devices** *(Invited Paper)*, V. M. Bhosle, J. Narayan, North Carolina State Univ. . [6474-37]

6:00 pm: **Scaling and parasitic effects in ZnO transparent thin film transistors** *(Invited Paper)*, C. Wu II, H. Hsieh, National Taiwan Univ. (Taiwan) . . . . . [6474-38]

6:20 pm: **The characteristics of transparent metal-ZnO contacts and ZnO-based photodiodes** *(Invited Paper)*, Y. Z. Chiou, Southern Taiwan Univ. of Technology (Taiwan) . . . . . [6474-39]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 10

Room: Conv. Ctr. Room A3 . . . . . Tues. 10:30 am to 12:15 pm

ZnO Based Nanostructures I

Chairs: **Yicheng Lu**, Rutgers Univ.; **Camilla Baratto**, Univ. degli Studi di Brescia (Italy)

10:30 am: **Nanodevices and electric nanogenerators based on ZnO nanobelts and nanowires** *(Invited Paper)*, Z. L. Wang, Georgia Institute of Technology . . . . . [6474-40]

11:00 am: **ZnO based nanostructures for optoelectronics** *(Invited Paper)*, A. Waag, A. El-Shaer, A. C. Mofor, M. Al-Suleiman, B. Postels, E. Schlenker, H. Wehmann, A. S. Bakin, Technische Univ. Braunschweig (Germany) [6474-41]

11:25 am: **Zinc oxide nanocrystals for optical chemical sensing** *(Invited Paper)*, C. Baratto, E. Comini, G. Faglia, M. Ferroni, G. Sberveglieri, Univ. degli Studi di Brescia (Italy) . . . . . [6474-42]

11:50 am: **Integration of multifunctional ZnO and its nanostructures for novel devices** *(Invited Paper)*, Y. Lu, J. Zhong, J. Zhu, H. Chen, G. Saraf, Y. Chen, Z. Zhang, Rutgers Univ.; J. J. Song, C. K. Choi, ZN Technology, Inc. . . . . [6474-43]

Lunch/Exhibition Break . . . . . 12:15 to 1:35 pm

SESSION 11

Room: Conv. Ctr. Room A3 . . . . . Tues. 1:35 to 3:05 pm

ZnO Based Nanostructures II

Chairs: **Zhong Lin Wang**, Georgia Institute of Technology;
Ian T. Ferguson, Georgia Institute of Technology

1:35 pm: **Morphological control of ZnO nanostructures on silicon substrates,** R. T. Rajendra Kumar, J. Grabowska, J. Mosnier, M. O. Henry, E. McGlynn, Dublin City Univ. (Ireland) . . . . . [6474-44]

1:55 pm: **Optical characteristics of ZnO nanowires synthesized by nanoparticle-assisted deposition and their application to sensors** *(Invited Paper)***,** T. Okada, J. Suehiro, Kyushu Univ. (Japan) . . . . . [6474-46]

2:20 pm: **Patterned growth of ZnO nanorod by solution chemical method,** S. Yi, S. Choi, J. Jang, S. Go, J. Kim, W. Jung, Kookmin Univ. (South Korea) . . . . . [6474-47]

2:40 pm: **Carrier relaxation and stimulated emission in ZnO nanorods grown by catalyst-assisted vapor transport on various substrates,** V. Avrutin, Ü. Özgür, N. Izyumskaya, S. A. Chevtchenko, J. H. Leach, J. C. Moore, A. A. Baski, H. Morkoc, Virginia Commonwealth Univ.; P. Ruterana, ENSICAEN (France); K. Tsen, Arizona State Univ. . . . . [6474-48]

Coffee Break . . . . . 3:05 to 3:30 pm

SESSION 12

Room: Conv. Ctr. Room A3 . . . . . Tues. 3:30 to 5:35 pm

Spintronics and Ferroelectrics

Chairs: **Scott A. Chambers**, Pacific Northwest National Lab.;
Jeff Nause, Cermet, Inc.

3:30 pm: **Electron mediated ferromagnetism in epitaxial co-doped ZnO** *(Invited Paper)***,** S. A. Chambers, Pacific Northwest National Lab. . . . . [6474-49]

4:00 pm: **Spin injecting devices based on ZnO,** S. Ramachandran, J. T. Prater, J. Narayan, North Carolina State Univ. . . . . [6474-50]

4:25 pm: **Transition metal-doped ZnO: a comparaison of opical, magnetic, and structural behaviour of bulk and thin films** *(Invited Paper)***,** I. T. Ferguson, Georgia Institute of Technology . . . . . [6474-51]

4:50 pm: **Physical properties modulation of magnetic and non-magnetic ZnO thin films by field effect** *(Invited Paper)***,** E. Bellingeri, I. Pallecchi, L. Pellegrino, A. Caviglia, G. Canu, A. Gerbi, A. S. Siri, D. Marre, Univ. degli Studi di Genova (Italy) . . . . . [6474-52]

5:15 pm: **Spontaneous polarization in ferroelectric wurtzite (ZnO) perovskite (BaTiO3) heterostructures: theory, experiments and further prospects,** M. M. Schubert, R. Voora, T. Hofmann, Univ. of Nebraska/Lincoln; H. Hochmuth, M. Lorenz, M. Grundmann, Univ. Leipzig (Germany) . . [6474-53]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Surface modification of ZnO nanostructures for use in gas sensing,** J. Delaunay, K. Yanagisawa, T. Nishino, The Univ. of Tokyo (Japan) [6474-56]

✔ **Fabrication of well-aligned ZnO nanorods by hydrothermal process using GaN epitaxial layer,** J. Jang, S. Yi, S. Choi, J. Kim, W. Jung, Kookmin Univ. (South Korea) . . . . . [6474-57]

✔ **Transition metal-doped ZnO: a comparison of optical, magnetic, and structural behavior of bulk and thin films,** M. H. Kane, W. E. Fenwick, Georgia Institute of Technology; R. Varatharajan, Cermet, Inc.; M. Strassburg, Georgia Institute of Technology; W. Nemeth, Cermet, Inc.; D. Keeble, Univ. of Dundee (United Kingdom); H. El-Mkami, G. M. Smith, Univ. of St. Andrews (United Kingdom); J. Nause, Cermet, Inc.; C. J. Summers, I. T. Ferguson, Georgia Institute of Technology . . . . . [6474-59]

✔ **Fabrication and characterization of zinc oxide based rib waveguide,** M. Gioffrè, M. Gagliardi, M. Iodice, G. Coppola, Istituto per la Microelettronica e Microsistemi (Italy); F. G. Della Corte, Univ. degli Studi Mediterranea di Reggio Calabria (Italy) . . . . . [6474-60]

✔ **Influence of annealing in oxygen ambient on crystal properties of rf-sputtered PZT layers on ZnO substrates,** Y. I. Alivov, F. Agra, B. Xiao, S. A. Chevtchenko, Virginia Commonwealth Univ.; C. W. Litton, Air Force Research Lab.; H. Morkoc, Virginia Commonwealth Univ. . . . . [6474-63]

✔ **Electrical characteristics of n-ZnO/n-6H-SiC heterostructures grown by rf-sputtering,** Y. I. Alivov, B. Xiao, Q. Fan, Virginia Commonwealth Univ.; D. K. Johnstone, SEMETROL; C. W. Litton, Air Force Research Lab.; H. Morkoc, Virginia Commonwealth Univ. . . . . [6474-64]

✔ **An overview of ZnO research activity in Hong Kong,** H. C. Ong, The Chinese Univ. of Hong Kong (Hong Kong China) . . . . . [6474-65]

✔ **ZnO thin film growth on various substrates,** F. H. Teherani, D. Rogers, Nanovation SARL (France) . . . . . [6474-66]

OPTO

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Integrated Optics: Devices, Materials, and Technologies XI

Conference Chairs: **Yakov Sidorin**, Photineer Technology Group; **Christoph A. Waechter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

Program Committee: **Trevor M. Benson**, The Univ. of Nottingham (United Kingdom); **Jean-Emmanuel Broquin**, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France); **Venkatraman Gopalan**, The Pennsylvania State Univ.; **Christoph M. Greiner**, LightSmyth Technologies, Inc.; **Helmut Heidrich**, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); **Pierre Lemaitre-Auger**, École Supérieure d'Ingénieurs en Systèmes Industriels Avancés Rhône-Alpes (France); **Christi K. Madsen**, Texas A&M Univ.; **Robert L. Nelson**, Air Force Research Lab.; **Gualtiero Nunzi Conti**, Centro Studi e Ricerche "Enrico Fermi" (Italy)

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room N . . . . . Mon. 8:30 to 10:10 am

Tunable WGs and WG Sensors

Chair: **Jean-Emmanuel Broquin**, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France)

8:30 am: **Characterization of a quality-factor tunable integrated silicon microtoroidal resonators,** J. Yao, D. Leuenberger, M. C. Wu, Univ. of California/Berkeley . . . . . [6475-01]

8:50 am: **Micro-photonic cylindrical waveguide based protein biosensor,** S. Prasad, P. K. Padigi, Portland State Univ.; K. Asante, Portland State Univ; V. Kovvuri, R. K. Reddy, A. H. La Rosa, Portland State Univ. . . . . [6475-02]

9:10 am: **Optical waveguide biosensor based on 2D diffractive elements obtained by nano-imprint lithography,** S. Grego, RTI International; Y. Cao, The Univ. of North Carolina at Charlotte; C. A. Bower, B. R. Stoner, RTI International; T. J. Suleski, The Univ. of North Carolina at Charlotte . . . . . [6475-03]

9:30 am: **Demonstration of a liquid core optical ring resonator sensor coupled with an ARROW waveguide array,** I. M. White, H. Oveys, Univ. of Missouri/Columbia; T. L. Smith, J. Zhang, 3M Co.; X. Fan, Univ. of Missouri/Columbia . . . . . [6475-04]

9:50 am: **Direct detecting thin polymer and organic adlayers using a local evanescent-field array coupled waveguide sensor,** G. Yuan, M. D. Stephens, D. S. Dandy, K. L. Lear, Colorado State Univ. . . . . [6475-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room N . . . . . Mon. 10:30 am to 12:00 pm

Glass WG Optics

Chair: **Yakov Sidorin**, Photineer Technology Group

10:30 am: **Glass integrated optics: state of the art and position towards other technologies** *(Invited Paper)***,** J. Broquin, École Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (France) . . . . . [6475-06]

11:00 am: **Chalcogenide waveguide for IR optical range,** V. Nazabal, Univ. de Rennes I (France); P. Nemec, Univ. Pardubice (Czech Republic); M. Anne, J. Adam, Univ. de Rennes I (France); M. Frumar, Univ. Pardubice (Czech Republic); A. Jurdyc, B. Jacquier, Univ. Claude Bernard Lyon 1 (France) . . . . . [6475-07]

11:20 am: **Channel waveguides fabrication in Er^{3+}-doped tellurite glass by ion beam irradiation,** S. Pelli, S. Berneschi, M. Brenci, G. Nunzi Conti, G. C. Righini, Istituto di Fisica Applicata Nello Carrara (Italy); I. Baniasz, A. Watterich, N. Q. Khanh, M. Fried, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary) . . . . . [6475-08]

11:40 am: **Three-dimensional integration of passive functions on glass by means of selectively buried waveguides and multiple ion-exchanges,** J. Grelin, D. Bucci, E. Ghibaudo, J. Broquin, Ecole Nationale Superieure d'Electronique et de Radioelectricite de Grenoble (France) . . . . . [6475-09]

Lunch Break . . . . . 12:00 to 1:20 pm

SESSION 3

Room: Conv. Ctr. Room N . . . . . Mon. 1:20 to 3:10 pm

Subwavelength Diffractive Photonics

Chair: **Christoph M. Greiner**, LightSmyth Technologies, Inc.

1:20 pm: **A reconfigurable self-collimation-based photonic crystal switch in silicon** *(Invited Paper)***,** A. Sharkawy, EM Photonics, Inc.; B. Miao, C. Chen, Univ. of Delaware; E. J. Kelmelis, EM Photonics, Inc.; D. W. Prather, Univ. of Delaware . . . . . [6475-10]

1:50 pm: **Distributed subwavelength grating demultiplexer in SOI,** E. M. Bisaillon, McGill Univ. (Canada); D. T. H. Tan, The Univ. of British Columbia (Canada); M. Nadeau, McGill Univ. (Canada); L. Chrostowski, The Univ. of British Columbia (Canada); A. G. Kirk, McGill Univ. (Canada) . . . . . [6475-11]

2:10 pm: **Waveform generators based on parallel anti-symmetric waveguide Bragg gratings,** J. M. Castro, D. F. Geraghty, The Univ. of Arizona . . [6475-12]

2:30 pm: **Narrowband Bragg reflectors in Ti:$LiNbO_3$ optical waveguides and applications,** R. Kim, Advanced Micro Devices, Inc.; O. Eknoyan, Texas A&M Univ. . . . . [6475-13]

2:50 pm: **The quarter-wave Bragg reflection waveguide: analytical solutions and properties,** B. R. West, McGill Univ. (Canada); A. Helmy, Univ. of Toronto (Canada) . . . . . [6475-14]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room N . . . . . Mon. 3:30 to 5:40 pm

Modelling

Chair: **Christoph A. Waechter**, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany)

3:30 pm: **Self-focusing in high-power optical fibers** *(Invited Paper)***,** G. R. Hadley, A. V. Smith, Sandia National Labs. . . . . [6475-15]

4:00 pm: **Goal oriented adaptive finite element method for precise simulations of optical components,** L. W. Zschiedrich, S. Burger, F. Schmidt, Zuse Institute Berlin (Germany) . . . . . [6475-16]

4:20 pm: **Design issues with MMI based photonic switches and routers,** L. W. Cahill, La Trobe Univ. (Australia) . . . . . [6475-17]

4:40 pm: **Light exctraction from OLEDs: the waveguide perspective,** N. Danz, D. Michaelis, C. A. Waechter, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [6475-18]

5:00 pm: **Theoretical analysis of active ring microresonator filter,** H. Chen, Yangtze Univ. (China) . . . . . [6475-19]

5:20 pm: **Automatic design and optimisation of Si nanophotonics devices using finite element frequency domain solvers,** T. P. Felici, D. F. G. Gallagher, Photon Design (United Kingdom) . . . . . [6475-20]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room N . . . . . Tues. 10:30 am to 12:30 pm

Recent Advances

Chair: **Venkat Gopalan**, The Pennsylvania State Univ.

10:30 am: **Closed-loop design of a semiconductor laser** *(Invited Paper)***,** J. V. Moloney, J. Hader, The Univ. of Arizona and Nonlinear Control Strategies; M. Fallahi, L. Fan, The Univ. of Arizona; S. W. Koch, Philipps-Univ. Marburg (Germany) . . . . . [6475-21]

11:00 am: **Integrated optoelectronics in an optical fiber** *(Invited Paper)***,** J. V. Badding, The Pennsylvania State Univ.; P. J. A. Sazio, A. Amezcua Correa, Univ. of Southampton (United Kingdom); T. J. Scheidemantel, The Pennsylvania State Univ.; C. E. Finlayson, Univ. of Southampton (United Kingdom); N. F. Baril, D. Won, B. R. Jackson, V. Gopalan, The Pennsylvania State Univ. . . . [6475-22]

11:30 am: **Photonic components for 100GBE** *(Invited Paper)***,** M. Schell, Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH (Germany) [6475-23]

12:00 pm: **A new physical approach to understanding bend loss in optical fibers** *(Invited Paper)***,** J. D. Love, C. J. Durniak, A. N. Ankiewicz, The Australian National Univ. (Australia) . . . . . [6475-24]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room N . . . . . Tues. 1:30 to 3:10 pm

Plasmonics

Chair: **Gualtiero Nunzi Conti**,
Centro Studie Ricerche "Enrico Fermi" (Italy) (Italy)

1:30 pm: **Design of mid-infrared photodetectors enhanced by surface plasmons on grating structures,** Z. Yu, G. Veronis, M. L. Brongersma, S. Fan, Stanford Univ. . . . . [6475-25]

1:50 pm: **SPR waveguide sensor based on combined sensing of modal, phase, and amplitude changes,** R. Levy, S. Ruschin, Tel-Aviv Univ. (Israel) . . . . . [6475-26]

2:10 pm: **Compact couplers between dielectric and plasmonic slot waveguides,** G. Veronis, S. L. Fan, Stanford Univ. . . . . [6475-27]

2:30 pm: **Long range plasmonic waveguide devices with Au and PFCB polymer: design and fabrication,** J. Guo, R. Adato, R. Gollapalli, J. Jiang, M. Davenport, The Univ. of Alabama in Huntsville; Q. H. Liu, Duke Univ. . . . . [6475-28]

2:50 pm: **Long-range surface plasmon waveguides and devices in lithium niobate,** P. Berini, Univ. of Ottawa (Canada) and Spectalis Corp. (Canada); G. A. Mattiussi, Epocal, Inc. (Canada); N. Lahoud, R. Charbonneau, Spectalis Corp. (Canada) . . . . . [6475-29]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 7

Room: Conv. Ctr. Room N . . . . . Tues. 3:30 to 4:50 pm

Subwavelength and Microstructures

Chair: **Trevor M. Benson**, The Univ. of Nottingham (United Kingdom)

3:30 pm: **Digital holographic microscopy for nanometric quality control of micro-optical components,** J. Kühn, F. Charrière, École Polytechnique Fédérale de Lausanne (Switzerland); E. Cuche, Lyncée Tec SA (Switzerland); Y. Emery, LynceeTec SA (Switzerland); C. D. Depeursinge, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6475-31]

3:50 pm: **Fabrication of 400GHz spacing 1.62 nm bandwidth flat-top arrayed waveguide gratings (AWGs),** M. Maweidong, Accelink Technologies Co., Ltd. (China); W. Li II, Huazhong Univ. of Science and Technology (China) . [6475-32]

4:10 pm: **Two-photon absorption for the realization of optical waveguides on printed circuit boards,** G. Langer, M. Riester, Austria Technologie und Systemtechnik AG (Austria) . . . . . [6475-34]

4:30 pm: **Micro ring cavity resonator incorporating total internal reflection mirrors,** D. G. Kim, W. Choi, Y. W. Choi, Chung-Ang Univ. (South Korea); J. C. Yi, Hong Ik Univ. (South Korea); Y. Chung, Kwangwoon Univ. (South Korea); N. Dagli, Univ. of California/Santa Barbara . . . . . [6475-35]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room N . . . . . Wed. 8:10 to 10:00 am

PhC-Based Devices

Chair: **Robert L. Nelson**, Air Force Research Lab.

8:10 am: **Nanophotonic integrated lasers** *(Invited Paper)***,** M. Kamp, H. Scherer, A. W. B. Forchel, Univ. Würzburg (Germany); K. Janiak, H. Heidrich, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); R. Brenot, G. Duan, Alcatel Research & Innovation (France); H. Benisty, Institut d'Optique (France) . . . . . [6475-36]

8:40 am: **Superprism phenomena in low index 3D polymer photonic crystal,** L. Wang, W. Jiang, R. T. Chen, The Univ. of Texas/Austin . . . . . [6475-37]

9:00 am: **Silicon-based low-loss photonic crystal waveguides,** D. Pergande, A. von Rhein, R. B. Wehrspohn, Univ. Paderborn (Germany); T. M. Geppert, Univ. Paderborn (Germany) and Max Planck Institute of Microstructure Physics (Germany); C. Jamois, Univ. of Surrey (United Kingdom) . . . . . [6475-38]

9:20 am: **Photonic crystal slab reflectors for compact passive and active optical devices,** S. Boutami, B. Ben Bakir, J. Leclercq, X. Letartre, P. Regreny, M. Garrigues, P. Viktorovitch, École Centrale de Lyon (France); L. Le Gratiet, G. Beaudoin, I. Sagnes, Lab. de Photonique et de Nanostructures (France) . . . . . [6475-39]

9:40 am: **Nanofluidic tuning of photonic crystal circuits,** D. C. Ericson, Cornell Univ.; T. D. Rockwood, T. Emery, A. Scherer, D. Psaltis, California Institute of Technology . . . . . [6475-40]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 9

Room: Conv. Ctr. Room N . . . . . Wed. 10:30 am to 12:10 pm

Novel Materials

Chair: **Christi K. Madsen**, Texas A&M Univ.

10:30 am: **Hybrid organic-silicon electro-optic materials and devices,** D. C. Abeysinghe, R. E. Nelson, Air Force Research Lab.; J. W. Haus, B. Birchfield, Univ. of Dayton . . . . . [6475-41]

10:50 am: **Nonlinear electro-optic composite materials,** B. Birchfield, Univ. of Dayton . . . . . [6475-42]

11:10 am: **Active Maxwell Garnett polymers,** R. L. Nelson, Air Force Research Lab. . . . . [6475-43]

11:30 am: **Tailored nanoaggregates from functionalized organic molecules,** M. Schiek, Carl von Ossietzky Univ. Oldenburg (Germany); J. R. Brewer, Syddansk Univ. (Denmark); F. Balzer, Humboldt-Univ. zu Berlin (Germany); A. Lützen, Univ. Bonn (Germany); K. Al-Shamery, Carl von Ossietzky Univ. Oldenburg (Germany); H. Rubahn, Syddansk Univ. (Denmark) . . . . . [6475-44]

11:50 am: **Microfabrication of integrated atomic vapor cells,** D. B. Conkey, R. L. Brenning, A. R. Hawkins, Brigham Young Univ.; W. Yang, B. Wu, H. Schmidt, Univ. of California/Santa Cruz . . . . . [6475-45]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

Monday-Wednesday 22-24 January 2007 • Proceedings of SPIE Vol. 6476

Optoelectronic Integrated Circuits XI

Conference Chairs: **Louay A. Eldada**, DuPont Photonics Technologies; **El-Hang Lee**, Inha Univ. (South Korea)

Program Committee: **Yung J. Chen**, Univ. of Maryland/Baltimore County; **Larry A. Coldren**, Univ. of California/Santa Barbara; **Yeshaiahu Fainman**, Univ. of California/San Diego; **Alexei L. Glebov**, Fujitsu Labs. of America; **Hans J. Heider**, Technische Univ. Hamburg-Harburg (Germany); **Ghassan E. Jabbour**, Arizona State Univ.; **Richard M. Osgood, Jr.**, Columbia Univ.; **Manijeh Razeghi**, Northwestern Univ.; **Giancarlo C. Righini**, Istituto di Fisica Applicata Nello Carrara (Italy); **Robert Scarmozzino**, RSoft Design Group, Inc.

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room C2 . . . . . Mon. 8:10 to 10:10 am

Trends in OEIC Components and Subsystems

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

8:10 am: **Waveguides and devices in silicon photonics** *(Invited Paper)*, G. T. Reed, B. D. Timotijevic, F. Y. Gardes, D. Thomson, P. Yang, S. Howe, W. R. Headley, G. Z. Mashanovich, Univ. of Surrey (United Kingdom) . [6476-01]

8:40 am: **Hybrid integration platform based on silica-on-silicon planar lightwave circuit** *(Invited Paper)*, W. Lin, J. C. K. Sun, K. M. Schmidt, ANDevices, Inc. . . . . [6476-02]

9:10 am: **Interaction of metal-oxide functionality on optical chips** *(Invited Paper)*, R. M. Osgood, Jr., R. M. Roth, D. Djukic, Columbia Univ. . . . . [6476-03]

9:40 am: **ROADM architectures and technologies for agile optical networks** *(Invited Paper)*, L. A. Eldada, DuPont Photonics Technologies . . . . . [6476-04]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room C2 . . . . . Mon. 10:30 am to 12:00 pm

Micro-Cavity OEICs

Chair: **Richard M. Osgood, Jr.**, Columbia Univ.

10:30 am: **Silicon microspheres for ingrated photonics** *(Invited Paper)*, A. Serpengüzel, Koç Univ. (Turkey) . . . . . [6476-05]

11:00 am: **Microring and microdisk resonator integrated circuits on a silicon chip** *(Invited Paper)*, A. W. Poon, L. Zhou, H. Chen, C. Li, J. Y. Lee, Hong Kong Univ. of Science and Technology (Hong Kong China) . . . . . [6476-06]

11:30 am: **Slow light photonic crystal waveguides and their use for confinement control** *(Invited Paper)*, H. Benisty, L. Martinelli, C. Cambournac, Institut d'optique/LCFIO, CNRS (France); A. David, Univ. of California/Santa Barbara; O. Khayam, Institut d'optique/LCFIO, CNRS (France); C. Weisbuch, Univ. of California/Santa Barbara and Institut d'optique/LCFIO, CNRS (France) . . . . . [6476-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room C2 . . . . . Mon. 1:30 to 3:00 pm

Micro/Nano-Scale OEICs

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

1:30 pm: **Photonic device concepts based on photonically engineered nanostructures** *(Invited Paper)*, G. Bona, IBM Almaden Research Ctr. [6476-08]

2:00 pm: **Nanophotonics for information systems** *(Invited Paper)*, Y. Fainman, Univ. of California/San Diego . . . . . [6476-09]

2:30 pm: **Optical integrated circuits and networks on micro/nano-scale** *(Invited Paper)*, E. Lee, Inha Univ. (South Korea) . . . . . [6476-10]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room C2 . . . . . Mon. 3:30 to 5:10 pm

Design of OEICs and Their Control ICs

Chair: **Yeshaiahu Fainman**, Univ. of California/San Diego

3:30 pm: **Semiconductor integrated multi-spectral photo receiver for WDM networks,** B. Gilman, M-Borg, Inc. . . . . [6476-11]

3:50 pm: **Analysis of extraordinary self-images with weak-guiding multimode interference structure for wavelength MUX/DeMUX,** J. K. Hong, S. Lee, J. Jung, J. Kim, Hanyang Univ. (South Korea) . . . . . [6476-12]

4:10 pm: **Integrated Sagnac loop mirror circuit for fiber Raman laser,** T. Lee, C. Kim, M. Y. Jeong, Pusan National Univ. (South Korea) . . . . . [6476-13]

4:30 pm: **A high-dynamic range transimpedance amplifier with compression,** D. Micusik, H. Zimmermann, Technische Univ. Wien (Austria) . . . . . [6476-14]

4:50 pm: **Linear trans-impedance amplifier with functional active loads for analog optical communication systems,** D. Kim, H. Kang, I. Jung, Y. Choi, Chung-Ang Univ. (South Korea) . . . . . [6476-15]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room C2 . . . . . Tues. 10:30 am to 12:00 pm

Quantum IT OEICs

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

10:30 am: **Free-space quantum key distribution at GHz repetition rates** *(Invited Paper)*, J. C. Bienfang, D. J. Rogers, A. Mink, X. Tang, B. J. Hershman, T. Nakassis, D. H. Su, C. W. Clark, C. J. Williams, National Institute of Standards and Technology . . . . . [6476-16]

11:00 am: **Progress toward quantum communications networks: opportunities and challenges** *(Invited Paper)*, R. J. Runser, T. E. Chapuran, P. Toliver, N. A. Peters, M. S. Goodman, J. T. Kosloski, N. Nweke, S. R. McNown, Telcordia Technologies, Inc.; R. J. Hughes, D. Rosenberg, G. Peterson, K. P. McCabe, J. E. Nordholt, K. Tyagi, P. A. Hiskett, N. Dallmann, Los Alamos National Lab. . . . . [6476-17]

11:30 am: **Quantum dot devices for single photon quantum systems** *(Invited Paper)*, R. P. Mirin, J. J. Berry, E. J. Gansen, M. Greene, R. H. Hadfield, T. E. Harvey, S. W. Nam, M. A. Rowe, K. L. Silverman, M. J. Stevens, M. Y. Su, National Institute of Standards and Technology . . . . . [6476-18]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room C2 . . . . . Tues. 1:30 to 3:20 pm

Joint Session with Conference 6478

OEIC Integration, Packaging and Interconnects I

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

1:30 pm: **Onboard optical interconnect technologies for 10 Gbps and beyond** *(Invited Paper)*, A. L. Glebov, M. G. Lee, Fujitsu Labs. of America . . . . . [6476-19]

2:00 pm: **Low-cost micro-optics for PCB level photonic interconnects** *(Invited Paper)*, H. Thienpont, J. Van Erps, C. Debaes, M. Vervaeke, L. Desmet, H. Ottevaere, P. Vynck, Y. Ishii, A. Hermanne, Vrije Univ. Brussel (Belgium); N. Hendrickx, G. Van Steenberge, P. Van Daele, Univ. Gent (Belgium) [6476-20]

2:30 pm: **Fabrication of a 10Gbps/ch flexible optical- printed circuit board (FO-PCB),** H. Lee, S. An, S. Lee, B. O, E. Lee, Inha Univ. (South Korea) . . . . . [6476-21]

3:00 pm: **Flexible polymer pillars for optical chip assembly: materials, structures, and characterization** *(Invited Paper)*, P. A. Kohl, Georgia Institute of Technology; A. L. Glebov, Fujitsu Labs. of America; E. Elce, Promerus LLC; D. Bhusari, M. Bakir, J. D. Meindl, Georgia Institute of Technology; M. G. Lee, Fujitsu Labs. of America . . . . . [6478-01]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 7

Room: Conv. Ctr. Room C2 . . . . . Tues. 3:40 to 5:00 pm

Joint Session with Conference 6478

OEIC Integration, Packaging and Interconnects II

Chair: **Ray T. Chen**, The Univ. of Texas at Austin

3:40 pm: **Nanophotonic devices and systems to enable optical interconnects** *(Invited Paper)*, D. V. Plant, McGill Univ. (Canada) . . . . [6476-22]

4:10 pm: **Toward convergence in optoelectronic integration, packaging, and interconnects** *(Invited Paper)*, L. A. Eldada, DuPont Photonics Technologies . . . . . [6476-23]

4:40 pm: **Application of two-photon 3D lithography for the fabrication of embedded ORMOCER(r) waveguides,** V. Schmidt, L. Kuna, V. Satzinger, JOANNEUM RESEARCH GmbH (Austria); R. Houbertz, Fraunhofer-Institut für Silicatforschung (Germany); G. Jakopic, G. Leising, JOANNEUM RESEARCH GmbH (Austria) . . . . . [6476-44]

4:10 pm: **Optoelectronic packaging for 16-channel optical backplane with VHOEs,** J. Choi, H. Bi, R. T. Chen, The Univ. of Texas/Austin . . . . . [6478-02]

4:40 pm: **Low cost optical interconnects,** E. J. Palen, PalenSolutions . . . . . [6478-03]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room C2 . . . . . Wed. 8:30 to 10:10 am

Compound Semiconductor OEICs

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

8:30 am: **Type II InAs/GaSb superlattice focal plane arrays for high performance third generation infrared imaging and free space communications** *(Invited Paper)*, M. Razeghi, A. D. Hood, Northwestern Univ. . . . . [6476-25]

9:00 am: **Ultra-compact monolithically integrated photonic switches in InP,** D. A. Yanson, J. H. Marsh, Intense Photonics Ltd. (United Kingdom) . [6476-26]

9:20 am: **Q-modulated semiconductor laser** *(Invited Paper)*, J. He, Zhejiang Univ. (China) . . . . . [6476-27]

9:50 am: **Postgrowth wavelength engineering of InAs/InAlGaAs/InP quantum-dash-in-well lasers,** H. S. Djie, Lehigh Univ. . . . . [6476-28]

SESSION 9

Room: Conv. Ctr. Room C2 . . . . . Wed. 10:10 to 10:50 am

Polymer OEICs

Chair: **El-Hang Lee**, Inha Univ. (South Korea)

10:10 am: **Reliability of polymer-PLC-based photonic components, modules, and subsystems,** L. A. Eldada, DuPont Photonics Technologies . . . . . [6476-30]

10:30 am: **Fabrication of 45-degree-ended polymer waveguides by single step embossing technique,** S. An, H. Lee, S. Lee, B. O, S. Park, E. Lee, Inha Univ. (South Korea) . . . . . [6476-32]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Novel 1x3 wavelength MUX/DeMUX using extraordinary self-imaging phenomenon,** J. K. Hong, S. Choi, S. Lee, J. Jung, J. Park, Hanyang Univ. (South Korea) . . . . . [6476-33]

✔ **Novel bio-signal processing technique with hybrid bio-system integrated with optical microcavity ring resonator,** I. Jung, D. Kim, W. Choi, D. Kim, Y. Choi, Chung-Ang Univ. (South Korea) . . . . . [6476-34]

✔ **Fabrication of polymer AWG demultiplexer using embossing technique,** C. Choi, M. W. Lee, J. Sung, B. Kim, J. S. Yang, E. Lee, B. O, Inha Univ. (South Korea) . . . . . [6476-38]

✔ **Preparation of surfactant-mediated nanoporous PMMA film,** S. Lee, I. Chin, H. Kim, Inha Univ. (South Korea) . . . . . [6476-39]

✔ **Photonic crystal optical group delay device for optical code division multiple access,** J. Sung, C. Choi, M. W. Lee, J. Yang, E. Lee, B. O, Inha Univ. (South Korea) . . . . . [6476-40]

✔ **Design and characterization of polymer waveguide grating coupler for normal fiber incidence,** J. Yang, C. Choi, B. O, S. Lee, E. Lee, Inha Univ. (South Korea) . . . . . [6476-41]

✔ **Nano-patterning fabrication by low energy lithography,** Y. Takatoshi, D. J. Seong, D. Kim, S. J. Ahn, Y. Kim, H. S. Kim, Sun Moon Univ. (South Korea) . . . . . [6476-42]

✔ **Fabrication of multilayer porous silicon optical filter,** H. Yim, C. Choi, J. Sung, M. W. Lee, E. Lee, B. O, Inha Univ. (South Korea) . . . . . [6476-43]

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Silicon Photonics II

Conference Chairs: **Joel A. Kubby**, Univ. of California/Santa Cruz; **Graham T. Reed**, Univ. of Surrey (United Kingdom)

Program Committee: **Alyssa B. Apsel**, Cornell Univ.; **Laurence W. Cahill**, La Trobe Univ. (Australia); **Philippe M. Fauchet**, Univ. of Rochester; **Ghassan E. Jabbour**, Arizona State Univ.; **Siegfried Janz**, National Research Council Canada (Canada); **Andrew P. Knights**, McMaster Univ. (Canada); **Laura M. Lechuga**, Ctr. Nacional de Microelectrónica (Spain); **Sebania Libertino**, Istituto per la Microelettronica e Microsistemi (Italy); **Mario J. Paniccia**, Intel Corp.; **David J. Robbins**, Consultant (United Kingdom); **Adrian P. Vonsovici**, Argessus Photonics Ltd. (United Kingdom); **Dan-Xia Xu**, National Research Council Canada (Canada)

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room A2 . . . . . Mon. 1:30 to 3:10 pm

Integration

Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

1:30 pm: **Progress in manufactured silicon photonics** *(Invited Paper)***,** B. T. Smith, D. Feng, H. Lei, D. Zheng, J. Fong, P. Zhou, M. Asghari, Kotura, Inc. . . . . [6477-01]

2:10 pm: **OLED-on-CMOS integration for optoelectronic sensor applications,** U. Vogel, D. Kreye, S. Reckziegel, M. Toerker, C. Grillberger, J. Amelung, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6477-02]

2:30 pm: **Active silicon components for chip to chip interconnects** *(Invited Paper)***,** J. Castracane, N. Tokranova, D. Song, SUNY/Univ. at Albany . . . . . [6477-03]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 2

Room: Conv. Ctr. Room A2 . . . . . Mon. 3:30 to 5:10 pm

Detectors

Chair: **Andrew P. Knights**, McMaster Univ. (Canada)

3:30 pm: **High-speed, low-voltage optical receivers consisting of Ge-on-SOI photodiodes paired with CMOS ICs** *(Invited Paper)***,** C. L. Schow, S. J. Koester, L. Schares, Thomas J. Watson Research Ctr.; G. Dehlinger, Infineon Technologies Austria AG; R. A. John, Thomas J. Watson Research Ctr. [6477-04]

4:10 pm: **Waveguide integrated MIM tunnel junction NIR detectors,** P. C. D. Hobbs, IBM Thomas J. Watson Research Ctr.; R. B. Laibowitz, Columbia Univ.; F. R. Libsch, N. C. LaBianca, IBM Thomas J. Watson Research Ctr.; P. P. Chiniwalla, IBM Corp. . . . . [6477-05]

4:30 pm: **Germanium on silicon photodetectors for telecom wavelengths,** L. Vivien, Univ. Paris-Sud II (France); M. Rouvière, Univ. Paris-Sud II (France) and STMicroelectronics (France); X. Le Roux, J. Mangeney, P. Crozat, D. Marris-Morini, D. Pascal, E. Cassan, S. C. Laval, Univ. Paris-Sud II (France); J. Damlencourt, J. Fédéli, CEA-LETI (France) . . . . . [6477-06]

4:50 pm: **5GHz front-end for active pixel applications in standard 0.35μm CMOS,** M. Li, I. Harrison, B. R. Hayes-Gill, M. Clark, M. C. Pitter, M. G. Somekh, The Univ. of Nottingham (United Kingdom) . . . . . [6477-07]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 3

Room: Conv. Ctr. Room A2 . . . . . Tues. 10:30 am to 12:10 pm

Waveguides I

Chair: **Dan-Xia Xu**, National Research Council Canada (Canada)

10:30 am: **Silicon photonic-wire waveguide devices** *(Invited Paper)***,** T. Chu, NEC Corp. (Japan); H. Yamada, Tohoku Univ. (Japan); S. Nakamura, NEC Corp. (Japan); M. Tojo, Alnair Labs. Corp. (Japan); S. Ishida, Y. Arakawa, The Univ. of Tokyo (Japan) . . . . . [6477-08]

11:10 am: **Growth and band-gap modulation of Group IV semiconductor alloy nanowires,** C. Jin, J. Yang, C. Kim, Pohang Univ. of Science and Technology (South Korea); S. Kim, Korea Univ. (South Korea); M. Jo, Pohang Univ. of Science and Technology (South Korea) . . . . . [6477-09]

11:30 am: **Tailoring the response and temperature characteristics of multiple serial-coupled resonators in SOI,** B. D. Timotijevic, D. Thomson, F. Y. Gardes, S. Howe, Univ. of Surrey (United Kingdom); A. Michaeli, Intel Corp. (Israel); J. V. Crnjanski, Univ. of Belgrade (Serbia and Montenegro); V. M. N. Passaro, Politecnico di Bari (Italy); G. Z. Mashanovich, G. T. Reed, Univ. of Surrey (United Kingdom) . . . . . [6477-10]

11:50 am: **Silicon microspheres in photonics,** A. Serpengüzel, Koç Univ. (Turkey) . . . . . [6477-11]

lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 4

Room: Conv. Ctr. Room A2 . . . . . Tues. 1:30 to 2:30 pm

Waveguides II

Chair: **Adam S. Densmore**, National Research Council Canada (Canada)

1:30 pm: **Polarization-insensitive ring resonators in SOI using cladding stress engineering and MMI couplers** *(Invited Paper)***,** D. Xu, S. Janz, P. Cheben, A. Delage, B. Lamontagne, E. Post, W. N. Ye, National Research Council Canada (Canada) . . . . . [6477-12]

2:10 pm: **A novel fabrication technique for silicon photonics,** G. T. Reed, G. Z. Mashanovich, P. Yang, W. R. Headley, S. Howe, Univ. of Surrey (United Kingdom) . . . . . [6477-15]

SESSION 5

Room: Conv. Ctr. Room A2 . . . . . Tues. 2:30 to 4:50 pm

Waveguides III

Chair: **Laurence W. Cahill**, La Trobe Univ. (Australia)

2:30 pm: **SOI waveguide based planar reflective grating demultiplexer for FTTH** *(Invited Paper)***,** S. Bidnyk, Enablence Inc. (Canada); D. Feng, Kotura, Inc.; A. Balakrishnan, M. R. T. Pearson, M. Gao, Enablence Inc. (Canada); H. Liang, W. Qian, C. Kung, J. Fong, J. Yin, M. Asghari, Kotura, Inc. . . . . [6477-16]

Coffee Break . . . . . 3:10 to 3:30 pm

3:30 pm: **Broadband silicon-on-insulator (SOI) polarization splitters and filters,** W. N. Ye, National Research Council Canada (Canada) and Carleton Univ. (Canada); D. Xu, S. Janz, P. Waldron, National Research Council Canada (Canada); N. G. Tar, Carleton Univ. (Canada) . . . . . [6477-17]

3:50 pm: **Effective medium based on two-dimensional photonic crystals for index-confinement waveguide application,** M. Wu, H. Lan, Y. Tsai, C. Hsu, J. Chang, National Central Univ. (Taiwan) . . . . . [6477-18]

4:10 pm: **Efficient and compact silicon-on-insulator rib waveguide 90 degree bends and splitters,** Y. Qian, G. P. Nordin, Brigham Young Univ. . . . . [6477-19]

4:30 pm: **Scattering loss measurement of SOI waveguides using 5X17 integrated optical star coupler,** K. P. Yap, Carleton Univ. (Canada) and National Research Council Canada (Canada); S. Janz, A. Delâge, B. Lamontagne, J. Lapointe, P. Chow-Chong, E. Post, National Research Council Canada (Canada); B. A. Syrett, Carleton Univ. (Canada) . . . . . [6477-20]

Wednesday 24 January

SESSION 6

Room: Conv. Ctr. Room A2 . . . . . Wed. 8:10 to 10:10 am

Electronic and Photonic Integrated Circuit (EPIC)

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

8:10 am: **A 40Gb silicon photonics transceiver** *(Invited Paper)***,** C. Gunn, Luxtera Inc. . . . . [6477-21]

8:50 am: **Integrated optical components in silicon for high speed analog-to-digital conversion** *(Invited Paper)***,** S. J. Spector, T. M. Lyszczarz, M. W. Geis, D. M. Lennon, J. U. Yoon, M. E. Grein, R. T. Schulein, MIT Lincoln Lab.; F. X. Kaertner, R. Amatya, G. Barbastathis, H. Byun, F. Gan, C. W. Holzwarth, J. L. Hoyt, E. P. Ippen, O. O. Olubuyide, J. S. Orcutt, M. J. Park, M. H. Perrott, M. A. Popovic, P. T. Rakich, R. J. Ram, H. I. Smith, Massachusetts Institute of Technology . . . . . [6477-22]

9:30 am: **Advances in fully CMOS integrated photonic devices** *(Invited Paper)***,** J. Michel, J. Liu, D. Ahn, D. K. Sparacin, C. Hong, M. A. Beals, L. C. Kimerling, Massachusetts Institute of Technology; Q. Xu, M. F. Lipson, Cornell Univ.; M. S. Rasras, D. M. Gill, S. S. Patel, K. Tu, Y. Chen, A. E. White, Lucent Technologies; A. T. S. Pomerene, D. N. Carothers, M. J. Grove, BAE Systems North America . . . . . [6477-23]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 7

Room: Conv. Ctr. Room A2 . . . . . Wed. 10:30 am to 12:10 pm

Emitters

Chair: **Joel A. Kubby**, Univ. of California/Santa Cruz

10:30 am: **Field effect light emitting devices** *(Invited Paper)***,** R. J. Walters, H. A. Atwater, California Institute of Technology . . . . . [6477-24]

11:10 am: **Spontaneous emission dynamics of Si nanocrystals in microdisk resonators,** R. D. Kekatpure, M. L. Brongersma, Stanford Univ. . . . . [6477-25]

11:30 am: **Integrating luminescent Si nano-crystal films into low loss optical waveguides,** J. N. Milgram, J. Wojcik, O. Zalloum, P. Mascher, A. P. Knights, McMaster Univ. (Canada) . . . . . [6477-26]

11:50 am: **Two order increase in the optical emission intensity of CMOS integrated circuit Si LED's (450nm × 750nm),** L. W. Snyman, Tshwane Univ. of Technology (South Africa); M. du Plessis, H. Aharoni, Univ. of Pretoria (South Africa) . . . . . [6477-27]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 8

Room: Conv. Ctr. Room A2 . . . . . Wed. 1:30 to 3:30 pm

Joint Session with Conference 6485

Silicon Optoelectronics I

Chair: **Mario J. Paniccia**, Intel Corp.

1:30 pm: **Si/Ge platform for lasers, amplifiers, and nonlinear optical devices based on the Raman effect** *(Invited Paper)***,** R. Claps, Neptec Optical Solutions, Inc.; D. P. Dimitropoulos, V. Raghunathan, S. Fathpour, Univ. of California/Los Angeles; B. Jusserand, Univ. Pierre et Marie Curie (France); B. Jalali, Univ. of California/Los Angeles . . . . . [6485-35]

2:00 pm: **Monolithic integrated ring resonator based silicon lasers and amplifiers** *(Invited Paper)***,** H. Rong, Intel Corp. . . . . [6485-36]

2:30 pm: **Energy harvesting in silicon Raman amplifiers and lasers** *(Invited Paper)***,** B. Jalali, Univ. of California/Los Angeles . . . . . [6485-37]

3:00 pm: **Laser charactersitics and gain properties of the novel Ga(NAsP)/GaP-material system for the integration to Si** *(Invited Paper)***,** W. Stolz, Philipps-Univ. Marburg (Germany) . . . . . [6485-38]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 9

Room: Conv. Ctr. Room A2 . . . . . Wed. 4:00 to 6:00 pm

Joint Session with Conference 6485

Silicon Optoelectronics II

Chair: **Bahram Jalali**, Univ. of California/Los Angeles

4:00 pm: **Quantum dot lasers and integrated guided wave devices on Si** *(Invited Paper)***,** J. Yang, Z. Mi, P. K. Bhattacharya, Univ. of Michigan . [6485-39]

4:30 pm: **High temperature silicon evanescent lasers** *(Invited Paper)***,** J. E. Bowers, Univ. of California/Santa Barbara . . . . . [6485-40]

5:00 pm: **Nano-engineered crystalline silicon for enhanced photoluminescence and 1.28um laser action** *(Invited Paper)***,** J. M. Xu, S. G. Cloutier, C. Hsu, P. Kossyrev, E. Rotem, J. M. Shainline, Brown Univ. . . . . [6477-28]

5:30 pm: **Towards an electrically pumped silicon laser** *(Invited Paper)***,** T. L. Koch, Lehigh Univ. . . . . [6477-30]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Plasmonics and the parallel programming problem,** U. Vishkin, I. I. Smolyaninov, C. C. Davis, Univ. of Maryland/College Park . . . . [6477-46]

✔ **Guided-mode resonance device constructed with membrane structure: theoretical analysis and experimental demonstration,** J. Chang, M. Wu, C. Hsu, Y. Lee, Y. Tsai, H. Lan, Y. Liu, Z. Tu, National Central Univ. (Taiwan) . . . . . [6477-47]

✔ **Lab-on-a-chip platforms based on highly sensitive nanophotonic Si biosensors for single nucleotide DNA testing,** J. Sánchez del Rio, Ctr. Nacional de Microelectrónica (Spain); L. G. Carrascosa, Consejo Superior de Investigaciones Científicas (Spain); F. J. Blanco, IKERLAN (Spain); M. Moreno, Ctr. Nacional de Microelectrónica (Spain); J. Berganzo, IKERLAN (Spain); A. Calle, C. Dominguez, L. M. Lechuga, Ctr. Nacional de Microelectrónica (Spain) . . . . . [6477-49]

✔ **A CMOS-compatible rib waveguide with local oxidation of silicon isolation,** L. K. Rowe, N. G. Tarr, Carleton Univ. (Canada); A. P. Knights, M. Elsey, McMaster Univ. (Canada) . . . . . [6477-50]

✔ **Fabrication strategies for continuous Raman gain in a silicon waveguide via defect engineering,** D. Walters, A. P. Knights, McMaster Univ. (Canada) . . . . . [6477-51]

Thursday 25 January

SESSION 10

Room: Conv. Ctr. Room A2 . . . . . Thurs. 8:40 to 10:00 am

Modulators I

Chair: **Graham T. Reed**, Univ. of Surrey (United Kingdom)

8:40 am: **Ge electroabsorption modulators and SiGe technology for optical interconnects** *(Invited Paper)***,** Y. Kuo, National Taiwan Univ. (Taiwan) [6477-31]

9:20 am: **Cavity enhanced electro-optic effect in silicon and its applications,** C. Chen, B. Miao, D. W. Prather, Univ. of Delaware . . . . . [6477-32]

9:40 am: **High-speed electro-optical silicon modulators based on photonic crystal waveguides,** L. Gu, W. Jiang, X. Chen, R. T. Chen, The Univ. of Texas at Austin . . . . . [6477-33]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 11

Room: Conv. Ctr. Room A2 . . . . . Thurs. 10:30 am to 12:10 pm

Modulators II

Chair: **Sharon M. Weiss**, Vanderbilt Univ.

10:30 am: **Recent advances in high speed silicon optical modulator** *(Invited Paper)***,** A. Liu, L. Liao, Intel Corp.; D. Rubin, Intel Corp. (Israel); H. D. Nguyen, Intel Corp.; Y. Chetrit, Intel Corp. (Israel); M. J. Paniccia, Intel Corp. . . . . [6477-35]

11:10 am: **Assessment of the effective carrier lifetime in a SOI p-i-n diode Si modulator using the reverse recovery method,** D. Zheng, M. Asghari, Kotura, Inc. . . . . [6477-36]

11:30 am: **Hybrid photonic crystal microcavity switches on SOI,** M. Haurylau, J. Zhang, S. P. Anderson, P. M. Fauchet, Univ. of Rochester . . . . . [6477-37]

11:50 am: **High performance total internal reflection type optical switches in silicon-on-insulator,** D. Thomson, B. D. Timotijevic, G. Z. Mashanovich, G. T. Reed, Univ. of Surrey (United Kingdom) . . . . . [6477-38]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 12

Room: Conv. Ctr. Room A2 . . . . . Thurs. 1:30 to 3:10 pm

Lab-on-a-Chip I

Chair: **Laura M. Lechuga**, Ctr. Nacional de Microelectrónica (Spain)

1:30 pm: **Integrated silicon optical sensors based on hollow core waveguide** *(Invited Paper)***,** R. Bernini, Consiglio Nazionale delle Ricerche (Italy); E. De Nuccio, A. Minardo, L. Zeni, Seconda Univ. degli Studi di Napoli (Italy); P. M. Sarro, Technische Univ. Delft (Netherlands) . . . . . [6477-39]

2:10 pm: **Tailoring the transmission of liquid-core waveguides for wavelength filtering on a chip,** U. Hakanson, ETH Zürich (Switzerland); D. Yin, P. Measor, Univ. of California/Santa Cruz; E. J. Lunt, Brigham Young Univ.; V. Sandoghdar, ETH Zürich (Switzerland); A. R. Hawkins, Brigham Young Univ.; H. Schmidt, Univ. of California/Santa Cruz . . . . . [6477-40]

2:30 pm: **High-speed laser scanning detection of protein binding on the silicon BioCD** *(Invited Paper)***,** D. D. Nolte, Purdue Univ. . . . . [6477-41]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 13

Room: Conv. Ctr. Room A2 . . . . . Thurs. 3:30 to 5:50 pm

Lab-on-a-Chip II

Chair: **Philippe M. Fauchet**, Univ. of Rochester

3:30 pm: **Optical DNA sensing based on resonant porous silicon structures** *(Invited Paper)***,** S. M. Weiss, Vanderbilt Univ. . . . . [6477-42]

4:10 pm: **Thin silicon waveguides for biological and chemical sensing,** A. S. Densmore, D. Xu, P. Waldron, S. Janz, A. Delâge, P. Cheben, J. Lapointe, National Research Council Canada (Canada) . . . . . [6477-43]

4:30 pm: **Si based waveguide and surface plasmon sensors** *(Invited Paper)***,** P. Debackere, D. Taillaert, S. S. Scheerlinck, K. De Vos, P. Bienstman, R. G. Baets, Univ. Gent (Belgium) . . . . . [6477-44]

5:10 pm: **Optical biosensor based on arrays of waveguided cantilevers** *(Invited Paper)***,** K. E. Zinoviev, J. A. Plaza, C. Domínguez, V. J. Cadarso, L. M. Lechuga, Ctr. Nacional de Microelectrónica (Spain) . . . . . [6477-45]

Tuesday-Thursday 23-25 January 2007 • Proceedings of SPIE Vol. 6478

Photonics Packaging, Integration, and Interconnects

Conference Chairs: **Allen M. Earman**, Novalux Inc.; **Ray T. Chen**, The Univ. of Texas at Austin

Program Committee: **Shiuh Chao**, National Tsing Hua Univ. (Taiwan); **Alexei L. Glebov**, Fujitsu Labs. of America; **Craig Goldberg**, Newport Corp.; **Ruth Houbertz**, Fraunhofer-Institut für Silicatforschung (Germany); **Wei Jiang**, Omega Optics, Inc.; **Charles Y. C. Lee**, Air Force Office of Scientific Research; **John McKeen**, Siemens Milltronics Process Instruments (Canada); **Yakov G. Soskind**, ALCON Research, Ltd.; **Torsten Wipiejewski**, FireComms Ltd. (Ireland); **Xiao-Cong Yuan**, Nanyang Technological Univ. (Singapore); **Xuping Zhang**, Nanjing Univ. (China)

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

SESSION 1

Room: Conv. Ctr. Room C2 . . . . . Tues. 1:30 to 3:20 pm

Joint Session with Conference 6476

OEIC Integration, Packaging and Interconnects I

Chair: **Louay A. Eldada**, DuPont Photonics Technologies

1:30 pm: **Onboard optical interconnect technologies for 10 Gbps and beyond** *(Invited Paper)***,** A. L. Glebov, M. G. Lee, Fujitsu Labs. of America . . . . . [6476-19]

2:00 pm: **Low-cost micro-optics for PCB level photonic interconnects** *(Invited Paper)***,** H. Thienpont, J. Van Erps, C. Debaes, M. Vervaeke, L. Desmet, H. Ottevaere, P. Vynck, Y. Ishii, A. Hermanne, Vrije Univ. Brussel (Belgium); N. Hendrickx, G. Van Steenberge, P. Van Daele, Univ. Gent (Belgium) [6476-20]

2:30 pm: **Fabrication of a 10Gbps/ch flexible optical- printed circuit board (FO-PCB),** H. Lee, S. An, S. Lee, B. O, E. Lee, Inha Univ. (South Korea) . . . . . [6476-21]

3:00 pm: **Flexible polymer pillars for optical chip assembly: materials, structures, and characterization** *(Invited Paper)***,** P. A. Kohl, Georgia Institute of Technology; A. L. Glebov, Fujitsu Labs. of America; E. Elce, Promerus LLC; D. Bhusari, M. Bakir, J. D. Meindl, Georgia Institute of Technology; M. G. Lee, Fujitsu Labs. of America . . . . . [6478-01]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 2

Room: Conv. Ctr. Room C2 . . . . . Tues. 3:40 to 5:00 pm

Joint Session with Conference 6476

OEIC Integration, Packaging and Interconnects II

Chair: **Ray T. Chen**, The Univ. of Texas at Austin

3:40 pm: **Nanophotonic devices and systems to enable optical interconnects** *(Invited Paper)***,** D. V. Plant, McGill Univ. (Canada) . . . . [6476-22]

4:10 pm: **Toward convergence in optoelectronic integration, packaging, and interconnects** *(Invited Paper)***,** L. A. Eldada, DuPont Photonics Technologies . . . . . [6476-23]

4:40 pm: **Application of two-photon 3D lithography for the fabrication of embedded ORMOCER(r) waveguides,** V. Schmidt, L. Kuna, V. Satzinger, JOANNEUM RESEARCH GmbH (Austria); R. Houbertz, Fraunhofer-Institut für Silicatforschung (Germany); G. Jakopic, G. Leising, JOANNEUM RESEARCH GmbH (Austria) . . . . . [6476-44]

4:10 pm: **Optoelectronic packaging for 16-channel optical backplane with VHOEs,** J. Choi, H. Bi, R. T. Chen, The Univ. of Texas/Austin . . . . . [6478-02]

4:40 pm: **Low cost optical interconnects,** E. J. Palen, PalenSolutions . . . . . [6478-03]

Wednesday 24 January

SESSION 3

Room: Conv. Ctr. Room C2 . . . . . Wed. 1:30 to 3:00 pm

High-Power Components/Thermal Issues

Chair: **Allen M. Earman**, Novalux Inc.

1:30 pm: **Thermal considerations in high power semiconductor lasers and semiconductor optical amplifiers** *(Invited Paper)***,** M. Dagenais, S. H. Cho, S. S. Saini, X. Liu, Univ. of Maryland/College Park . . . . . [6478-04]

2:00 pm: **High-power, slab-coupled optical waveguide laser array packaging for beam combining,** L. J. Missaggia, R. K. Huang, B. Chann, C. T. Harris, J. P. Donnelly, A. Sanchez-Rubio, G. W. Turner, MIT Lincoln Lab. . . . . [6478-05]

2:20 pm: **Surface roughening on n-GaN surface and its effect on lighting performance of thin-GaN LED,** T. C. Hsu, C. Liu, National Central Univ. (Taiwan) . . . . . [6478-06]

2:40 pm: **Experimental investigation of optical spectrum deformation of FBG sensors,** X. Zhang, J. Max, X. Jiang, L. Yu, H. Kassi, ITF Optical Technologies, Inc. (Canada) . . . . . [6478-07]

Coffee Break . . . . . 3:00 to 3:20 pm

SESSION 4

Room: Conv. Ctr. Room C2 . . . . . Wed. 3:20 to 5:00 pm

Optical Interconnects

Chair: **Alexei L. Glebov**, Fujitsu Labs. of America

3:20 pm: **Fiber optic interconnect and optoelectronic packaging challenges for future generation avionics** *(Invited Paper)***,** M. W. Beranek, Naval Air Systems Command . . . . . [6478-08]

3:50 pm: **Realization of integrated optical interconnections on printed circuit boards** *(Invited Paper)***,** M. Riester, G. Langer, Austria Technologie und Systemtechnik AG (Austria); G. Leising, Joanneum Research GmbH (Austria) . . . . . [6478-09]

4:20 pm: **Minimising crosstalk in microchannel free-space optical interconnects with the presence of higher order modes,** F. F. Tsai, C. O'Brien, A. D. Rakić, The Univ. of Queensland (Australia) . . . . . [6478-10]

4:40 pm: **3.2Gbps multi-channel optical backplane bus demonstrator using photopolymer volume gratings,** H. Bi, J. Choi, The Univ. of Texas/Austin; W. Jiang, Omega Optics, Inc.; X. Han, Brewer Science, Inc.; R. T. Chen, The Univ. of Texas/Austin . . . . . [6478-11]

Thursday 25 January

SESSION 5

Room: Conv. Ctr. Room C2 . . . . . Thurs. 8:30 to 10:10 am

Fabrication and Advanced Materials

Chair: **Ruth Houbertz**, Fraunhofer-Institut für Silicatforschung (Germany)

8:30 am: **Three-dimensional microoptic systems integration: advances in fabrication and packaging** *(Invited Paper)***,** J. Jahns, M. Bohling, M. Jarczynski, T. Seiler, Fern Univ./Hagen (Germany) . . . . . [6478-12]

9:00 am: **Innovative materials tailored for advanced microoptic applications** *(Invited Paper)***,** R. Himmelhuber, micro resist technology GmbH (Germany) and College of Optical Sciences/The Univ. of Arizona; M. Fink, K. Pfeiffer, U. Ostrzinski, A. Klukowska, G. Gruetzner, micro resist technology GmbH (Germany); R. Houbertz, H. Wolter, Fraunhofer-Institut für Silicatforschung (Germany) . . . . . [6478-13]

9:30 am: **A characterization of UV effects on optical silicones used in opto-electronic devices and new developments in resistant materials,** B. Riegler, NuSil Technology LLC . . . . . [6478-14]

9:50 am: **Novel cost effective carbon nanotubes deposition technique using optical tweezer effect,** K. Kashiwagi, S. Yamashita, The Univ. of Tokyo (Japan); S. Y. Set, Alnair Labs. Corp. (Japan) . . . . . [6478-15]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Room: Conv. Ctr. Room C2 . . . . . Thurs. 10:30 am to 12:00 pm

Packaging/Assembly for Low-Cost Components

Chair: **Ray T. Chen**, The Univ. of Texas at Austin

10:30 am: **High speed IC design trends and optoelectronic packaging: a perspective on cost reduction** *(Invited Paper)***,** B. N. Gomatam, B. Mayampurath, Vitesse Semiconductor . . . . . [6478-16]

11:00 am: **WDM over POF: the inexpensive way to breakthrough the limitation of bandwidth of standard POF communication,** U. H. P. Fischer-Hirchert, M. Haupt, Hochschule Harz (Germany) . . . . . [6478-17]

11:20 am: **10Gb/s bi-directional optical sub-assembly module for the application of FTTH network,** T. Shih, National Kaohsiung Univ. of Applied Sciences (Taiwan); M. Lin, Y. Chiu, National Sun Yat-Sen Univ. (Taiwan); C. Li, T. Hung, APAC Opto Electronics Inc. (Taiwan); W. Cheng, National Sun Yat-Sen Univ. (Taiwan) . . . . . [6478-18]

11:40 am: **Optical coupling to monolithic integrated photonic circuits,** E. J. Palen, PalenSolutions . . . . . [6478-19]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room C2 . . . . . Thurs. 1:30 to 3:10 pm

Component and System Integration

Chair: **Yakov G. Soskind**, Alcon Labs., Inc.

1:30 pm: **Hybridization of active and passive elements for planar photonic components and interconnects** *(Invited Paper)***,** M. R. T. Pearson, S. Bidnyk, A. Balakrishnan, Enablence Inc. (Canada) . . . . . [6478-20]

2:00 pm: **Integrated silicon photonics: packaging and chip level assembly** *(Invited Paper)***,** M. Asghari, P. Zhou, Kotura, Inc. . . . . [6478-21]

2:30 pm: **Silicon photonics packaging: characterization of a waveguide grating coupler and modeling of the fiber coupling ratio,** C. H. Kopp, J. Fédéli, P. Grosse, S. Poncet, Lab. d'Electronique de Technologie de l'Information (France) . . . . . [6478-22]

2:50 pm: **Efficient fiber to waveguide coupling structure for optical systems integration using grayscale lithography,** T. E. Dillon, J. A. Murakowski, C. Chen, D. W. Prather, Univ. of Delaware . . . . . [6478-23]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

Room: Conv. Ctr. Room C2 . . . . . Thurs. 3:30 to 5:10 pm

Components for Optical Instruments

Chair: **Craig Goldberg**, Newport Corp.

3:30 pm: **Long period gratings for integrated optical power splitters,** J. N. McMullin, C. P. Wong, C. J. Haugen, Univ. of Alberta (Canada) . [6478-24]

3:50 pm: **Polarimetric imaging cross talk effects from glue separation between FPA and micropolarizer arrays at the MWIR,** A. A. Cruz-Cabrera, Sandia National Labs. Legal Organizations; S. A. Kemme, J. R. Wendt, R. R. Boye, Sandia National Labs.; T. R. Carter, S. Samora, L&M Technologies . . . . . [6478-25]

4:10 pm: **Multichannel fiber optical inclination measuring transducer,** Y. N. Kulchin, O. B. Vitrik, A. V. Dyshlyuk, Institute for Automation and Control Processes (Russia) . . . . . [6478-26]

4:30 pm: **An all-optical nonlinear threshold gate based on microring resonators,** X. Lu, L. Zheng, J. Vaillancourt, Univ. of Massachusetts/ Lowell . . . . . [6478-27]

4:50 pm: **Hybrid mutichannel fiber-optic strain gauge,** A. D. Lantsov, Far Eastern State Technical Univ. (Russia); O. B. Vitrik, Y. N. Kulchin, Institute for Automation and Control Processes (Russia) . . . . . [6478-28]

OPTO

Monday-Thursday 22-25 January 2007 • Proceedings of SPIE Vol. 6479

Quantum Sensing and Nanophotonic Devices IV

Conference Chairs: **Manijeh Razeghi**, Northwestern Univ.; **Gail J. Brown**, Air Force Research Lab.

Program Committee: **Yoshinobu Aoyagi**, The Institute of Physical and Chemical Research (Japan); **Latika S. R. Becker**, U.S. Army Space and Missile Defense Command; **Federico Capasso**, Harvard Univ.; **Eronides F. da Silva, Jr.**, Univ. Federal de Pernambuco (Brazil); **Henri-Jean M. Drouhin**, École Polytechnique (France); **Michael D. Gerhold**, U.S. Army Research Office; **Matthew Grayson**, Technische Univ. München (Germany); **Allan Hahn**, Air Force Research Lab.; **Ferechteh Hosseini Teherani**, Nanovation (France); **Hongxing Jiang**, Kansas State Univ.; **Mark B. Johnson**, Naval Research Lab.; **Patrick Kung**, Northwestern Univ.; **Leonard V. LaCroix**, Lockheed Martin Space Systems Co.; **James A. Lott**, Air Force Institute of Technology; **Whitney Mason**, U.S. Army Night Vision & Electronic Sensors Directorate; **Kazuhiko Matsumoto**, National Institute of Advanced Industrial Science and Technology (Japan); **Jerry R. Meyer**, Naval Research Lab.; **Hooman Mohseni**, Northwestern Univ.; **Venkatesh Narayanamurti**, Harvard Univ.; **Vaidya Nathan**, Air Force Research Lab.; **Yoon Soo Park**, Rensselaer Polytechnic Institute; **Chandra Kumar N. Patel**, Pranalytica, Inc.; **Joseph G. Pellegrino**, U.S. Army Night Vision & Electronic Sensors Directorate; **Alain A. Quivy**, Univ. de São Paulo (Brazil); **Antoni Rogalski**, Wojskowa Akademia Techniczna (Poland); **Donald J. Silversmith**, Air Force Office of Scientific Research; **Meimei Z. Tidrow**, Missile Defense Agency

Monday 22 January

Welcome and Opening Remarks . . . . . **Mon. 8:05 am**

SESSION 1

Room: Conv. Ctr. Room B1 . . . . . **Mon. 8:05 to 10:00 am**

Spintronics I

Chairs: **Henri-Jean M. Drouhin**, École Polytechnique (France); **Manijeh Razeghi**, Northwestern Univ.

Keynote Presentation

8:05 am: **Recent developments and perspective in spintronics: spin transfer, spintronics with semiconductors, molecular spintronics** *(Invited Paper)*, A. Fert, UMR CNRS/Thales (France) and Univ. Paris Sud (France) . . . . . [6479-01]

9:00 am: **Measurement of spin torques** *(Invited Paper)*, H. Siegmann, Stanford Synchrotron Radiation Lab. . . . . [6479-02]

9:30 am: **Nanoscale spintronic devices** *(Invited Paper)*, L. W. Molenkamp, Univ. Würzburg (Germany) . . . . . [6479-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room B1 . . . . . **Mon. 10:30 am to 12:00 pm**

Spintronics II

Chairs: **Albert Fert**, Thales Research & Technology (France); **Donald J. Silversmith**, Air Force Office of Scientific Research

10:30 am: **Band-gap induced electron spin precession upon reflecting from ferromagnetic surfaces** *(Invited Paper)*, L. Joly, J. K. Ha, M. Alouani, J. Kortus, W. Weber, Institut de Physique et Chimie des Matériaux de Strasbourg (France) . . . . . [6479-04]

11:00 am: **Spin injection and accumulation in mesoscopic metal device structures** *(Invited Paper)*, M. S. Johnson, Naval Research Lab. . . . . [6479-05]

11:30 am: **Observation of coupled magnetic vortex structure dynamics by time-resolved magneto-optical Kerr effect microscopy** *(Invited Paper)*, R. Antos, J. Hamrle, The Institute of Physical and Chemical Research (Japan); H. Masaki, T. Kimura, The Univ. of Tokyo (Japan); J. Shibata, Y. Otani, The Institute of Physical and Chemical Research (Japan) . . . . . [6479-06]

Lunch Break . . . . . 12:00 to 1:00 pm

SESSION 3

Room: Conv. Ctr. Room B1 . . . . . **Mon. 1:00 to 2:30 pm**

Spintronics III

Chairs: **Mark B. Johnson**, Naval Research Lab.; **Alessandro Tredicucci**, NEST CNR-INFM (Italy) and Scuola Normale Superiore di Pisa (Italy)

1:00 pm: **Spin injection and detection in GaMnAs-based tunnel junctions: theory and experiments** *(Invited Paper)*, H. Jaffres, M. Elsen, J. George, R. Mattana, A. Fert, Thales Research & Technology (France); A. Lemaitre, Lab. de Photonique et de Nanostructures (France) . . . . . [6479-61]

1:30 pm: **Magnetic race-track: a novel spintronic storage-semory** *(Invited Paper)*, S. S. P. Parkin, IBM Almaden Research Ctr. . . . . [6479-14]

2:00 pm: **Electron tunneling through a spin-orbit-split barrier** *(Invited Paper)*, H. M. Drouhin, École Polytechnique (France); G. Fishman, Univ. Paris-Sud II (France) . . . . . [6479-15]

SESSION 4

Room: Conv. Ctr. Room B1 . . . . . **Mon. 2:30 to 4:30 pm**

Quantum Dots and Nanophotonics I

Chairs: **Mitra Dutta**, Univ. of Illinois/Chicago; **Woo-Gwang Jung**, Kookmin Univ. (South Korea)

2:30 pm: **Integration of micro/nano-photonic and quantum devices for circuit board and VLSI photonic application** *(Invited Paper)*, E. Lee, Inha Univ. (South Korea) . . . . . [6479-07]

3:00 pm: **Quantitative characterization of carrier transport in nanowire photodetectors** *(Invited Paper)*, L. J. Lauhon, Northwestern Univ. . . . [6479-08]

Coffee Break . . . . . 3:30 to 4:00 pm

4:00 pm: **Dual cavity, three-terminal, quantum dot VCSELs emitting near 1300 nm** *(Invited Paper)*, J. A. Lott, Air Force Institute of Technology . [6479-09]

SESSION 5

Room: Conv. Ctr. Room B1 . . . . . **Mon. 4:30 to 5:40 pm**

Quantum Dots and Nanophotonics II

Chairs: **James A. Lott**, Air Force Institute of Technology; **Elias Towe**, Carnegie Mellon Univ.

4:30 pm: **Free-standing quantum dots for electronic applications** *(Invited Paper)*, M. Chason, A. Skipor, Motorola, Inc. . . . . [6479-10]

5:00 pm: **Micro pore optics from planetary x-ray imager to industrial market,** J. Mutz, R. Fairbend, J. Seguy, Photonis S.A.S. (France) . . . . [6479-11]

5:20 pm: **Calculations of bandstructures on the lens and pyramid-shaped InAs quantum dot for confirming the photoluminescence and photoresponse,** T. Huang, S. Tang, Chung-Shan Institute of Science and Technology (Taiwan); T. Chen, Chung Cheng Institute of Technology (Taiwan); F. Lu, C. Chiang, Chung-Shan Institute of Science and Technology (Taiwan) . . . . . [6479-12]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 6

Room: Conv. Ctr. Room B1 . . . . . Tues. 10:30 am to 12:10 pm

Quantum Dots and Nanophotonics III

Chairs: **Marc Chason**, Motorola, Inc.;
Meimei Z. Tidrow, Missile Defense Agency

Keynote Presentation

10:30 am: **Ballistic transport and luminescence from semiconductor nanowires and quantum dots** *(Invited Paper)***,** V. Narayanamurti, Harvard Univ. . . . . [6479-16]

11:10 am: **Colloidal quantum dots as optoelectronic elements** *(Invited Paper)***,** Y. Li, M. Dutta, M. A. Stroscio, M. Vasudev, J. Yang, D. Ramadurai, Univ. of Illinois/Chicago . . . . . [6479-17]

11:40 am: **Photonic crystal nanowire emitters** *(Invited Paper)***,** E. Towe, L. Chen, Carnegie Mellon Univ. . . . . [6479-18]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room B1 . . . . . Tues. 1:30 to 3:00 pm

Detectors and Focal Plane Arrays I

Chairs: **Joseph G. Pellegrino**, U.S. Army Night Vision & Electronic Sensors Directorate; **Jerry R. Meyer**, Naval Research Lab.

1:30 pm: **Advances in 3rd generation and large format focal plane arrays at Raytheon Visions Systems** *(Invited Paper)***,** R. E. Bornfreund, Raytheon Vision Systems . . . . . [6479-19]

2:00 pm: **Recent progress in HgCdTe detectors and focal plane arrays at DRS** *(Invited Paper)***,** P. Mitra, DRS Infrared Technologies LP . . . . . [6479-20]

2:30 pm: **Layer interdiffusion in HgTe/CdTe superlattice based infrared materials** *(Invited Paper)***,** C. H. Grein, J. W. Garland, H. S. Jung, P. Boieriu, EPIR Technologies, Inc. . . . . [6479-21]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Room: Conv. Ctr. Room B1 . . . . . Tues. 3:30 to 5:00 pm

Detectors and Focal Plane Arrays II

Chairs: **Pradip Mitra**, DRS Infrared Technologies LP;
Paul Koskey, Missile Defense Agency

3:30 pm: **Plasmon resonance based in-line fiber optic sensing** *(Invited Paper)***,** M. D. Gerhold, U.S. Army Research Office; A. Dhawan, J. F. Muth, North Carolina State Univ. . . . . [6479-22]

4:00 pm: **Surface plasmon enhanced III-V based THz detectors** *(Invited Paper)***,** A. G. U. Perera, Georgia State Univ. . . . . [6479-23]

4:30 pm: **Prospects for next generation HgCdTe-based infrared sensors** *(Invited Paper)***,** S. Sivananthan, Univ. of Illinois/Chicago; P. Boieriu, EPIR Technologies, Inc. . . . . [6479-24]

Wednesday 24 January

SESSION 9

Room: Conv. Ctr. Room B1 . . . . . Wed. 8:00 to 10:10 am

Detectors and Focal Plane Arrays III

Chairs: **Michael D. Gerhold**, U.S. Army Research Office;
A. G. Unil Perera, Georgia State Univ.

Keynote Presentation

8:00 am: **Some tactical considerations for hyperspectral imaging** *(Invited Paper)***,** J. G. Pellegrino, J. G. Zeibel, U.S. Army Night Vision & Electronic Sensors Directorate; R. T. Littleton, Consultant; N. Supola, P. Perconti, U.S. Army Night Vision & Electronic Sensors Directorate; W. J. Gunning III, J. F. DeNatale, Rockwell Scientific Co., LLC . . . [6479-25]

8:40 am: **InGaAs avalanche photodiode arrays for photon counting applications** *(Invited Paper)***,** R. Sudharsanan, J. C. Boisvert, P. A. McDonald, P. Yuan, E. Labios, T. Isshiki, N. H. Karam, Spectrolab, Inc.; F. Yan, C. M. Stahle, P. K. Shu, NASA Goddard Space Flight Ctr. . . . . [6479-26]

9:10 am: **Type-II "M" structure photodiodes: an alternative material design for mid-wave to long wavelength infrared regimes,** B. M. Nguyen, M. Razeghi, Northwestern Univ. . . . . [6479-27]

9:30 am: **Growth studies on short period superlattices for mid-infrared detection,** G. J. Brown, H. J. Haugan, Air Force Research Lab.; F. Szmulowicz, Univ. of Dayton; K. Mahalingam, S. Houston, Air Force Research Lab. [6479-28]

9:50 am: **A resonant tunneling CdSe/ZnS core shell quantum dot photodetector for spectral resolution in the visible region,** A. Dindar, J. M. Therrien, Univ. of Massachusetts/Lowell . . . . . [6479-29]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 10

Room: Conv. Ctr. Room B1 . . . . . Wed. 10:30 am to 12:30 pm

Detectors and Focal Plane Arrays IV

Chairs: **Paul D. LeVan**, Air Force Research Lab.; **Hiroshi Ito**, NTT Photonics Labs. (Japan)

10:30 am: **Demonstration of 640x512 pixels long-wavelength infrared (LWIR) quantum dot infrared photodetector (QDIP) focal plane array** *(Invited Paper)***,** S. D. Gunapala, Jet Propulsion Lab. . . . . [6479-30]

11:00 am: **Innovative hyperspectral applications of dualband, infrared focal plane array technology** *(Invited Paper)***,** P. D. LeVan, Air Force Research Lab.; J. P. Hartke, U.S. Military Academy; E. L. Dereniak, College of Optical Sciences/ The Univ. of Arizona . . . . . [6479-31]

11:30 am: **Uni-traveling-carrier photodiodes for high-speed detection and broadband sensing** *(Invited Paper)***,** H. Ito, Nippon Telegraph and Telephone Corp. (Japan) . . . . . [6479-32]

12:00 pm: **To be announced** *(Invited Paper)***,** E. H. Aifer, Naval Research Lab. . . . . [6479-33]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 11

Room: Conv. Ctr. Room B1 . . . . . Wed. 1:30 to 3:00 pm

Lasers I

Chairs: **Miriam S. Vitiello**, Lab. Regionale INFM-CNR (Italy);
Allan Hahn, Air Force Research Lab.

1:30 pm: **Mid-infrared active optical antennas and optofluidic lasers** *(Invited Paper)***,** F. Capasso, N. Yu, E. Cubukcu, K. Crozier, L. Diehl, B. G. Lee, M. A. Belkin, P. Berhoozi, M. Loncar, Harvard Univ. . . . . [6479-34]

2:00 pm: **Thermal properties of mid-infrared and THz Quantum Cascade Lasers** *(Invited Paper)***,** V. Spagnolo, A. Lops, M. S. Vitiello, G. Scamarcio, Univ. degli Studi di Bari (Italy) . . . . . [6479-35]

2:30 pm: **Electronic and thermal properties of mid-IR QCLs** *(Invited Paper)***,** G. Scamarcio, M. S. Vitiello, V. Spagnolo, C. DiFranco, Univ. degli Studi di Bari (Italy); C. J. Pflügl, W. Schrenk, G. Strasser, Technische Univ. Wien (Austria) . . . . . [6479-36]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 12

Room: Conv. Ctr. Room B1 . . . . . Wed. 3:30 to 6:30 pm

Lasers II

Chairs: **Federico Capasso**, Harvard Univ.; **Gaetano Scamarcio**, Univ. degli Studi di Bari (Italy)

3:30 pm: **Emission properties of THz quantum cascade lasers** *(Invited Paper)*, A. Tredicucci, NEST CNR-INFM (Italy) and Scuola Normale Superiore di Pisa (Italy) . . . . . [6479-37]

4:00 pm: **Dual interband cascade laser based trace gas sensor for studying urban air pollution** *(Invited Paper)*, G. Wysocki, Y. Bkhirkin, M. Fraser, S. G. So, R. Lewicki, F. K. Tittel, Rice Univ.; R. Q. Yang, Jet Propulsion Lab. . . . [6479-38]

4:30 pm: **Visible submicron semiconductor disk laser,** Z. Zhang, L. Yang, K. J. Vahala, A. Scherer, California Institute of Technology . . . . . [6479-39]

4:50 pm: **High brightness GaSb-based optically pumped semiconductor disk lasers at 2.3 μm,** M. Rattunde, N. Schulz, C. Ritzenthaler, C. Manz, K. Köhler, C. Wild, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6479-40]

5:10 pm: **Interband cascade distributed feedback lasers** *(Invited Paper)*, J. R. Meyer, C. Kim, M. Kim, C. L. Canedy, W. W. Bewley, J. R. Lindle, I. Vurgaftman, Naval Research Lab. . . . . [6479-41]

5:40 pm: **High performance THz quantum cascade laser with different optical waveguide configurations** *(Invited Paper)*, M. S. Vitiello, G. Scamarcio, Univ. degli Studi di Bari (Italy); V. Spagnolo, Politecnico di Bari (Italy); J. Alton, Univ. of Cambridge (United Kingdom); S. Barbieri, S. S. Dhillon, C. Sirtori, Univ. Paris VII (France); H. E. Beere, D. A. Ritchie, Univ. of Cambridge (United Kingdom) . . . . . [6479-59]

6:00 pm: **Pentenary GaInAsPSb for mid-infrared light emitting diodes and lasers grown by liquid phase epitaxy** *(Invited Paper)*, A. Krier, V. M. Smirnov, P. J. Batty, R. Jones, Lancaster Univ. (United Kingdom); V. I. Vasil'ev, G. S. Gagis, V. I. Kuchinskii, A.F. Ioffe Physico-Technical Institute (Russia) . . . . . [6479-60]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Size-dependent quantum dynamical influence of metal nanoparticles on surface plasmon resonance,** D. Kang, D. Kim, E. Sim, Yonsei Univ. (South Korea) . . . . . [6479-13]

Thursday 25 January

SESSION 13

Room: Conv. Ctr. Room B1 . . . . . Thurs. 8:30 to 10:00 am

Biosensors

Chairs: **Yoon-Soo Park**, Seoul National Univ.; **Vincenzo Spagnolo**, Univ. degli Studi di Bari (Italy)

8:30 am: **Artificial haircells and artificial lateral line** *(Invited Paper)*, C. Liu, Univ. of Illinois at Urbana-Champaign . . . . . [6479-43]

9:00 am: **Purification and optical properties of biofunctionalized carbon nanotubes: implications for multi-analyte sensing** *(Invited Paper)*, M. C. Hersam, Northwestern Univ. . . . . [6479-44]

9:30 am: **A novel bio-inspired single photon infrared detector** *(Invited Paper)*, P. Kung, H. Mohseni, O. G. Memis, S. Kong, A. Katsnelson, Northwestern Univ. . . . . [6479-45]

Coffee Break . . . . . 10:00 to 10:20 am

SESSION 14

Room: Conv. Ctr. Room B1 . . . . . Thurs. 10:20 am to 12:30 pm

Nitrides I

Chairs: **Ferechteh H. Teherani**, Nanovation SARL (France); **Michael D. Gerhold**, U.S. Army Research Office

Keynote Presentation

10:20 am: **ZnO and GaN: choices, comparisons, challenges and configurations** *(Invited Paper)*, D. J. Silversmith, Air Force Office of Scientific Research . . . . . [6479-46]

11:00 am: **GaN/AlN multiple quantum well structures grown by MBE for 1.5 μm intersubband absorption** *(Invited Paper)*, T. G. Andersson, T. Aggerstam, P. Holmstrom, P. Janes, X. Y. Liu, S. Lourdudoss, L. Thylén, Chalmers Tekniska Högskola (Sweden) and Kungliga Tekniska Högskolan (Sweden) . . . . . [6479-47]

11:30 am: **Fabrication and characterization of self-assembled InGaN quantum dots by periodic interrupted growth** *(Invited Paper)*, S. Choi, J. Jang, S. Yi, J. Kim, W. Jung, Kookmin Univ. (South Korea) . . . . . [6479-48]

12:00 pm: **Progress on new wide bandgap materials BGaN, BAlN, BGaAlN and their potential applications** *(Invited Paper)*, A. Ougazzaden, S. Gautier, C. Sartel, J. Martin, Georgia Tech Lorraine (France); W. E. Fenwick, Georgia Institute of Technology; N. Maloufi, UMR CNRS (France); F. Jomard, Univ. de Versailles Saint-Quentin-en Yvelines (France) . . . . . [6479-49]

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 15

Room: Conv. Ctr. Room B1 . . . . . Thurs. 1:30 to 3:10 pm

Nitrides II

Chairs: **Gail J. Brown**, Air Force Research Lab.; **Abdallah Ougazzaden**, Georgia Tech Lorraine (France)

1:30 pm: **Optimization of nanoscale phenomena in AlGaN for improved UV emitters** *(Invited Paper)*, M. Wraback, G. A. Garrett, A. V. Sampath, P. H. Shen, Army Research Lab. . . . . [6479-50]

2:00 pm: **Achieving conductive high-Al content AlGaN alloys for deep UV photonics** *(Invited Paper)*, J. Lin, H. Jiang, Kansas State Univ. . . . . [6479-51]

2:30 pm: **III-nitride avalanche photodiodes,** K. Minder, R. P. McClintock, C. Bayram, P. Kung, M. Razeghi, Northwestern Univ. . . . . [6479-52]

2:50 pm: **Techniques for high quality SiO2 films,** J. Nguyen, M. Razeghi, Northwestern Univ. . . . . [6479-53]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 16

Room: Conv. Ctr. Room B1 . . . . . Thurs. 3:30 to 5:00 pm

Hot Subjects

Chairs: **Venkatesh Narayanamurti**, Harvard Univ.; **Manijeh Razeghi**, Northwestern Univ.

3:30 pm: **Super growth: from highly efficient impurity-free CNT synthesis to DWNT forests, CNTsolids and super-capacitors** *(Invited Paper)*, K. Hata, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6479-54]

4:00 pm: **Phase conjugation for space Lidar applications** *(Invited Paper)*, A. Brignon, S. Richard, J. Huignard, Thales Research & Technology (France); M. P. Georges, J. D. Plesseria, T. Thibert, P. Blanche, Ctr. Spatial de Liege (Belgium); A. I. Gussarov, F. Berghmans, SCK•CEN (Belgium); Y. Lien, ESA/ESTEC (Netherlands) . . . . . [6479-55]

4:30 pm: **Holographic polarimetry enhanced target recognition and remote sensing** *(Invited Paper)*, S. M. Shahriar, J. T. Shen, S. Tseng, G. S. Pati, Northwestern Univ. . . . . [6479-56]

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Photonic Crystal Materials and Devices VI

Conference Chairs: **Ali Adibi**, Georgia Institute of Technology; **Shawn-Yu Lin**, Rensselaer Polytechnic Institute; **Axel Scherer**, California Institute of Technology

Program Committee: **Douglas C. Allan**, Corning Inc.; **Shanhui Fan**, Stanford Univ.; **Maryanne C. J. Large**, The Univ. of Sydney (Australia); **Susumu Noda**, Kyoto Univ. (Japan); **Masaya Notomi**, NTT Basic Research Labs. (Japan); **Ekmel Özbay**, Bilkent Univ. (Turkey); **Dennis W. Prather**, Univ. of Delaware; **William J. Wadsworth**, Univ. of Bath (United Kingdom); **Yong Xu**, Virginia Polytechnic Institute and State Univ.; **Eli Yablonovitch**, Univ. of California/Los Angeles

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room B2 . . . . . Mon. 8:30 to 10:00 am

Special Review Session:
Present and Future of Photonic Crystals

Chair: **Ali Adibi**, Georgia Institute of Technology

8:30 am: **Infrared and visible photonic crystal light emitters** *(Invited Paper)*, A. Scherer, California Institute of Technology . . . . . [6480-01]

9:00 am: **Photonic band gap materials: engineering the fundamental properties of light** *(Invited Paper)*, S. John, Univ. of Toronto (Canada) [6480-02]

9:30 am: **Three-dimensional visible photonic crystal** *(Invited Paper)*, S. Lin, Rensselaer Polytechnic Institute . . . . . [6480-03]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room B2 . . . . . Mon. 10:30 am to 12:00 pm

Photonic Crystal Lasers and Emitters

Chair: **Axel Scherer**, California Institute of Technology

10:30 am: **Photonic crystal LEDs: design rules for in plane photonic crystal structure** *(Invited Paper)*, C. Weisbuch, Univ. of California/Santa Barbara and LCFIO, CNRS (France); A. David, Univ. of California/Santa Barbara; H. Benisty, LCFIO, CNRS (France) . . . . . [6480-04]

11:00 am: **Random lasers from chiral photonic crystal films,** Y. Huang, Y. Zhou, S. Wu, College of Optics & Photonics/Univ. of Central Florida [6480-05]

11:20 am: **Fiber coupled photonic crystal bandedge laser,** Y. Park, Seoul National Univ. (South Korea); C. Cho, Samsung Electronics Co., Ltd. (South Korea); S. Kim, H. Jeon, Seoul National Univ. (South Korea) . . . . . [6480-06]

11:40 am: **GaAs based InAs quantum dot photonic crystal lasers,** Y. Zhang, The Arizona State Univ. and NTT Basic Research Labs. (Japan); T. Tawara, N. Cade, NTT Basic Research Labs. (Japan); D. Ding, The Arizona State Univ.; T. Tanabe, E. Kuramochi, NTT Basic Research Labs. (Japan); S. R. Johnson, The Arizona State Univ.; S. C. Huang, M. Notomi, NTT Basic Research Labs. (Japan) . . . . . [6480-07]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room B2 . . . . . Mon. 1:30 to 3:00 pm

Novel Effects and Applications in Photonic Crystal Structures I

Chair: **Claude Weisbuch**, Univ. of California/Santa Barbara

1:30 pm: **Polarization stop bands in chiral 3D photonic crystals** *(Invited Paper)*, M. Thiel, M. Decker, M. Deubel, S. Linden, G. von Freymann, M. Wegener, Univ. Karlsruhe (Germany) . . . . . [6480-08]

2:00 pm: **Plasmonic antireflection surfaces for the mid-infrared,** D. W. Peters, Sandia National Labs.; L. I. Basilio, Sandia National Labs . . . . . [6480-09]

2:20 pm: **An interface-isolator in 2D magneto-optical photonic crystals,** Z. Wang, Z. Yu, S. Fan, Stanford Univ. . . . . [6480-10]

2:40 pm: **Transmission enhancement and suppression by subwavelength hole arrays in polaritonic films,** P. B. Catrysse, S. Fan, Stanford Univ. . . . . [6480-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room B2 . . . . . Mon. 3:30 to 5:20 pm

Novel Effects and Applications in Photonic Crystal Structures II

Chair: **Martin Wegener**, Univ. Karlsruhe (Germany)

3:30 pm: **Miniature infrared gas sensors using photonic crystals,** A. Lambrecht, S. Hartwig, Fraunhofer-Institut für Physikalische Messtechnik (Germany); S. L. Schweizer, R. B. Wehrspohn, Univ. Paderborn (Germany) . . . . . [6480-12]

3:50 pm: **Design and experimental verification of a novel anisotropic photonic crystal band edge device,** Y. Cao, R. Hudgins, T. Suleski, M. A. Fiddy, J. Raquet, The Univ. of North Carolina at Charlotte; K. Burbank, M. Graham, P. Sanger, Western Carolina Univ. . . . . [6480-14]

4:10 pm: **Negative index photonic crystals: new concepts in imaging and negative refraction** *(Invited Paper)*, S. Sridhar, Northeastern Univ. . . [6480-59]

4:40 pm: **Multilayer antireflection coating for photonic applications: a theoretical analysis,** M. Chen, Rensselaer Polytechnic Institute and National Taiwan Univ. (Taiwan); S. Lin, J. Xi, E. F. Schubert, Rensselaer Polytechnic Institute; A. J. Fischer, M. H. Crawford, Sandia National Labs.; H. Chang, National Taiwan Univ. (Taiwan) . . . . . [6480-16]

5:00 pm: **Development of an optical, analog-to-digital converter using photonic crystals,** A. S. Sharkawy, EM Photonics, Inc.; C. Chen, B. Miao, S. Shi, D. W. Prather, Univ. of Delaware . . . . . [6480-17]

Tuesday 23 January

Optoelectronics
Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room B2 . . . . . Tues. 10:30 to 11:10 am

Special Review Session:
Present and Future of Photonic Crystal Fibers

Chair: **Ali Adibi**, Georgia Institute of Technology

10:30 am: **Microfluidic ARROW photonic crystal fibers** *(Invited Paper)*, B. J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6480-18]

10:50 am: **Supercontinuum generation in photonic crystal fibers using quasi-CW pumping** *(Invited Paper)*, M. H. Frosz, O. Bang, P. D. Rasmussen, A. O. Bjarklev, Danmarks Tekniske Univ. (Denmark) . . . . . [6480-19]

Lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room B2 . . . . . Tues. 1:30 to 2:50 pm

Photonic Crystal Fibers

Chair: **Benjamin J. Eggleton**, The Univ. of Sydney (Australia)

1:30 pm: **Improvement of transmission properties and characterization of chalcogenide photonic crystal fiber for the 3–5 μm and 8–12 μm atmospheric windows,** P. Houizot, J. Troles, L. Brillant, F. Désévédavy, F. Smektala, Univ. de Rennes I (France) . . . . . [6480-20]

1:50 pm: **PbTe quantum dot doped tellurite glass photonic crystal optical fiber,** G. J. Jacob, E. Rodriguez, E. F. Chillcce, W. M. Faustino, W. M. Moreira, L. C. Barbosa, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6480-21]

2:10 pm: **FEM investigation of leaky modes in hollow core photonic crystal fibers,** J. Pomplun, Zuse Institute Berlin (Germany); R. Holzloehner, European Southern Observatory (Germany); S. Burger, L. W. Zschiedrich, F. Schmidt, Zuse Institute Berlin (Germany) . . . . . [6480-22]

2:30 pm: **Propagation characteristics of highly elliptical core photonic crystal fiber,** R. K. Sinha, A. D. Varshney, Delhi College of Engineering (India) . . . . . [6480-23]

Coffee Break . . . . . 2:50 to 3:20 pm

SESSION 7

Room: Conv. Ctr. Room B2 . . . . . Tues. 3:20 to 5:30 pm

Fabrication of Photonic Crystal Structures

Chair: **Shawn-Yu Lin**, Rensselaer Polytechnic Institute

3:20 pm: **Three-dimensional photonic band gap materials: adding optical functionality through novel materials and defined defects** *(Invited Paper)***,** E. C. Nelson, F. García-Santamaría, X. Yu, S. Rinne, P. V. Braun, Univ. of Illinois at Urbana-Champaign . . . . . [6480-24]

3:50 pm: **Core-shell diamond-like silicon photonic crystals from 3D polymer templates created by holographic lithography,** J. H. Moon, Y. Xu, Univ. of Pennsylvania; W. Dong, J. W. Perry, A. Adibi, Georgia Institute of Technology; S. Yang, Korea Advanced Institute of Science and Technology (South Korea); S. Yang, Univ. of Pennsylvania . . . . . [6480-25]

4:10 pm: **Two-dimensional diffractive optical element based fabrication of 3D photonic crystal templates,** D. Chanda, L. Abolghasemi, P. R. Herman, Univ. of Toronto (Canada) . . . . . [6480-26]

4:30 pm: **Metallization of 3D photonic crystals with different thickness of Cu thin films,** D. Ye, Z. P. Yang, J. A. Bur, S. Lin, T. Lu, Rensselaer Polytechnic Institute . . . . . [6480-27]

4:50 pm: **Emission spectroscopy of ZnO inverse opal photonic crystals,** M. G. Scharrer, H. Noh, M. V. Erementchouk, H. Cao, R. P. H. Chang, Northwestern Univ. . . . . [6480-28]

5:10 pm: **Porous silicon 2D photonic crystals,** N. Tokranova, D. Song, B. Xu, J. Castracane, SUNY/Univ. at Albany . . . . . [6480-29]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room B2 . . . . . Wed. 8:30 to 10:00 am

Photonic Crystal Waveguides I

Chair: **Dennis W. Prather**, Univ. of Delaware

8:30 am: **Broadband and low loss slow light in SOI photonic crystal waveguides** *(Invited Paper)***,** T. F. Krauss, Univ. of St. Andrews (United Kingdom) . . . . . [6480-30]

9:00 am: **Radiation loss of coupled-resonator waveguides,** M. L. Povinelli, S. L. Fan, Stanford Univ. . . . . [6480-31]

9:20 am: **Active transmission control based on slow-light photonic crystal waveguide,** X. Chen, L. Gu, W. Jiang, R. T. Chen, The Univ. of Texas at Austin . . . . . [6480-32]

9:40 am: **Meandering photonic crystal delay lines,** M. Fakharzadeh, Univ. of Waterloo (Canada) . . . . . [6480-33]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 9

Room: Conv. Ctr. Room B2 . . . . . Wed. 10:30 to 11:50 am

Photonic Crystal Waveguides II

Chair: **Thomas F. Krauss**, Univ. of St. Andrews (United Kingdom)

10:30 am: **Nanowire photonic crystal waveguide and active diode (Presentation Only),** H. Park, C. J. Barrelet, Y. Wu, C. M. Lieber, Harvard Univ. . . . . [6480-34]

10:50 am: **Optimal photonic crystal bends with linear dispersion,** M. Askari, A. Adibi, Georgia Institute of Technology . . . . . [6480-35]

11:10 am: **Efficient characterization of dispersion in photonic crystal waveguides using spectral interferometery,** A. Jafarpour, M. Askari, J. Huang, A. Adibi, Georgia Institute of Technology . . . . . [6480-37]

11:30 am: **Photonic band structure of Abrikosov lattices in superconductors,** H. Zandi, A. Kokabi, S. Khorasani, M. Fardmanesh, Sharif Univ. of Technology (Iran); A. Hosseini, Rice Univ. . . . . [6480-61]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 10

Room: Conv. Ctr. Room B2 . . . . . Wed. 1:30 to 3:30 pm

Dispersive and Nonlinear Properties of Photonic Crystals

Chair: **Ole Sigmund**, Danmarks Tekniske Univ. (Denmark)

1:30 pm: **Compact photonic crystal demultiplexers and spectrometers** *(Invited Paper)***,** B. Momeni, Georgia Institute of Technology . . . . . [6480-38]

2:00 pm: **3D holographic polymer photonic crystal for superprism application,** J. Chen, L. Wang, X. Chen, The Univ. of Texas at Austin; W. Jiang, Omega Optics, Inc.; R. T. Chen, The Univ. of Texas at Austin . . . . . [6480-39]

2:20 pm: **Diffraction properties of a photonic crystal,** A. Gandhi, X. Sun, Nanyang Technological Univ. (Singapore); M. Yu, Institute of Microelectronics (Singapore); P. Shum, Nanyang Technological Univ. (Singapore) . . . . . [6480-40]

2:40 pm: **Nonlinear diffraction of second- and third-harmonics in three-dimensional photonic crystals of opals,** I. V. Soboleva, S. A. Seregin, A. A. Fedyanin, O. A. Aktsipetrov, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6480-41]

3:00 pm: **Systematic synthesis of photonic crystal structures by topology optimization** *(Invited Paper)***,** O. Sigmund, Danmarks Tekniske Univ. (Denmark) . . . . . [6480-42]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 11

Room: Conv. Ctr. Room B2 . . . . . Wed. 4:00 to 5:00 pm

Modeling and Simulation of Photonic Crystal Structures I

Chair: **Srinivas Sridhar**, Northeastern Univ.

4:00 pm: **Inverse design beyond photonic crystals: an introduction to scattering optical elements,** A. Håkansson, H. T. Miyazaki, National Institute for Material Science (Japan); J. Sanchez-Dehesa, Univ. Politècnica de València (Spain) . . . . . [6480-43]

4:20 pm: **Efficient modeling of spatially incoherent sources for the analysis of photonic crystal spectrometers,** M. Badieirostami, H. Zhou, S. N. Chow, A. Adibi, Georgia Institute of Technology . . . . . [6480-44]

4:40 pm: **Investigation on dispersive properties of photonic crystals for employment of Z-scan method,** J. Hwang, College of Optics & Photonics/ Univ. of Central Florida; J. W. Wu, Ewha Womans Univ. (South Korea) [6480-45]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **A fluid sensor based on a sub-terahertz photonic crystal waveguide,** T. Hasek, Technische Univ. Braunschweig (Germany); H. Kurt, D. S. Citrin, Georgia Institute of Technology; M. Koch, Technische Univ. Braunschweig (Germany) . . . . . [6480-13]

✔ **Effects of paraffin addition on optical properties and self-assembly of SiO2 photonic crystal,** Y. T. O, S. J. Hong, D. C. Shin, Chosun Univ. (South Korea) . . . . . [6480-55]

✔ **Photonic crystal waveguides,** J. N. Ptasinski, San Diego State Univ. and SPAWAR Systems Ctr; San Diego . . . . . [6480-58]

Thursday 25 January

SESSION 12

Room: Conv. Ctr. Room B2 . . . . . Thurs. 8:30 to 10:10 am

Photonic Crystal Cavities

Chair: **Babak Momeni**, Georgia Institute of Technology

8:30 am: **Adiabatic wavelenegth conversion and optomechanical energy conversion in photonic crystal cavities** *(Invited Paper)***,** M. Notomi, NTT Basic Research Labs. (Japan) . . . . . [6480-46]

9:00 am: **Investigation of the optical farfield of photonic crystal microcavities,** F. Roemer, ETH Zürich (Switzerland); L. Balet, École Polytechnique Fédérale de Lausanne (Switzerland); O. Chinellato, ETH Zürich (Switzerland); L. Li, N. Le Thomas, R. Houdre, École Polytechnique Fédérale de Lausanne (Switzerland); M. Francardi, A. Gerardino, Consiglio Nazionale delle Ricerche (Italy); A. Fiore, École Polytechnique Fédérale de Lausanne (Switzerland); B. Witzigmann, ETH Zürich (Switzerland) . . . . . [6480-47]

9:20 am: **Spectrally selective absorption enhancement in photonic crystal defect cavities,** L. Chen, Z. Qiang, W. Zhou, The Univ. of Texas/ Arlington . . . . . [6480-48]

9:40 am: **Analytical analysis of tm polarized defect modes in 2D photonic crystals based on hermite expansion of Floquet orders,** P. Sarrafi, K. Mehrany, S. Khorasani, Sharif Univ. of Technology (Iran) . . . . . [6480-62]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 13

Room: Conv. Ctr. Room B2 . . . . . Thurs. 10:30 to 11:50 am

Modeling and Simulation of Photonic Crystal Structures II

Chair: **Masaya Notomi**, NTT Basic Research Labs. (Japan)

10:30 am: **Multi-layered photonic crystals de novo: new formalism, results, insights, and analytic possibilities,** F. Szmulowicz, Univ. of Dayton . [6480-50]

10:50 am: **Correlation between tamm-like and shockley-like surface states in photonic crystals,** N. Malkova, C. Ning, NASA Ames Research Ctr. [6480-51]

11:10 am: **Magnetic photonics crystals,** S. Yang, H. Horng, National Taiwan Normal Univ. (Taiwan); C. Hong, Da-Yeh Univ. (Taiwan); H. Yang, National Taiwan Normal Univ. (Taiwan) . . . . . [6480-52]

11:30 am: **Ultra compact photonic crystal polarization mode splitter,** R. K. Sinha, Y. Kalra, Delhi College of Engineering (India) . . . . . [6480-53]

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Quantum Dots, Particles, and Nanoclusters IV

Conference Chairs: **Kurt G. Eyink**, Air Force Research Lab.; **Diana L. Huffaker**, The Univ. of New Mexico; **Frank Szmulowicz**, Univ. of Dayton

Program Committee: **Pallab K. Bhattacharya**, Univ. of Michigan; **C. J. Brinker**, Sandia National Labs.; **Dennis G. Deppe**, The Univ. of Texas at Austin; **Alfred W. B. Forchel**, Univ. Würzburg (Germany); **Lingjie J. Guo**, Univ. of Michigan; **Axel Hoffmann**, Technische Univ. Berlin (Germany); **Yong Hee Lee**, Korea Advanced Institute of Science and Technology (South Korea); **Luke F. Lester**, Univ. of New Mexico; **James A. Lott**, Air Force Institute of Technology; **Manijeh Razeghi**, Northwestern Univ.; **Kevin L. Silverman**, National Institute of Standards and Technology

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room M . . . . . Mon. 1:30 to 3:10 pm

Quantum Dot Growth

Chair: **Garnett W. Bryant**, National Institute of Standards and Technology

1:30 pm: **Controlling the optical properties of quantum dots and nanocrytals using size, composition, coupling and strain** *(Invited Paper)*, G. W. Bryant, National Institute of Standards and Technology . . . . . [6481-01]

2:00 pm: **Stress-engineered self-organized quantum dots: platform for advanced technologies** *(Invited Paper)*, A. Madhukar, Univ. of Southern California . . . . . [6481-02]

2:30 pm: **Copper selenide nanostructures,** G. Statkute, Vilnius Univ. (Lithuania); I. Mikulskas, EKSPLA Ltd. (Lithuania); A. Jagminas, Institute of Chemistry (Lithuania); R. Tomasiunas, Vilnius Univ. (Lithuania) . . . . . [6481-03]

2:50 pm: **Thermal-lens study of thermo-optical properties of CdSe/ZnS quantum dots embedded into PMMA matrix,** V. Pilla, E. Munin, L. P. Alves, M. T. T. Pacheco, Univ. do Vale do Paraíba (Brazil) . . . . . [6481-04]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 2

Room: Conv. Ctr. Room M . . . . . Mon. 3:30 to 5:10 pm

Quantum Dot Physics and Materials I

Chair: **Alexander A. Balandin**, Univ. of California/Riverside

3:30 pm: **Phonons in semiconductor quantum dot materials,** A. A. Balandin, M. Shamsa, I. Calizo, W. Liu, Univ. of California/Riverside . . . . . [6481-05]

3:50 pm: **Maximum operating temperature and characteristic temperature of a quantum dot laser in the presence of internal loss,** L. Jiang, L. V. Asryan, Virginia Polytechnic Institute and State Univ. . . . . [6481-06]

4:10 pm: **Effect of excited states on light-current characteristic of a quantum dot laser,** L. Jiang, L. V. Asryan, Virginia Polytechnic Institute and State Univ. . . . . [6481-07]

4:30 pm: **Cavity QED with quantum dots in semiconductor microcavities,** M. T. Rakher, S. Strauf, Y. Choi, N. G. Stolz, K. J. Hennessey, H. Kim, A. Badolato, L. A. Coldren, E. L. Hu, P. M. Petroff, D. Bouwmeester, Univ. of California/Santa Barbara . . . . . [6481-08]

4:50 pm: **A GISAXS study of PbTe quantum dots/SiO_2 multilayer,** E. Rodriguez, G. Kellermann, E. Jimenez, G. J. Jacob, E. F. Chillcce, C. L. Cesar, L. C. Barbosa, Univ. Estadual de Campinas (Brazil) . . . . . [6481-09]

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 3

Room: Conv. Ctr. Room M . . . . . Tues. 10:30 am to 12:10 pm

Quantum Dot Physics and Materials II

Chair: **Grzegorz Sek**, Politechnika Wroclawska (Poland)

10:30 am: **Pseudopotential theory of interband and intraband transitions in (InGa)As/GaAs quantum dots (Presentation Only),** G. Narvaez, Eclipse Energy Systems, Inc. and National Renewable Energy Lab.; A. Zunger, National Renewable Energy Lab. . . . . [6481-10]

10:50 am: **Size effects in silicon quantum dots probed by second-harmonic spectroscopy,** V. O. Bessonov, A. G. Zhdanov, A. A. Rassudov, A. A. Fedyanin, O. A. Aktsipetrov, M.V. Lomonosov Moscow State Univ. (Russia); X. Huang, K. Chen, Nanjing Univ. (China) . . . . . [6481-11]

11:10 am: **Modulation spectroscopy characterization of InAs/GaInAsP/InP quantum dash laser structures,** G. Sek, Politechnika Wroclawska (Poland) . . . . . [6481-12]

11:30 am: **Photoabsorption spectroscopy of InAs/InGaAlAs/InP quantum-dash-in-well laser structure,** D. E. Negro, Y. Wang, H. S. Djie, B. S. Ooi, Lehigh Univ.; V. Donchev, T. Ivanov, Sofia Univ. (Bulgaria) . . . . . [6481-13]

11:50 am: **Efficient energy transfer in InAs quantum dash based tunnel-injection structures at low temperatures,** G. Sek, Politechnika Wroclawska (Poland) . . . . . [6481-14]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 4

Room: Conv. Ctr. Room M . . . . . Tues. 1:30 to 3:20 pm

Quantum Dot Devices

Chair: **Vladimir Bulovic**, Consultant

1:30 pm: **Colloidal quantum dots in optoelectronic devices** *(Invited Paper)***,** V. Bulovic, Massachusetts Institute of Technology . . . . . [6481-15]

2:00 pm: **Fabrication and characterization of In(Ga)As quantum dot semiconductor optical amplifiers on InP operating at 1.5 μm,** N. Kim, J. M. Oh, J. S. Yim, D. Lee, Chungnam National Univ. (South Korea); S. Pyun, W. Jeong, Sungkyunkwan Univ. (South Korea); J. W. Jang, NanoEpi Technologies (South Korea) . . . . . [6481-16]

2:20 pm: **All-epitaxial VCSELs with tunnel QW-QDs InGaAs-InAs gain medium,** V. E. Tokranov, M. Yakimov, J. Van Eisden, S. Oktyabrsky, SUNY/Univ. at Albany . . . . . [6481-17]

2:40 pm: **Quantum dot based phase modulator at 1300 nm,** S. P. Hegarty, D. Goulding, G. Huyet, Tyndall National Institute (Ireland) . . . . . [6481-18]

3:00 pm: **A two-photon sequential absorption photocurrent generation process in modulation doped InAs/GaAs quantum dots,** X. Lu, Univ. of Massachusetts/Lowell; M. J. Meisner, Raytheon Missile Systems . . . [6481-19]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 5

Room: Conv. Ctr. Room M . . . . . Tues. 3:40 to 5:00 pm

Novel Systems

Chair: **Gerhard Seifert**,
Martin-Luther Univ. Halle-Wittenberg (Germany)

3:40 pm: **Micro-structuring of glass doped with silver nanoparticles,** A. Abdolvand, Martin-Luther Univ. Halle-Wittenberg (Germany); A. V. Podlipensky, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); S. Wackerow, G. Seifert, H. Graener, Martin-Luther Univ. Halle-Wittenberg (Germany) . . . . . [6481-20]

4:00 pm: **Fabrication and third-order optical nonlinearity of germano-silicate glass optical fiber incorporated with au nanoparticles,** A. Lin, B. Kim, P. R. Watekar, S. Ju, W. Han, Gwangju Institute of Science and Technology (South Korea) . . . . . [6481-21]

4:20 pm: **Micro-Raman spectroscopic characterization ZnO quantum dots and nanocrystals,** A. A. Balandin, V. Fonoberov, I. Calizo, K. Alim, Univ. of California/Riverside . . . . . [6481-22]

4:40 pm: **Self-assembly of heterojunction quantum dots(HeQuaDs),** K. G. Eyink, D. H. Tomich, J. J. Pitz, Air Force Research Lab.; K. Mahalingam, Universal Technology Corp.; J. Shank, Southwestern Ohio Council for Higher Education; S. R. Munshi, Air Force Research Lab.; B. Ullrich, Bowling Green State Univ.; W. Rice, Wright State Univ. . . . . [6481-23]

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Advanced Optical and Quantum Memories and Computing IV

Conference Chairs: **Zameer U. Hasan**, Temple Univ.; **Alan E. Craig**, Montana State Univ.-Bozeman; **Selim M. Shahriar**, Northwestern Univ.; **Hans J. Coufal**, IBM Corp.

Program Committee: **Richard I. Epstein**, Los Alamos National Lab.; **Philip R. Hemmer**, Texas A&M Univ.; **M. Saif Islam**, Univ. of California/Davis; **Demetri Psaltis**, California Institute of Technology; **M. Suhail Zubairy**, Texas A&M Univ.

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. Room M . . . . . Wed. 8:00 to 10:00 am

Advanced Optical Memories and Processors

Chair: **Hans J. Coufal**, IBM Corp.

8:00 am: **Time-domain processing of information carried by ultrashort pulses** *(Invited Paper)***,** R. E. Saperstein, Univ. of California/San Diego; D. Panasenko, Lawrence Berkeley National Lab.; K. A. Tetz, Univ. of California/San Diego; R. I. Rokitski, Cymer Corp.; Y. Fainman, Univ. of California/San Diego . . . . . [6482-01]

8:30 am: **The homogeneous dispersive lineshape as a wavelet basis** *(Invited Paper)***,** A. E. Craig, Montana State Univ./Bozeman . . . . . [6482-02]

9:00 am: **Fabrication and plasma spectroscopy of PLD thin film deposition for power-gated holeburning** *(Invited Paper)***,** F. Bezares, Z. U. Hasan, Temple Univ. . . . . [6482-03]

9:30 am: **Sluggish-light based true-time-delay multiple beam-forming system for broadband RF phased-array antennas** *(Invited Paper)***,** L. Gao, S. I. Herriot, K. H. Wagner, Univ. of Colorado/Boulder . . . . . [6482-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room M . . . . . Wed. 10:30 am to 12:20 pm

Quantum Computing: Materials and Methods

Chair: **Alan E. Craig**, Montana State Univ./Bozeman

10:30 am: **Scalable quantum computing in diamond** *(Invited Paper)***,** P. R. Hemmer, Texas A&M Univ.; F. Jelezko, J. Wrachtrup, Univ. Stuttgart (Germany); P. Tamarat, Univ. Bordeaux I (France); S. D. Prawer, The Univ. of Melbourne (Australia); M. D. Lukin, Harvard Univ. . . . . [6482-05]

11:00 am: **Photonic quantum information processing in diamond** *(Invited Paper)***,** C. M. Santori, S. M. Spillane, D. Fattal, R. G. Beausoleil, Hewlett-Packard Labs.; J. R. Rabeau, P. Olivero, A. D. Greentree, S. D. Prawer, The Univ. of Melbourne (Australia) . . . . . [6482-06]

11:30 am: **Micro-characterization of spectral memory materials using nuclear forward scattering** *(Invited Paper)***,** A. Konjhodzic, Z. U. Hasan, Temple Univ.; E. E. Alp, Argonne National Lab. . . . . [6482-07]

12:00 pm: **High efficiency DOEs at large diffraction angles for quantum information and computing architectures,** A. A. Cruz-Cabrera, Sandia National Labs. Legal Organizations; S. A. Kemme, J. R. Wendt, Sandia National Labs.; T. R. Carter, S. Samora, L&M Technologies . . . . . [6482-08]

Lunch/Exhibition Break . . . . . 12:20 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room M . . . . . Wed. 1:30 to 3:00 pm

Memories and Methods for Advanced Computing

Chair: **Zameer U. Hasan**, Temple Univ.

1:30 pm: **Optimizing two-photon optical storage in the presence of hot band absorption** *(Invited Paper)***,** N. S. Makarov, A. Rebane II, M. A. Drobizhev, Montana State Univ./Bozeman; H. Wolleb, H. Spahni, Ciba Specialty Chemicals (Switzerland) . . . . . [6482-09]

2:00 pm: **Design and implementation of all-optical half adder using cross gain modulation in semiconductor optical amplifiers,** S. H. Kim, Korea Institute of Science and Technology (South Korea); J. H. Kim, Korea Institute of Science and Technology (South Korea) and Pennsylvania State Univ.; C. W. Son, G. C. Kim, Y. T. Byun, Y. M. Jhon, S. Lee, D. H. Woo, S. H. Kim, Korea Institute of Science and Technology (South Korea) . . . . . [6482-10]

2:20 pm: **Secure display that limits the viewing space by use of optically decodable encryption,** H. Yamamoto, Y. Hayasaki, The Univ. of Tokushima (Japan) . . . . . [6482-11]

2:40 pm: **An evolutionary path toward quantum switching architectures,** F. Toudeh-Fallah, M. Carroll, Cisco Systems, Inc.; A. Y. Oruc, Univ. of Maryland/College Park . . . . . [6482-12]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room M . . . . . Wed. 3:30 to 4:40 pm

Photonics in Silicon and Organic Materials

Chair: **Alex K. Rebane**, Montana State Univ./Bozeman

3:30 pm: **Erbium in silicon nanostructures,** Z. F. Krasilnik, Institute for Physics of Microstructures (Russia) . . . . . [6482-13]

3:50 pm: **High directivity of subwavelength wire lasers** *(Invited Paper)***,** E. E. Orlova, Institute for Physics of Microstructures (Russia) . . . . . [6482-14]

4:20 pm: **Acceptors in silicon for Tunable THz lasing,** E. E. Orlova, Institute for Physics of Microstructures (Russia) . . . . . [6482-16]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Beam pattern investigations for terahertz quantum cascade lasers,** E. E. Orlova, Institute for Physics of Microstructures (Russia); J. N. Hovenier, T. O. Klaassen, I. Kasalynas, A. Adam, J. Gao, T. M. K. Klapwijk, Technische Univ. Delft (Netherlands); B. S. Williams, Q. Hu, Massachusetts Institute of Technology; J. L. Reno, Sandia National Labs. . . . . [6482-36]

✔ **Squeezing and squared-amplitude squeezing in a two-atom Jaynes-Cummings model with cavity damping and atomic dissipation,** E. K. Bashkirov, M. S. Rusakova, Samara State Univ. (Russia) . . . . [6482-37]

✔ **Nonblocking photonic switching for P2P self-organized optical concurrent communications network using pseudorandom numbers,** N. Oshima, Y. Nozaki, W. Sasaki, Doshisha Univ. (Japan) . . . . . [6482-38]

✔ **Intra-center relaxation in shallow centerrs in silicon,** E. E. Orlova, D. V. Kozlov, A. V. Antonov, Institute for Physics of Microstructures (Russia); J. N. Hovenier, T. O. Klaassen, A. Adam, Technische Univ. Delft (Netherlands); M. S. Kagan, I. V. Altukhov, Institute of Radio Engineering and Electronics (Russia); Q. V. Nguyen, D. A. Carder, P. J. Phillips, B. Redlich, FOM-Institute for Plasma Physics (Netherlands) . . . . . [6482-39]

Thursday 25 January

SESSION 5

Room: Conv. Ctr. Room M . . . . . Thurs. 8:00 to 9:50 am

Applications of Slow and Fast Light I

Chair: **Selim M. Shahriar**, Northwestern Univ.

8:00 am: **Coherent interactions with atoms and molecules in photonic band-gap fibers** *(Invited Paper)***,** A. L. Gaeta, S. Ghosh, A. Bhagwat, C. Kyle, B. J. Kirby, Cornell Univ. . . . . [6482-18]

8:30 am: **Comparing slow-light properties of 10-Gbps RZ data in dispersion shifted fibers and highly nonlinear fibers based on Raman-assisted optical parametric amplification** *(Invited Paper)***,** Z. Hu, Tsinghua Univ. (China); D. J. Blumenthal, Univ. of California/Santa Barbara . . . . . [6482-19]

9:00 am: **Large widely tunable fractional delays based on wavelength conversion and dispersion,** Y. Okawachi, J. E. Sharping, C. Xu, A. L. Gaeta, Cornell Univ. . . . . [6482-20]

9:20 am: **Tunable slow light in Bragg-spaced quantum wells** *(Invited Paper)***,** J. P. Prineas, A. L. Smirl, The Univ. of Iowa; R. H. Binder, The Univ. of Arizona . . . . . [6482-21]

Coffee Break . . . . . 9:50 to 10:10 am

SESSION 6

Room: Conv. Ctr. Room M . . . . . Thurs. 10:10 am to 12:00 pm

Applications of Slow and Fast Light II

Chair: **Philip R. Hemmer**, Texas A&M Univ.

10:10 am: **Demonstration of interferometer sensitivity varying as the inverse of the group index** *(Invited Paper)***,** M. S. Shahriar, G. S. Pati, M. Messal, Northwestern Univ. . . . . [6482-22]

10:40 am: **Optimization of slow and stored light in atomic vapor** *(Invited Paper)***,** I. Novikova, D. F. Phillips, M. Klein, R. L. Walsworth, Harvard-Smithsonian Ctr. for Astrophysics . . . . . [6482-23]

11:10 am: **Demonstration of a white light interferometer using fast light,** G. S. Pati, M. Messal, M. Shahriar, Northwestern Univ. . . . . [6482-24]

11:30 am: **Large fractional displays in a hot vapor** *(Invited Paper)***,** R. M. Camacho, M. V. Pack, R. W. Boyd, J. C. Howell, Univ. of Rochester . . . . . [6482-25]

Lunch/Exhibition Break . . . . . 12:00 to 1:00 pm

SESSION 7

Room: Conv. Ctr. Room M . . . . . Thurs. 1:00 to 3:20 pm

Applications of Slow and Fast Light III

Chair: **Alexander L. Gaeta**, Cornell Univ.

1:00 pm: **Rubidium spectroscopy on a chip** *(Invited Paper)***,** H. Schmidt, Univ. of California/Santa Cruz . . . . . [6482-26]

1:30 pm: **Coherent few-photon quantum transport in one-dimensional systems** *(Invited Paper)***,** J. Shen, S. L. Fan, Stanford Univ. . . . . [6482-27]

2:00 pm: **Designing optimal gain profiles for slow-light applications** *(Invited Paper)***,** R. Pant, Consultant; M. D. Stenner, M. A. Neifeld, The Univ. of Arizona . . . . . [6482-28]

2:30 pm: **Subluminal and superluminal propagation of an optical pulse in an active Raman gain medium,** L. Deng, National Institute of Standards and Technology . . . . . [6482-29]

2:50 pm: **Electromagnetically induced backscatering via slow light** *(Invited Paper)***,** Y. V. Rostovtsev, M. O. Scully, Texas A&M Univ. . . . . [6482-30]

Coffee Break . . . . . 3:20 to 3:40 pm

SESSION 8

Room: Conv. Ctr. Room M . . . . . Thurs. 3:40 to 5:10 pm

Applications of Slow and Fast Light IV

Chair: **Shanhui L. Fan**, Stanford Univ.

3:40 pm: **Ultralow-light level saturation spectroscopy and EIT using a tapered fiber in a hot vapor cell,** G. S. Pati, M. Shahriar, P. Kumar, Northwestern Univ.; S. M. Spillane, R. G. Beausoleil, Hewlett-Packard Labs. . . . . [6482-32]

4:00 pm: **Slow wave atom interferometers for rotation sensing,** M. Ozcan, Sabanci Univ. (Turkey) . . . . . [6482-33]

4:20 pm: **An optical prism based on resonance ultradispersive media,** V. A. Sautenkov, Y. V. Rostovtsev, M. O. Scully, Texas A&M Univ. . . . . [6482-34]

4:40 pm: **Reduced density matrix descriptions for electromagnetic induced transparency and related pump-probe optical phenomena in atomic systems** *(Invited Paper)***,** V. L. Jacobs, Z. Dutton, M. Bashkansky, M. J. Steiner, J. F. Reintjes, Naval Research Lab. . . . . [6482-35]

Wednesday-Thursday 24-25 January 2007 • Proceedings of SPIE Vol. 6483

Complex Light and Optical Forces

Conference Chair: **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom)

Cochairs: **Enrique J. Galvez**, Colgate Univ.; **Gerard Nienhuis**, Univ. Leiden (Netherlands)

Program Committee: **Nicholas P. Bigelow**, Univ. of Rochester; **Wolfgang Ertmer**, Laser Zentrum Hannover e.V. (Germany); **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland); **Jesper Glückstad**, Risø National Lab. (Denmark); **David G. Grier**, New York Univ.; **Lukas Novotny**, Univ. of Rochester; **Miles J. Padgett**, Univ. of Glasgow (United Kingdom); **Halina H. Rubinsztein-Dunlop**, The Univ. of Queensland (Australia)

Wednesday 24 January

SESSION 1

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Wed. 8:00 to 10:10 am

Optical Binding and Atom Traps

Chair: **Enrique J. Galvez**, Colgate Univ.

8:00 am: **Optical trap shaping for binding force study and optimization** *(Invited Paper)*, M. Guillon, Observatoire de Haute-Provence (France); J. Fournier, École Polytechnique Fédérale de Lausanne (Switzerland) [6483-01]

8:30 am: **Forces and binding in a two-mirror system,** A. Mizrahi, L. Schachter, Technion-Israel Institute of Technology (Israel) . . . . . [6483-02]

8:50 am: **Optical electrostriction,** R. G. Crisp, D. L. Andrews, Univ. of East Anglia Norwich (United Kingdom) . . . . . [6483-03]

9:10 am: **High-speed, dynamic spatial control of cold atoms with combined acousto-optic and spatial light modulation,** F. Fatemi, M. Bashkansky, Z. Dutton, Naval Research Lab. . . . . [6483-04]

9:30 am: **Developments towards atomic quantum sensors,** W. A. Ertmer, Univ. Hannover (Germany) . . . . . [6483-05]

9:50 am: **Single-beam, blue-detuned toroidal optical traps for cold atoms,** F. Fatemi, M. Bashkansky, Z. Dutton, S. E. Olson, M. Terraciano, Naval Research Lab. . . . . [6483-06]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . Wed. 10:30 to 11:50 am

Optical Tweezers and Near-Field Interactions

Chair: **David L. Andrews**, Univ. of East Anglia Norwich (United Kingdom)

10:30 am: **Exact theory of optical forces of Mie scatterers exposed to high numerical aperture beams examined with 3D photonic force measurements,** A. Á. R. Neves, A. Fontes, W. L. Moreira, A. A. d. Thomaz, D. B. d. Almeida, L. C. Barbosa, C. L. Cesar, Univ. Estadual de Campinas (Brazil) . . . . . [6483-07]

10:50 am: **Refractive multiple optical tweezers for parallel biochemical analysis in micro-fluidics,** F. Merenda, J. Rohner, J. Fournier, R. Salathé, École Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [6483-08]

11:10 am: **Scattering of light at micro- and nanostructures of triangular shape,** M. Goncalves, A. Siegel, R. Ameling, O. Marti, Univ. Ulm (Germany) . . . . . [6483-09]

11:30 am: **Time-resolved evanescent wave-induced fluorescence studies of macromolecular adsorption,** T. A. Smith, C. A. Scholes, A. Mularski, M. L. Gee, The Univ. of Melbourne (Australia) . . . . . [6483-10]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 3

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Wed. 1:30 to 2:30 pm

Nanoparticle Optical Manipulation

Chair: **Jesper Gluckstad**, Risø National Lab. (Denmark)

1:30 pm: **Assembling mesoscopic systems with holographic optical traps,** D. G. Grier, Y. Roichman, New York Univ. . . . . [6483-11]

1:50 pm: **Optical manipulation of gold micro and nano-particles on silicon nitride waveguides: impact of polarization and particle size on gradient forces,** S. Getin, S. Gaugiran, J. Fedeli, Commissariat a l'Energie Atomique (France); J. Derouard, Univ. Joseph Fourier (France) . . . . . [6483-12]

2:10 pm: **Measuring mesoscopic interactions with holographic line traps,** Y. Roichman, M. Polin, I. Cholis, D. G. Grier, New York Univ. . . . . [6483-13]

SESSION 4

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Wed. 2:30 to 5:00 pm

Beam Sculpting

Chair: **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland)

2:30 pm: **Nonlinear effects in the propagation of short laser pulses in air** *(Invited Paper)*, J. San Román, Univ. de Salamanca (Spain); C. Ruiz, Max-Planck-Institut für Physik komplexer Systeme (Germany); I. Sola, C. Mendez, J. A. Perez, D. Delgado, V. H. Diaz, L. Plaja, I. Arias, L. Roso, Univ. de Salamanca (Spain) . . . . . [6483-14]

Coffee Break . . . . . 3:00 to 3:30 pm

3:30 pm: **Multimode fibers: mutual influence of propagation and polarization** *(Invited Paper)*, B. Y. Zeldovich, College of Optics & Photonics/ Univ. of Central Florida . . . . . [6483-15]

4:00 pm: **Complex beam sculpting with tunable acoustic gradient index lenses: an alternative to spatial light modulators,** E. J. R. B. McLeod, C. B. Arnold, Princeton Univ. . . . . [6483-16]

4:20 pm: **Spatial structure of cavity modes with general astigmatism,** G. Nienhuis, S. J. M. Habraken, Univ. Leiden (Netherlands) . . . . . [6483-17]

4:40 pm: **Engineering of illumination and collection field profiles for single-molecule orientational imaging,** Z. Sikorski, L. M. Davis, The Univ. of Tennessee Space Institute . . . . . [6483-18]

✔ Posters-Wednesday

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✔ **Analysis of localization phenomena in weakly interacting disordered lattice gases,** W. A. Ertmer, T. Schulte, S. Drenkelforth, J. Kruse, R. Tiemeyer, Univ. Hannover (Germany); K. Sacha, J. Zakrzewski, Jagiellonian Univ. (Poland); J. J. Arlt, M. Lewenstein, Univ. Hannover (Germany) . . . . [6483-28]

Thursday 25 January

SESSION 5

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . . Thurs. 8:10 to 8:40 am

Session 5

Chair: **Lukas Novotny**, Univ. of Rochester

8:10 am: **Nonlinear photonic quasi-crystals and Anderson localization** *(Invited Paper)***,** M. Segev, Technion-Israel Institute of Technology (Israel) . . . . . [6483-19]

SESSION 6

Room: Marriott Hotel: San Jose Ballroom Salon II . . . . Thurs. 8:40 to 10:10 am

Optical Vortices I

Chair: **David G. Grier**, New York Univ.

8:40 am: **Femtosecond optical vortices: how to make them and what to do with them** *(Invited Paper)***,** C. J. Uiterwaal, J. Strohaber, I. Mariyenko, Univ. of Nebraska/Lincoln . . . . . [6483-20]

9:10 am: **Coherence measurements for light fields for optical trapping with helical wavefronts,** W. M. Lee, A. E. Carruthers, V. G. Garcés-Chávez, K. Dholakia, Univ. of St. Andrews (United Kingdom) . . . . . [6483-21]

9:30 am: **Three-dimensional intensity distribution of helico-conical optical beams,** C. A. C. Alonzo, P. J. J. L. Rodrigo, I. R. Perch-Nielsen, J. Glückstad, Risø National Lab. (Denmark) . . . . . [6483-22]

9:50 am: **Stability of powerful tubular pulsed beams in dielectrics with photo-induced ionisation,** O. K. Khasanov, T. V. Smirnova, O. M. Fedotova, Institute of Solid State and Semiconductor Physics (Belarus); A. V. Volyar, Taurida National Univ. (Ukraine); A. P. Sukhorukov, M.V. Lomonosov Moscow State Univ. (Russia) . . . . . [6483-23]

Coffee Break . . . . . 10:10 to 10:40 am

SESSION 7

Room: Marriott Hotel: San Jose Ballroom Salon II Thurs. 10:40 am to 12:00 pm

Optical Vortices II

Chair: **Gerard Nienhuis**, Univ. Leiden (Netherlands)

10:40 am: **Laguerre-Gaussian supercontinuum,** H. I. Sztul, V. Kartezayev, R. R. Alfano, City College/CUNY . . . . . [6483-24]

11:00 am: **Colloidal statistical mechanics in optical vortices,** Y. Roichman, S. Lee, K. Xiao, D. G. Grier, New York Univ. . . . . [6483-25]

11:20 am: **Optical taper beams,** S. Chávez-Cerda, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); D. P. Caetano, J. M. Hickmann, Univ. Federal de Estado de Alagoas (Brazil) . . . . . [6483-26]

11:40 am: **Optical vortices in diffracted light beams,** E. J. Galvez, S. Baumann, Colgate Univ. . . . . [6483-27]

Conference 6484 • Room: Conv. Ctr. Room A4

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Vertical-Cavity Surface-Emitting Lasers XI

Conference Chairs: **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign; **James K. Guenter**, Advanced Optical Components

Program Committee: **Luke A. Graham**, Picolight; **Karlheinz H. Gulden**, Avalon Photonics Ltd. (Switzerland); **Hong Q. Hou**, EMCORE Corp.; **Kevin L. Lear**, Colorado State Univ.; **Chun Lei**, Intel Corp.; **Duane A. Louderback**, OptiComp Corp.; **John G. McInerney**, National Univ. of Ireland/Cork (Ireland); **Ryan L. Naone**, Intel Corp.; **Krassimir P. Panayotov**, Institute of Solid State Physics (Bulgaria); **Dieter Wiedenmann**, ULM Photonics GmbH (Germany)

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. Room A4 . . . . . Wed. 8:30 to 10:00 am

Commercial VCSELs

Chair: **Kent D. Choquette**, Univ. of Illinois at Urbana-Champaign

8:30 am: **Design and manufacturing of 10G GenX VCSELs at Emcore** *(Invited Paper)***,** N. Li, D. Collins, S. Jatar, O. Lavrova, L. Liu, C. Liu, C. J. Helms, W. Luo, C. X. Wang, EMCORE Corp. . . . . [6484-01]

9:00 am: **VCSEL proliferation,** J. A. Tatum, Advanced Optical Components . . . . . [6484-02]

9:20 am: **High output power 670nm VCSELs,** K. Johnson, M. K. Hibbs-Brenner, Vixar . . . . . [6484-03]

9:40 am: **A TCAD approach to robust ESD design in oxide-confined VCSELs,** H. Meier, R. Santschi, S. Odermatt, B. Witzigmann, ETH Zürich (Switzerland); S. Eitel, Avalon Photonics Ltd. (Switzerland); G. Letay, F. Nallet, Synopsys Switzerland AG (Switzerland) . . . . . [6484-04]

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room A4 . . . . . Wed. 10:30 to 11:50 am

Emerging VCSEL Applications

Chair: **James K. Guenter**, Advanced Optical Components

10:30 am: **VCSELs for atomic sensors** *(Invited Paper)***,** D. K. Serkland, G. M. Peake, K. M. Geib, G. A. Keeler, Sandia National Labs. . . . . [6484-05]

11:00 am: **New markets for VCSELS: pulsed operation of high power devices,** M. Grabherr II, M. Miller, D. Wiedenmann, R. Jaeger, R. King, ULM Photonics GmbH (Germany) . . . . . [6484-06]

11:20 am: **Heterogenously integrated waveguide-coupled VCSEL-based optical interconnects** *(Invited Paper)***,** J. Cheng, K. Yang, D. A. Louderback, K. M. Patel, X. J. Jin, T. J. Eustis, C. Y. Chao, J. Schoengarth, P. S. Guilfoyle, OptiComp Corp. . . . . [6484-07]

Lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room A4 . . . . . Wed. 1:30 to 3:00 pm

VCSEL Integration

Chair: **Kevin L. Lear**, Colorado State Univ.

1:30 pm: **Monolithic integration of VCSELs and MSM photodiodes for bidirectional multimode fiber communications** *(Invited Paper)***,** R. Michalzik, M. Stach, F. Rinaldi, S. Lorch, Univ. Ulm (Germany) . . . . . [6484-08]

2:00 pm: **Modulation properties of VCSEL with intracavity modulator,** J. van Eisden, S. R. Oktyabrsky, M. Yakimov, V. E. Tokranov, M. Varanasi, SUNY/Univ. at Albany; E. M. Mohammed, I. A. Young, Intel Corp. . . . . [6484-09]

2:20 pm: **Optical switch and logic gates based on the integration of vertical cavity laser: depleted optical thyristor,** W. Choi, D. Kim, Y. Choi, Chung-Ang Univ. (South Korea); Y. Kim, K. D. Choquette, Univ. of Illinois at Urbana-Champaign; S. Lee, D. Woo, Y. Byun, Korea Institute of Science and Technology (South Korea) . . . . . [6484-10]

2:40 pm: **Monolithic integration of VCSEL/PiNs,** A. Giannopoulos, A. M. Kasten, C. Long, C. Chen, K. D. Choquette, Univ. of Illinois at Urbana-Champaign . . . . . [6484-11]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room A4 . . . . . Wed. 3:30 to 5:00 pm

VCSEL Materials and Structures

Chair: **Darwin K. Serkland**, Sandia National Labs.

3:30 pm: **Monolithic, bufferless III-Sb VCSELs on Si (011) wafers** *(Invited Paper)***,** D. L. Huffaker, The Univ. of New Mexico . . . . . [6484-12]

4:00 pm: **Low threshold current, low resistance 1.3 μm InAs/InGaAs quantum-dot VCSELs with fully doped DBRs grown by MBE,** H. Yu, National Cheng Kung Univ. (Taiwan); J. Wang, Chung Yuan Christian Univ. (Taiwan); Y. Su, S. Chang, National Cheng Kung Univ. (Taiwan); H. Kuo, National Chiao Tung Univ. (Taiwan); H. D. Yang, Industrial Technology Research Institute (Taiwan) . . . . . [6484-13]

4:20 pm: **1.3 μm VCSELs: InGaAs/GaAs, GaInNAs/GaAs multiple quantum wells or InAs/GaAs quantum dots: three candidates as active material,** P. Gilet, Commissariat à l'Energie Atomique (France); E. Pougeoise, L. Grenouillet, P. Grosse, S. Poncet, Lab. d'Electronique de Technologie de l'Information (France); A. Chelnokov, Commissariat à l'Energie Atomique (France); G. Bourgeois, R. Stevens, R. R. Hamelin, IntexyS SA (France); M. Hammar, J. Berggren, P. Sundgren, Kungliga Tekniska Högskolan (Sweden) . . . . . [6484-14]

4:40 pm: **1.55 μm InP-based electrically-pumped VECSELs: comparison of buried and implanted tunnel junction as current confinement schemes for the realisation of single-transverse-mode large diameter (50 μm),** A. Bousseksou, Lab. de Photonique et de Nanostructures (France); S. Bouchoule, Ctr. National de la Recherche Scientifique (France) . . . [6484-15]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **VCSELs with tunnel-regenerated multiple-active-region structure,** X. Guo, G. Shen, J. Deng, Beijing Univ. of Technology (China); K. L. Wang, Univ. of California/Los Angeles . . . . . [6484-19]

✔ **Numerical simulation of temperature-dependence on distributed Bragg reflector (DBR) and performance analyses for proton-implant/oxide confined VCSEL: comparison with transmission matrix, matrix calculating methods and macleod model,** H. Tsai, S. Tang, S. Sua, Chung-Shan Institute of Science and Technology (Taiwan); T. Chen, Chung Cheng Institute of Technology (Taiwan); C. Chiang, Chung Shan Institute of Science and Technology (Taiwan) . . . . . [6484-20]

Thursday 25 January

SESSION 5

Room: Conv. Ctr. Room A4 . . . . . Thurs. 9:00 to 10:10 am

VCSEL Modulation

Chair: **Rainer Michalzik**, Univ. Ulm (Germany)

9:00 am: **Progress and issues for high speed vertical cavity surface emitting lasers** *(Invited Paper)***,** K. L. Lear, A. N. Al-Omari, Colorado State Univ. [6484-16]

9:30 am: **Characterization of 1.55 μm VCSELs using high-resolution and high-dynamic range measurements of the CW spectrum,** A. Villafranca, J. Lasobras, I. Garces, Univ. de Zaragoza (Spain) . . . . . [6484-17]

9:50 am: **Single mode proton-implanted photonic crystal and holey VCSELs,** P. O. Leisher, D. Siriani, K. D. Choquette, Univ. of Illinois at Urbana-Champaign . . . . . [6484-18]

Monday-Thursday 22-25 January 2007 • Proceedings of SPIE Vol. 6485

Novel In-Plane Semiconductor Lasers VI

Conference Chairs: **Carmen Mermelstein**, Reute (Germany); **David P. Bour**, BridgeLux Corp.

Program Committee: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan); **Dan Botez**, Univ. of Wisconsin/Madison; **Federico Capasso**, Harvard Univ.; **Gary A. Evans**, Southern Methodist Univ.; **Claire F. Gmachl**, Princeton Univ.; **Michael Kneissl**, Technische Univ. Berlin (Germany); **Hui C. Liu**, National Research Council Canada (Canada); **Luke J. Mawst**, Univ. of Wisconsin/Madison; **Jerry R. Meyer**, Naval Research Lab.; **Mario J. Paniccia**, Intel Corp.; **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

Monday 22 January

SESSION 1

Room: Conv. Ctr. Room A5 . . . . . Mon. 8:10 to 10:10 am

Nitride Lasers

Chair: **David P. Bour**, BridgeLux Corp.

8:10 am: **Tunable broad-area InGaN laser diodes in external cavity,** K. Komorowska, P. Wisniewski, R. Czernecki, P. Prystawko, Instytut Wysokich Cisnien (Poland); M. Leszczynski, Instytut Wysokich Cisnien (Poland) and TopGaN Ltd. (Poland); T. Suski, Instytut Wysokich Cisnien (Poland); I. Grzegory, Instytut Wysokich Cisnien (Poland) and TopGaN Ltd. (Poland); S. A. Porowski, S. Grzanka, Instytut Wysokich Cisnien (Poland); P. Perlin, Instytut Wysokich Cisnien (Poland) and TopGaN Ltd. (Poland) . . . . . [6485-01]

8:30 am: **Recent progress of high-power GaN-based laser diodes** *(Invited Paper)***,** T. Kozaki, Nichia Corp. (Japan) . . . . . [6485-02]

9:00 am: **Comprehensive study of reliability of InGaN based laser diodes,** L. Marona, P. Wisniewski, M. Leszczynski, P. Prystawko, I. Grzegory, T. Suski, S. A. Porowski, R. Czernecki, Instytut Wysokich Cisnien (Poland); A. Czerwinski, M. Pluska, J. Ratajczak, Instytut Technologii Elektronowej (Poland); P. Perlin, Instytut Wysokich Cisnien (Poland) . . . . . [6485-03]

9:20 am: **High-power operation of inner-stripe GaN-based blue-violet laser diodes** *(Invited Paper)***,** C. Sasaoka, NEC Corp. (Japan) . . . . . [6485-04]

9:50 am: **Investigation and comparison of optical gain spectra of (Al,In)GaN laser diodes emitting in the 375nm to 470 nm spectral range,** U. T. Schwarz, H. Braun, Univ. Regensburg (Germany); K. Kojima, M. Funato, Y. Kawakami, Kyoto Univ. (Japan); S. Nagahama, T. Mukai, Nichia Corp. (Japan) . . . [6485-05]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room A5 . . . . . Mon. 10:30 am to 12:10 pm

Quantum Cascade Lasers I

Chair: **Federico Capasso**, Harvard Univ.

10:30 am: **Quantum-cascade lasers without injector regions** *(Invited Paper)***,** M. Amann, A. Friedrich, Walter Schottky Institute (Germany) . . . . . [6485-06]

11:00 am: **Electronic and thermal properties of Sb-based QCLs operating in the first atmospheric window,** M. S. Vitiello, G. Scamarcio, V. Spagnolo, Univ. degli Studi di Bari (Italy); Q. Yang, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6485-07]

11:20 am: **State-of-the-art GaInAs/AlAsSb quantum cascade lasers** *(Invited Paper)***,** Q. Yang, C. Manz, W. Bronner, C. Mann, F. Fuchs, K. Köhler, J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6485-08]

11:50 am: **Sub-wavelength antireflection gratings on quantum cascade laser facets,** A. O. Dirisu, C. F. Gmachl, Princeton Univ.; D. L. Sivco, Lucent Technologies/Bell Labs. . . . . [6485-09]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room A5 . . . . . Mon. 1:30 to 2:50 pm

Mid-Infrared and High Power Lasers

Chair: **Carmen Mermelstein**, Reute (Germany)

1:30 pm: **Toward an AlGaAsSb/GaInAsSb/GaSb laser emitting beyond 3μm,** J. Angellier, D. Barat, G. Boissier, F. Chevier, P. Grech, Y. Rouillard, Univ. Montpellier II (France) . . . . . [6485-10]

1:50 pm: **GaSb-based external cavity laser emitting around 2.3 μm,** E. Geerlings, M. Rattunde, J. Schmitz, G. Kaufel, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany); H. Zappe, Albert-Ludwigs-Univ. Freiburg (Germany); J. Wagner, Fraunhofer-Institut für Angewandte Festkörperphysik (Germany) . . . . . [6485-11]

2:10 pm: **Narrow linewidth and high power Al-free DFB laser diodes at 852nm for atomic clocks and interferometry applications,** V. Ligeret, F. Vermersch, S. Bansropun, M. Lecomte, M. Calligaro, O. Parillaud, M. M. Krakowski, Thales Research & Technology (France) . . . . . [6485-12]

2:30 pm: **In-phase coupling of tapered lasers in an external Talbot cavity,** I. Hassiaoui, N. Michel, A. Gomez, C. Larat, J. Huignard, M. M. Krakowski, Thales Research & Technology (France) . . . . . [6485-13]

Coffee Break . . . . . 2:50 to 3:20 pm

SESSION 4

Room: Conv. Ctr. Room A5 . . . . . Mon. 3:20 to 5:10 pm

High Power Lasers

Chair: **Luke J. Mawst**, Univ. of Wisconsin/Madison

3:20 pm: **High brightness slab coupled optical waveguide lasers** *(Invited Paper)***,** R. K. Huang, J. P. Donnelly, L. J. Missaggia, C. T. Harris, B. Chann, A. K. Goyal, A. Sanchez-Rubio, T. Y. Fan, G. W. Turner, MIT Lincoln Lab. . . . . [6485-14]

3:50 pm: **Very high power 1310nm InP single mode distributed feed back laser diode with reduced linewidth,** P. Doussiere, C. Shieh, S. D. DeMars, K. M. Dzurko, JDS Uniphase Corp. . . . . [6485-15]

4:10 pm: **Wavelength stabilized, narrow linewidth, high power and high efficiency broad-area laser** *(Invited Paper)***,** M. Kanskar, Alfalight, Inc. [6485-16]

4:40 pm: **To be announced** *(Invited Paper)***,** J. Farmer, nLight Corp. . [6485-17]

Tuesday 23 January

Optoelectronics
Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Coffee Break . . . . . 10:00 to 10:30 am

SESSION 5

Room: Conv. Ctr. Room A5 . . . . . Tues. 10:30 to 11:50 am

Quantum Dots

Chair: **Peter M. Smowton**, Cardiff Univ. (United Kingdom)

10:30 am: **Recombination in quantum dot ensembles** *(Invited Paper)*, P. Blood, Cardiff Univ. (United Kingdom) . . . . . [6485-18]

11:00 am: **Characteristics of In(Ga)As/InGaAsP quantum dot laser diodes lasing at 1.55μm,** E. Lee, N. Kim, D. Lee, Chungnam National Univ. (South Korea); S. Pyun, D. Ko, J. Yoon, W. Jeong, Sungkyunkwan Univ. (South Korea); J. Jang, NanoEpi Technologies Corp. (South Korea) . . . . . [6485-19]

11:20 am: **Robust passively mode-locked quantum-dot lasers with low timing jitter** *(Invited Paper)*, J. G. McInerney, National Univ. of Ireland/Cork (Ireland) . . . . . [6485-20]

lunch/Exhibition Break . . . . . 11:50 am to 1:30 pm

SESSION 6

Room: Conv. Ctr. Room A5 . . . . . Tues. 1:30 to 3:20 pm

Quantum Cascade Lasers II

Chair: **Hui Chun Liu**, National Research Council Canada (Canada)

1:30 pm: **High-temperature and high-power terahertz quantum-cascade lasers** *(Invited Paper)*, B. S. Williams, Massachusetts Institute of Technology . . . . . [6485-21]

2:00 pm: **MOCVD growth and regrowth of quantum cascade lasers** *(Invited Paper)*, F. Choa, Univ. of Maryland/Baltimore County . . . . . [6485-22]

2:30 pm: **Quantum cascade lasers emitting at wavelengths shorter than 4 microns** *(Invited Paper)*, M. Razeghi, Northwestern Univ. . . . . [6485-23]

3:00 pm: **Room temperature, continuous wave operation of distributed feedback quantum cascade lasers with widely spaced operation frequencies,** A. Wittmann, M. Giovannini, J. Faist, Univ. de Neuchâtel (Switzerland); L. Hvozdara, S. Blaser, Alpes Lasers SA (Switzerland); D. Hofstetter, Univ. de Neuchâtel (Switzerland); E. Gini, ETH Zürich (Switzerland) . . . . . [6485-24]

Coffee Break . . . . . 3:20 to 3:50 pm

SESSION 7

Room: Conv. Ctr. Room A5 . . . . . Tues. 3:50 to 5:10 pm

Novel Devices

Chair: **Jerry R. Meyer**, Naval Research Lab.

3:50 pm: **Nonselective oxidation of GaAs-based III-V compound semiconductor heterostructures for in-plane lasers** *(Invited Paper)*, D. Liang, J. Wang, D. C. Hall, Univ. of Notre Dame . . . . . [6485-25]

4:20 pm: **Highly reflective non-alloyed ohmic contacts on n-type GaAs,** N. A. Rider, S. Yu, Y. Zhang, D. Ding, J. Wang, S. R. Johnson, Arizona State Univ. . . . . [6485-26]

4:40 pm: **Room temperature continuous-wave operation of GaInNAsSb laser diodes at 1.55μm** *(Invited Paper)*, J. A. Gupta, National Research Council Canada (Canada) . . . . . [6485-27]

Wednesday 24 January

SESSION 8

Room: Conv. Ctr. Room A5 . . . . . Wed. 8:20 to 10:10 am

Quantum Cascade Lasers III

Chair: **Yasuhiko Arakawa**, The Univ. of Tokyo (Japan)

8:20 am: **Recent advances in MOVPE-grown high-performance quantum cascade lasers** *(Invited Paper)*, L. Diehl, Harvard Univ. . . . . [6485-28]

8:50 am: **New THz sources for biomedical imaging** *(Invited Paper)*, J. S. Harris, Jr., Stanford Univ. . . . . [6485-29]

9:20 am: **Nonlinear optics with intersubband transitions in high band offset heterostructures** *(Invited Paper)*, A. A. Belyanin, Texas A&M Univ. . . [6485-30]

9:50 am: **Mode tuning of quantum cascade lasers through optical processing of chalcogenide glass claddings,** S. Song, S. S. Howard, Z. Liu, A. O. Dirisu, C. F. Gmachl, C. B. Arnold, Princeton Univ. . . . . [6485-31]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 9

Room: Conv. Ctr. Room A5 . . . . . Wed. 10:30 am to 12:00 pm

Novel Devices and Physics

Chair: **Dan Botez**, Univ. of Wisconsin/Madison

10:30 am: **High frequency nanophotonic devices** *(Invited Paper)*, D. Bimberg, Technische Univ. Berlin (Germany) . . . . . [6485-32]

11:00 am: **Plasmonic laser antennas** *(Invited Paper)*, K. B. Crozier, Stanford Univ. . . . . [6485-33]

11:30 am: **High power pure-blue semiconductor lasers** *(Invited Paper)*, O. Goto, Sony Shiroishi Semiconductor, Inc. (Japan); S. Tomiya, Sony Corp. (Japan); Y. Hoshina, T. Tanaka, M. Ohta, Y. Ooizumi, Y. Yabuki, Sony Shiroishi Semiconductor, Inc. (Japan)); K. Funato, Sony Corp. (Japan); M. Ikeda, Sony Shiroishi Semiconductor, Inc. (Japan) . . . . . [6485-45]

lunch/Exhibition Break . . . . . 12:00 to 1:30 pm

SESSION 10

Room: Conv. Ctr. Room A2 . . . . . Wed. 1:30 to 3:30 pm

Joint Session with Conference 6477

Silicon Optoelectronics I

Chair: **Mario J. Paniccia**, Intel Corp.

1:30 pm: **Si/Ge platform for lasers, amplifiers, and nonlinear optical devices based on the Raman effect** *(Invited Paper)*, R. Claps, Neptec Optical Solutions, Inc.; D. P. Dimitropoulos, V. Raghunathan, S. Fathpour, Univ. of California/Los Angeles; B. Jusserand, Univ. Pierre et Marie Curie (France); B. Jalali, Univ. of California/Los Angeles . . . . . [6485-35]

2:00 pm: **Monolithic integrated ring resonator based silicon lasers and amplifiers** *(Invited Paper)*, H. Rong, Intel Corp. . . . . [6485-36]

2:30 pm: **Energy harvesting in silicon Raman amplifiers and lasers** *(Invited Paper)*, B. Jalali, Univ. of California/Los Angeles . . . . . [6485-37]

3:00 pm: **Laser charactersitics and gain properties of the novel Ga(NAsP)/GaP-material system for the integration to Si** *(Invited Paper)*, W. Stolz, Philipps-Univ. Marburg (Germany) . . . . . [6485-38]

Coffee Break . . . . . 3:30 to 4:00 pm

SESSION 11

Room: Conv. Ctr. Room A2 . . . . . Wed. 4:00 to 6:00 pm

Joint Session with Conference 6477

Silicon Optoelectronics II

Chair: **Bahram Jalali**, Univ. of California/Los Angeles

4:00 pm: **Quantum dot lasers and integrated guided wave devices on Si** *(Invited Paper)*, J. Yang, Z. Mi, P. K. Bhattacharya, Univ. of Michigan . [6485-39]

4:30 pm: **High temperature silicon evanescent lasers** *(Invited Paper)*, J. E. Bowers, Univ. of California/Santa Barbara . . . . . [6485-40]

5:00 pm: **Nano-engineered crystalline silicon for enhanced photoluminescence and 1.28um laser action** *(Invited Paper)*, J. M. Xu, S. G. Cloutier, C. Hsu, P. Kossyrev, E. Rotem, J. M. Shainline, Brown Univ. . . . . [6477-28]

5:30 pm: **Towards an electrically pumped silicon laser** *(Invited Paper)*, T. L. Koch, Lehigh Univ. . . . . [6477-30]

Thursday 25 January

SESSION 12

Room: Conv. Ctr. Room A5 . . . . . Thurs. 8:30 to 9:50 am

Near IR and Red Lasers

Chair: **Michael Kneissl**, Technische Univ. Berlin (Germany)

8:30 am: **670 nm semiconductor lasers for Lithium spectroscopy,** R. Haring, TOPTICA Photonics AG (Germany); B. Sumpf, G. Erbert, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); F. Lison, W. G. Kaenders, TOPTICA Photonics AG (Germany) . . . . . [6485-41]

8:50 am: **670 nm tapered lasers and amplifier with output powers P > 1 W and nearly diffraction limited beam quality,** B. Sumpf, M. Zorn, G. Erbert, J. Fricke, P. Froese, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); R. Häring, W. G. Kaenders, TOPTICA Photonics AG (Germany); A. Klehr, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany); F. Lison, TOPTICA Photonics AG (Germany); P. Ressel, H. Wenzel, M. Weyers, G. Tränkle, Ferdinand-Braun-Institut für Höchstfrequenztechnik (Germany) . . . . . [6485-42]

9:10 am: **Highly strained InGaAs lasers grown by MOVPE with low threshold current density,** W. Chen, Y. Su, R. W. Chuang, M. Tsai, National Cheng Kung Univ. (Taiwan) . . . . . [6485-43]

9:30 am: **Lifetime prediction of diode lasers with different aging behavior,** Y. Li, Symbol Technologies, Inc. . . . . [6485-44]

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Light-Emitting Diodes: Research, Manufacturing, and Applications XI

Conference Chairs: **Klaus P. Streubel**, OSRAM Opto Semiconductors GmbH (Germany); **Heonsu Jeon**, Seoul National Univ. (South Korea)

Program Committee: **Gerd Bacher**, Univ. Duisburg-Essen (Germany); **John C. Carrano**, Luminex Corp.; **Jonathan J. Halls**, Cambridge Display Technology Ltd. (United Kingdom); **Paul L. Heremans III**, IMEC (Belgium); **Michael Heuken**, AIXTRON AG (Germany); **Masayoshi Koike**, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea); **Kurt J. Linden**, Spire Corp.; **Heng Liu**, AXT, Inc.; **E. Fred Schubert**, Rensselaer Polytechnic Institute; **Jerry A. Simmons**, Sandia National Labs.; **Ross P. Stanley**, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland); **Steve A. Stockman**, Lumileds Lighting, LLC; **Li-Wei Tu**, National Sun Yat-Sen Univ. (Taiwan); **H. Walter Yao**, Advanced Micro Devices, Inc.; **John M. Zavada**, U.S. Army Research Office

SPIE and the organizers gratefully acknowledge the following sponsor:

OPTICAL RESEARCH ASSOCIATES

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. Room A3 . . . . . Wed. 8:10 to 10:10 am

Novel Technologies for LEDs

Chair: **Klaus P. Streubel**, OSRAM Opto Semiconductors GmbH (Germany)

8:10 am: **Nitride nano-LEDs** *(Invited Paper)***,** L. Tu, Y. J. Tu, M. Chen, Y. T. Lin, C. L. Hsiao, National Sun Yat-Sen Univ. (Taiwan) . . . . . [6486-01]

8:30 am: **GaN-based light-emitting diodes grown on patterned substrates by metal-organic vapor phase epitaxy** *(Invited Paper)***,** J. Chyi, National Central Univ. (Taiwan) . . . . . [6486-02]

8:50 am: **High extraction efficiency light emitting diodes for electroluminescence refrigeration,** S. Yu, N. A. Rider, J. Wang, D. Ding, S. R. Johnson, Y. Zhang, Arizona State Univ. . . . . [6486-03]

9:10 am: **Non-period binary optical structures for enhancing light extraction of emitters,** L. Hong, T. Yu, T. Dai, Z. Zhang, J. Xu, G. Zhang, X. Hu, Peking Univ. (China) . . . . . [6486-04]

9:30 am: **High light-extraction efficiency in GaInN light-emitting diode with pyramid reflector,** J. Xi, H. Luo, J. K. Kim, E. F. Schubert, Rensselaer Polytechnic Institute . . . . . [6486-05]

9:50 am: **LEDs engine hosted on a THS,** M. Checchetti, Microptronics Srl (Italy) . . . . . [6486-06]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 2

Room: Conv. Ctr. Room A3 . . . . . Wed. 10:30 am to 12:10 pm

Fabrication of LEDs and OLEDs

Chair: **Kurt J. Linden**, Spire Corp.

10:30 am: **Recent progress of high efficiency GaN-based light emitting diodes** *(Invited Paper)***,** C. Sone, J. Cho, S. Yoon, J. W. Lee, H. Kim, K. Kim, K. Choi, T. Sakong, J. Kim, H. Kim, Y. Kim, K. Baik, J. Song, J. Chae, J. Jeong, B. Min, Y. Park, SAMSUNG Advanced Institute of Technology (South Korea) . . . . . [6486-07]

10:50 am: **Mass production AIX 2800G3 HT MOCVD reactor in the 42x2 inch configuration for the growth of optoelectronic devices,** B. Schineller, C. Martin, M. Luenenbuerger, M. Dauelsberg, J. Kaeppeler, M. Heuken, Aixtron AG (Germany) . . . . . [6486-08]

11:10 am: **Dicing of high power white LEDs with heat sink by water-jet-guided laser,** R. Housh, Synova SA (Switzerland) . . . . . [6486-09]

11:30 am: **Study of wet etching on sapphire by H3PO4 and H2SO4 acid solution,** Y. Chen, C. Liu, National Central Univ. (Taiwan) . . . . . [6486-10]

11:50 am: **Integration of high-efficiency PIN organic light-emitting devices in lighting and optoelectronic applications** *(Invited Paper)***,** J. Amelung, M. Toerker, D. Kreye, U. Vogel, A. Elgner, M. Eritt, C. May, C. Luber, R. Hermann, C. Zschippang, Y. Tomita, K. Leo, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6486-11]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room A3 . . . . . Wed. 1:30 to 3:10 pm

Organic LEDs

Chair: **Michael Heuken**, AIXTRON AG (Germany)

1:30 pm: **New architectures for high performance polymer light-emitting diodes introducing a solution-processed titanium oxide layer** *(Invited Paper)***,** K. Lee, Pusan National Univ. (South Korea) . . . . . [6486-12]

1:50 pm: **OLED lighting - light where it never has been before** *(Invited Paper)***,** M. Klein, K. Heuser, OSRAM Opto Semiconductors GmbH (Germany) [6486-13]

2:10 pm: **See-through OLED displays** *(Invited Paper)***,** W. Kowalsky, H. H. Johannes, P. Goerrn, M. Kröger, J. Meyer, H. Krautwald, T. J. Riedl, Technische Univ. Braunschweig (Germany) . . . . . [6486-14]

2:30 pm: **Vacuum fabrication of a functional PLED by IR laser vapor deposition,** S. L. Johnson, R. F. Haglund, Jr., Vanderbilt Univ.; H. K. Park, Appliflex LLC . . . . . [6486-15]

2:50 pm: **Employing a 2D surface grating to improve light out coupling of a substrate emitting organic LED,** P. Vandersteegen, A. Ullan Nieto, C. Van Buggenhout, S. Verstuyft, P. Debackere, P. Bienstman, K. Neyts, R. G. Baets, Univ. Gent (Belgium) . . . . . [6486-16]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room A3 . . . . . Wed. 3:30 to 5:30 pm

LED Characterization and Reliability

Chair: **Gerd Bacher**, Univ. Duisburg-Essen (Germany)

3:30 pm: **Recent progress in understanding and optimizing nitride-based light emitters** *(Invited Paper)***,** A. Hangleiter, Technische Univ. Braunschweig (Germany) . . . . . [6486-17]

3:50 pm: **Measurement of the internal quantum efficiency of InGaN quantum wells,** A. Laubsch, M. Sabathil, G. Bruederl, E. Baur, M. O. Schillgalies, A. Lell, S. Lutgen, V. K. Haerle, Osram Opto Semiconductors GmbH (Germany) . . . . . [6486-18]

4:10 pm: **Design and implementation of real-time LED spatial radiance measurement systems,** G. Chang, Z. Yeh, C. Liao, S. Pan, National Taiwan Normal Univ. (Taiwan) . . . . . [6486-19]

4:30 pm: **Studies of InGaN LEDs degradation,** O. I. Rabinovich, E. K. Naimi, Moscow State Institute of Steel and Alloys Technological Univ. (Russia); S. G. Nikiforov, ATV Outdoor Systems (Russia); V. P. Sushkov, Moscow State Institute of Steel and Alloys Technological Univ. (Russia) and Acol Technologies S.A. (Russia); A. V. Shishov, Acol Technologies S.A. (Russia) . . . . . [6486-20]

4:50 pm: **Prediction of intensity and color degradation of LEDs,** M. Bürmen, F. Pernuš, B. Likar, Univ. v Ljubljani (Slovenia) . . . . . [6486-21]

5:10 pm: **Thermally induced stresses resulting from coefficient of thermal expansion differentials between various LED substrate materials and mounting substrates,** C. A. DeMilo, T. J. Brukilacchio, C. Bergad, Innovations in Optics, Inc. . . . . [6486-22]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

Poster presenters may post their poster papers Wednesday morning starting at 10:00 am in the Parkside Hall, and will need to remove their papers immediately following the poster session that evening. Any papers left on the boards at the close of the poster session will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of each poster session. Poster authors should be at their papers from 6:00 pm to 7:30 pm to answer questions from attendees.

✔ **Developing a new supplemental lighting device with ultra-bright white LED for vegetables,** Y. Hu, P. Li, J. Jiang, JiangSu Univ. (China) . . [6486-37]

✔ **Development of 140-inch autostereoscopic display by use of full-color LED panel,** H. Nishimura, T. Abe, K. Uchida, H. Yamamoto, Y. Hayasaki, N. Nishida, The Univ. of Tokushima (Japan) . . . . . [6486-45]

✔ **Nanoparticle-loaded encapsulants for light emitting diodes enhance light extraction via refractive index increase,** F. W. Mont, H. Luo, J. K. Kim, E. F. Schubert, Rensselaer Polytechnic Institute . . . . . [6486-48]

Thursday 25 January

SESSION 5

Room: Conv. Ctr. Room A3 . . . . . Thurs. 8:10 to 10:10 am

Photonic Crystals: LED Modelling

Chair: **Ross P. Stanley**, Ctr. Suisse d'Electronique et de Microtechnique SA (Switzerland)

8:10 am: **Interplay between light extraction and generation in photonic crystal GaN LEDs** *(Invited Paper)***,** A. David, Univ. of California/Santa Barbara and LCFIO, CNRS (France); C. Weisbuch, Univ. of California/Santa Barbara; H. Benisty, LCFIO, CNRS (France); S. P. DenBaars, Univ. of California/Santa Barbara . . . . . [6486-23]

8:30 am: **Novel GaN-LED structures for high surface extraction efficiency** *(Invited Paper)***,** H. Jeon, Seoul National Univ. (South Korea) . . . . . [6486-24]

8:50 am: **Manufacturing implications for photonic crystal patterning using imprint lithography** *(Invited Paper)***,** C. Jones, D. Lentz, G. F. Doyle, M. L. Miller, M. Ganapathisubramanian, X. Lu, D. L. LaBrake, Molecular Imprints, Inc. . . . . [6486-25]

9:10 am: **Photonic quasicrystal LEDs: design, modelling, optimisation and experiment** *(Invited Paper)***,** M. E. Zoorob, T. D. M. Lee, Mesophotonics Ltd. (United Kingdom) . . . . . [6486-26]

9:30 am: **Modeling of GaN based resonant-cavity light-emitting diodes,** Z. Li, Z. S. Li, Crosslight Software Inc. (Canada) . . . . . [6486-27]

9:50 am: **A generalized 2D and 3D white LED device simulator integrating photon recycling and luminescent spectral conversion effects,** W. Ng, Synopsys, Inc.; G. Letay, Synopsys Switzerland AG (Switzerland) . . . [6486-28]

Coffee Break . . . . . 10:10 to 10:30 am

SESSION 6

Room: Conv. Ctr. Room A3 . . . . . Thurs. 10:30 am to 12:10 pm

LED Modelling: Phosphors

Chair: **Li-Wei Tu**, National Sun Yat-Sen Univ. (Taiwan)

10:30 am: **Statistical analysis and yield management in LED design through TCAD device simulation,** G. Letay, Synopsys Switzerland AG (Switzerland); W. Ng, Synopsys, Inc. . . . . [6486-29]

10:50 am: **Self-consistent modeling of resonant PL in InGaN SQW LED-structure,** M. Sabathil, A. Laubsch, N. Linder, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6486-30]

11:10 am: **Phosphor conversion of light emitting diodes** *(Invited Paper)***,** G. O. Mueller, R. Mueller-Mach, Philips Lumileds Lighting . . . . . [6486-31]

11:30 am: **Production of Color on Demand LEDs with narrow color coordinate distribution,** B. G. Braune, K. Petersen, J. Strauss, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6486-32]

11:50 am: **Reference based optical characterization of glass ceramic converter for high power white light generation,** A. Engel, M. Letz, T. Zachau, E. Pawlowski, K. Seneschal-Merz, B. Hoppe, SCHOTT AG (Germany) [6486-33]

Lunch/Exhibition Break . . . . . 12:10 to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room A3 . . . . . Thurs. 1:30 to 3:10 pm

Chair: **Heonsu Jeon**, Seoul National Univ. (South Korea)

1:30 pm: **Requirements on LEDs for advanced optical systems** *(Invited Paper)***,** J. Reill, A. Wilm, OSRAM Opto Semiconductors GmbH (Germany) . . . . . [6486-34]

1:50 pm: **White LED lighting over Ra=95 for medical applications,** K. Kobashi, T. Taguchi, Yamaguchi Univ. (Japan) . . . . . [6486-35]

2:10 pm: **Development of light distribution controllable luminaire using high power LEDs,** H. Asakawa, Marumo Electric Co., Ltd. (Japan); J. Baba, A. Yaeda, M. Wakaki, Tokai Univ. (Japan) . . . . . [6486-36]

2:30 pm: **A novel temperature compensated operation scheme for trichromatic LED backlights,** D. Lee, J. Kim, M. Y. Park, H. D. Kim, S. R. Hwang, J. Park, S. Cho, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6486-38]

2:50 pm: **Silicon carbide white light LEDs for solid-state lighting,** S. Bet, College of Optics & Photonics/Univ. of Central Florida; N. R. Quick, Applicote Associates; A. Kar, College of Optics & Photonics/Univ. of Central Florida . . . . . [6486-49]

Coffee Break . . . . . 3:10 to 3:30 pm

SESSION 8

Room: Conv. Ctr. Room A3 . . . . . Thurs. 3:30 to 5:30 pm

Chair: **E. Fred Schubert**, Rensselaer Polytechnic Institute

3:30 pm: **Excitonic effects in ZnO nanorods** *(Invited Paper)***,** M. Willander, Linköpings Univ. (Sweden) . . . . . [6486-39]

3:50 pm: **Use of ZnO substrate for GaN-based devices,** F. H. Teherani, Nanovation SARL (France); D. Rogers, Nanovation SARL (France) and Univ. de Technologie de Troyes (France); P. Kung, M. Razeghi, Northwestern Univ.; O. Durand, G. Garry, Thales Research & Technology (France) . . . . . [6486-40]

4:10 pm: **Fabrication of high power AlInGaP-based red light emitting diodes with novel package by electroplating,** K. Chen, Y. Su, National Cheng Kung Univ. (Taiwan); C. L. Lin, Kung Shan Univ. of Technology (Taiwan); J. Q. Huang, National Cheng Kung Univ. (Taiwan) . . . . . [6486-41]

4:30 pm: **Low resistance and high reflectivity Al based reflectors for p-GaN flip process,** S. W. Chae, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6486-42]

4:50 pm: **Fabrication of thin-GaN LED by wafer bonding and electro-plating thick metal film,** C. Chang, C. Liu, National Central Univ. (Taiwan) . . [6486-43]

5:10 pm: **Fabrication study of thin-GaN LED,** C. Lin, C. Liu, National Central Univ. (Taiwan) . . . . . [6486-44]

Sunday-Wednesday 21-24 January 2007 • Proceedings of SPIE Vol. 6487

Emerging Liquid Crystal Technologies II

Conference Chair: **Liang-Chy Chien**, Kent State Univ.

Program Committee: **Dick J. Broer**, Technische Univ. Eindhoven (Netherlands); **Harry J. Coles**, Univ. of Cambridge (United Kingdom); **Gregory P. Crawford**, Brown Univ.; **Andy Y. G. Fuh**, National Cheng Kung Univ. (Taiwan); **Wolfgang Haase**, Technische Univ. Darmstadt (Germany); **Jun-ichi Hanna III**, Tokyo Institute of Technology (Japan); **Shunsuke Kobayashi**, Tokyo Univ. of Science (Japan); **Akihiro Mochizuki**, Nano Loa Inc.; **Ci-Ling Pan**, National Chiao Tung Univ. (Taiwan); **Shin-Tson Wu**, College of Optics and Photonics/Univ. of Central Florida

Sunday 21 January

SESSION 1

Room: Conv. Ctr. Room E . . . . . Sun. 8:10 to 10:10 am

Photonic and Electro-Optics Materials

Chair: **Liang-Chy Chien**, Kent State Univ.

8:10 am: **Optoelectronic and photonic properties of liquid crystals: electroluminescence and photorefractivity** *(Invited Paper)*, S. A. Benning, Univ. of Paderborn (Germany); M. W. Lauhof, L. Paelke, Univ. Paderborn (Germany); F. Scheliga, E. Thorn-Csanyi, Univ. Hamburg (Germany); H. Kitzerow, Univ. Paderborn (Germany) . . . . . [6487-01]

8:40 am: **Thin optical films in LCDs, LEDs and solar energy** *(Invited Paper)*, C. W. M. Bastiaansen, Technische Univ. Eindhoven (Netherlands) . . . [6487-02]

9:10 am: **Liquid crystal tunable and nonlinear negative-zero-positive index material** *(Invited Paper)*, I. C. Khoo, A. Diaz, The Pennsylvania State Univ. . . . . [6487-03]

9:40 am: **Chiral SmA* materials for optoelectronics applications** *(Invited Paper)*, D. M. Walba, E. Korblova, L. Eshdat, Univ. of Colorado/Boulder; M. C. Biewer, The Univ. of Texas at Dallas; H. Yang, M. Nakata, Univ. of Colorado/Boulder; M. Talarico, Univ. degli Studi della Calabria (Italy); R. Shao, N. A. Clark, Univ. of Colorado/Boulder . . . . . [6487-04]

Coffee Break . . . . . 10:10 to 10:20 am

SESSION 2

Room: Conv. Ctr. Room E . . . . . Sun. 10:20 am to 12:10 pm

Terahertz Applications

Chair: **Vladimir G. Chigrinov**, Hong Kong Univ. of Science and Technology (Hong Kong China)

10:20 am: **THz time-domain spectroscopy of liquid crystal colloids** *(Invited Paper)*, M. Oh-E, H. Yokoyama, Japan Science and Technology Agency (Japan); M. Koeberg, E. Hendry, M. Bonn, FOM Institute for Atomic and Molecular Physics (Netherlands) . . . . . [6487-05]

10:50 am: **Anomalous temperature dependence observed in polarized THz absorption spectra of MBBA and its homologs** *(Invited Paper)*, S. Tanaka, Y. Okada, Tokyo Institute of Technology (Japan); K. Yamamoto, Osaka Univ. (Japan); Y. Takanishi, Tokyo Institute of Technology (Japan); M. Tani, Osaka Univ. (Japan); K. Ishikawa, Tokyo Institute of Technology (Japan); M. Hangyo, Osaka Univ. (Japan); H. Takezoe, Tokyo Institute of Technology (Japan) . . . . [6487-06]

11:20 am: **Effect of permanent dipole moments perpendicular to molecular long axis on terahertz absorption in liquid crystals,** S. Tanaka, Y. Okada, Tokyo Institute of Technology (Japan); K. Yamamoto, Osaka Univ. (Japan); Y. Takanishi, Tokyo Institute of Technology (Japan); M. Tani, Osaka Univ. (Japan); K. Ishikawa, Tokyo Institute of Technology (Japan); M. Hangyo, Osaka Univ. (Japan); H. Takezoe, Tokyo Institute of Technology (Japan) . . . . . [6487-07]

11:40 am: **Liquid-crystal-based electrically tunable THz optical devices** *(Invited Paper)*, R. Pan, C. Pan, National Chiao Tung Univ. (Taiwan) . . [6487-08]

Lunch Break . . . . . 12:10 to 1:30 pm

SESSION 3

Room: Conv. Ctr. Room E . . . . . Sun. 1:20 to 3:20 pm

Lasing

Chair: **Iam Choon Khoo**, The Pennsylvania State Univ.

1:20 pm: **Lasing application using cholesteric liquid crystals** *(Invited Paper)*, Y. Takanishi, K. Sonoyama, N. Tomoe, M. H. Song, Tokyo Institute of Technology (Japan); S. Nishimura, T. Toyooka, Nippon Oil Corp. (Japan); H. Takezoe, Tokyo Institute of Technology (Japan) . . . . . [6487-09]

1:50 pm: **Tunable lasing from cholesteric liquid crystals via in-plane electric fields,** S. J. Woltman, L. J. Shelton, G. P. Crawford, Brown Univ. . . . . [6487-10]

2:10 pm: **High efficient photonic band-edge cholesteric liquid crystal lasers,** Y. Zhou, Y. Huang, Z. Ge, S. Wu, College of Optics & Photonics/Univ. of Central Florida . . . . . [6487-11]

2:30 pm: **Fast electro-optic gratings for high energy laser beam attenuations,** S. Tang, Y. Tang, T. S. Hartwick, Crystal Research, Inc.; J. J. Foshee, Air Force Research Lab. . . . . [6487-12]

2:50 pm: **Spatial filter based on azo-dye-doped liquid crystal film** *(Invited Paper)*, A. Y. Fuh, T. Lin, National Cheng Kung Univ. (Taiwan) . [6487-19]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 4

Room: Conv. Ctr. Room E . . . . . Sun. 3:30 to 5:30 pm

Liquid Crystal Alignment

Chair: **Tod L. Schneider**, Kent Displays, Inc.

3:30 pm: **Liquid crystal photoalignment: history and future** *(Invited Paper)*, V. G. Chigrinov, H. S. Kwok, Hong Kong Univ. of Science and Technology (Hong Kong China); H. Takada, H. Takatsu, Dainippon Ink and Chemicals, Inc. (Japan) . . . . . [6487-13]

4:00 pm: **Control of vertical liquid crystal alignment for various alignment surfaces** *(Invited Paper)*, Y. Iimura, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [6487-14]

4:30 pm: **Characterisation of the alignment of liquid crystals infiltrated into porous nanostructured thin films** *(Invited Paper)*, J. C. Sit, Univ. of Alberta (Canada) . . . . . [6487-15]

5:00 pm: **Lyotropic chromonic liquid crystals as materials for optical and biosensing applications** *(Invited Paper)*, O. D. Lavrentovich, Kent State Univ. . . . . [6487-16]

Monday 22 January

SESSION 5

Room: Conv. Ctr. Room E . . . . . Mon. 8:40 to 10:00 am

Flexible Displays

Chair: **Cees W. M. Bastiaansen**, Technische Univ. Eindhoven (Netherlands)

8:40 am: **New developments in flexible cholesteric liquid crystal displays** *(Invited Paper)*, T. L. Schneider, D. Davis, S. Franklin, N. Venkataraman, D. McDaniel, F. Nicholson, E. N. Montbach, A. A. Khan, J. W. Doane, Kent Displays, Inc. . . . . [6487-17]

9:10 am: **Development of polymer cholesteric liquid crystal flake technology for electro-optic devices and particle displays** *(Invited Paper)*, T. Z. Kosc, G. V. Babcock, K. L. Marshal, C. J. Coon, A. Trajkovska-Petkoska, S. D. Jacobs, K. Hasman, Univ. of Rochester . . . . . [6487-34]

9:30 am: **Bimsogenic flexoelectric liquid crystals: new materials for high-performance photonics devices and displays** *(Invited Paper)*, H. J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [6487-35]

Coffee Break . . . . . 10:10 to 10:20 am

SESSION 6

Room: Conv. Ctr. Room E . . . . . Mon. 10:20 am to 12:30 pm

Lens, Mirrors, and Waveguides

Chair: **Shin-Tson Wu**, College of Optics & Photonics/Univ. of Central Florida

10:20 am: **Development of high quality liquid crystal lens** *(Invited Paper)*, M. Ye, B. Wang, S. Sato, Akita Univ. (Japan) . . . . . [6487-20]

10:50 am: **Wave guiding with liquid crystals** *(Invited Paper)*, K. Neyts, J. Beeckman, H. J. Desmet, Univ. Gent (Belgium) . . . . . [6487-21]

11:20 am: **Electrically switchable mirrors based on polymer-stabilized cholesteric liquid crystals,** S. Lu, A. Golovin, L. Chien, Kent State Univ. . . . . [6487-22]

11:40 am: **Photonic effects in polymerized cholesteric liquid crystal nanofabricated by direct laser writing,** M. Ozaki, H. Yoshida, C. H. Lee, A. Fujii, Osaka Univ. (Japan) . . . . . [6487-23]

12:00 pm: **Design of liquid crystal cells for the investigation of optical spatial solitons** *(Invited Paper)*, C. Umeton, A. de Luca, G. Coschignano, L. Pezzi, A. Veltri, Univ. degli Studi della Calabria (Italy); A. Alberucci, C. Conti, M. Peccianti, G. Assanto, Univ. degli Studi di Roma Tre (Italy) . . . . . [6487-24]

Lunch Break . . . . . 12:30 to 1:30 pm

SESSION 7

Room: Conv. Ctr. Room E . . . . . Mon. 1:30 to 3:00 pm

Imaging, Tweezing, and Electro-Optics of Nanoparticle Dispersions

Chair: **Oleg D. Lavrentovich**, Kent State Univ.

1:30 pm: **Touchless optical control of defects, colloids, and structures in liquid crystals** *(Invited Paper)*, I. I. Smalyukh, Univ. of Illinois at Urbana-Champaign . . . . . [6487-25]

2:00 pm: **Applications of ferroelectric particles/liquid crystal colloids** *(Invited Paper)*, A. V. Glushchenko, Univ. of Colorado at Colorado Springs; C. I. Cheon, Hoseo Univ. (South Korea); Y. A. Reznikov, Institute of Physics (Ukraine); J. L. West, Kent State Univ. . . . . [6487-26]

2:30 pm: **Effects of carbon nanotubes on physical properties of nematic liquid crystal and liquid crystal device** *(Invited Paper)*, S. H. Lee, Chonbuk National Univ. (South Korea); Y. H. Lee, Sungkyunkwan Univ. (South Korea) . . . . . [6487-27]

Coffee Break . . . . . 3:00 to 3:30 pm

SESSION 8

Room: Conv. Ctr. Room E . . . . . Mon. 3:30 to 5:10 pm

Grating and Spatial Light Modulators

Chair: **Andy Ying-Guey Fuh**, National Cheng Kung Univ. (Taiwan)

3:30 pm: **Liquid crystal Bragg gratings: dynamic optical elements for spatial light modulators** *(Invited Paper)*, R. L. Sutherland, L. V. Natarajan, V. P. Tondiglia, Science Applications International Corp.; E. R. Beckel, A. M. Urbas, T. J. Bunning, Air Force Research Lab. . . . . [6487-28]

4:00 pm: **Diffraction of polarization gratings** *(Invited Paper)*, C. v. Heesch, Technische Univ. Eindhoven (Netherlands) . . . . . [6487-29]

4:30 pm: **New HDTV phase only SLM,** S. Osten, S. Krüger, A. Hermerschmidt, HoloEye Photonics AG (Germany) . . . . . [6487-30]

4:50 pm: **A reflective LCOS spatial light modulator controlled by 12-bit signals for optical phase only modulation,** T. Inoue, H. Tanaka, N. Fukuchi, M. Takumi, N. Matsumoto, T. Hara, N. Yoshida, Y. Kobayashi, Hamamatsu Photonics K.K. (Japan) . . . . . [6487-31]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Multiple-functional and cost-effective liquid-crystal cell parameter measurement system,** G. Chang, Y. Lin, Y. Lin, National Taiwan Normal Univ. (Taiwan) . . . . . [6487-32]

✔ **Spatial optical modulator (SOM): high density diffractive laser projection display,** S. K. Yun, SAMSUNG Electro-Mechanics Co., Ltd. (South Korea) . . . . . [6487-33]

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Practical Holography XXI: Materials and Applications

Conference Chairs: **Roger A. Lessard**, Univ. Laval (Canada); **Hans I. Bjelkhagen**, Optic Technium (United Kingdom)

Program Committee: **Jean-Marc R. Fournier**, École Polytechnique Fédérale de Lausanne (Switzerland); **Gerald L. Heidt**, Wasatch Photonics, Inc.; **Toshio Honda**, Chiba Univ. (Japan); **Fujio Iwata**, Consultant (Japan); **Tung H. Jeong**, Lake Forest College; **Raymond K. Kostuk**, The Univ. of Arizona; **Gaylord E. Moss**, MossOptics; **Nadya O. Reingand**, Celight, Inc.; **Martin J. Richardson**, De Montfort Univ. (United Kingdom); **Christopher W. Slinger**, QinetiQ (United Kingdom); **Steven L. Smith**, IN3D; **Fred D. Unterseher**, Columbia Career Ctr.; **Ichirou Yamaguchi**, Gunma Univ. (Japan); **Toyohiko Yatagai**, Univ. of Tsukuba (Japan)

Sunday 21 January

SESSION 1

Room: Conv. Ctr. Room B3 . . . . . Sun. 8:10 am to 12:00 pm

Recording Materials and Material Evaluation

8:10 am: **Photo-thermo-refractive glass: a new material for high efficiency large aperture optical elements** *(Invited Paper)***,** V. I. Smirnov, OptiGrate; G. B. Venus, L. B. Glebov, L. N. Glebova, College of Optics and Photonics/Univ. of Central Florida . . . . . [6488-01]

8:40 am: **Characterization of PVA doped with different metallic salts as conductor polymer and as holographic film sensitized with ammonium dichromate,** M. d. l. P. Hernández Garay, A. Olivares-Perez, I. Fuentes-Tapia, J. B. R. Ruiz-Limon, E. L. Ponce-Lee, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6488-02]

9:00 am: **Polyelectrolyte as holographic recording medium,** S. Toxqui López, A. Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6488-03]

9:20 am: **Organic photoluminescent holograms,** E. L. Ponce-Lee, A. Olivares-Pérez, J. B. R. Ruiz-Limón, M. P. Hernández-Garay, S. Toxqui-López, I. Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) [6488-04]

9:40 am: **Photopolymers containing epoxy monomers for holographic recording,** E. Kim, J. H. Kim, K. Rameshbabu, Yonsei Univ. (South Korea) . . . . . [6488-05]

Coffee Break . . . . . 10:00 to 10:20 am

10:20 am: **Pulsed holographic gratings in azo-polymethacrylates with different molecular architectures,** P. Forcen, F. Rodriguez, C. C. Sanchez, R. Alcala, L. Oriol, Univ. de Zaragoza (Spain); S. Hvilsted, Danmarks Tekniske Univ. (Denmark) . . . . . [6488-06]

10:40 am: **Quasi in-situ microscopic study of hologram build-up in $LiNbO_3$ crystal,** I. Bányász, G. Mandula, Magyar Tudományos Akadémia Szilárdtestfizikai és Optikai (Hungary) . . . . . [6488-07]

11:00 am: **Study for Bragg detuning effect and asymmetry of diffraction efficiency spectrum on the transmission and the reflection hologram,** Y. Kwon, K. Y. Kim, J. Y. Park, Daewoo Electronics Corp., Ltd. (South Korea) . . . . . [6488-08]

11:20 am: **Measurement of refractive index of photopolymer for holographic gratings,** E. Watanabe, Japan Women's Univ. (Japan); C. Fujikawa, Tokai Univ. (Japan); J. Mizuno, K. Kodate, Japan Women's Univ. (Japan) . . . . . [6488-09]

11:40 am: **Electo-optical characteristics of holographic replication using a photopolymer and ZnCl2,** M. d. l. P. Hernández Garay, A. Olivares-Perez, I. Fuentes-Tapia, J. B. R. Ruiz-Limon, E. L. Ponce-Lee, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6488-10]

Lunch Break . . . . . 12:00 to 1:30 pm

SESSION 2

Room: Conv. Ctr. Room B3 . . . . . Sun. 1:30 to 5:00 pm

Techniques and Applications

1:30 pm: **Polarization experiments in holographic interferometry** *(Invited Paper)***,** G. K. Ackermann, J. P. Eichler, L. Duenkel, C. Schneeweiss, Technische Fachhochschule Berlin (Germany) . . . . . [6488-11]

2:00 pm: **Problem of twin-image elimination in 2-D Fourier hologram,** V. I. Girnyk, State Enterprise PC Ukraine (Ukraine); S. Kostyukevich, Institute of Semiconductor Physics (Ukraine); E. Braginets, State Enterprise PC Ukraine (Ukraine) and National Taras Shevchenko Univ. of Kyiv (Ukraine); A. Soroka, National Taras Shevchenko Univ. of Kyiv (Ukraine) . . . . . [6488-12]

2:20 pm: **Non-collinear femtosecond photon echo in dye-doped polymers,** O. K. Khasanov, O. M. Fedotova, Institute of Solid State and Semiconductor Physics (Belarus); V. V. Samartsev, Kazan Physical-Technical Institute (Russia) . . . . . [6488-13]

2:40 pm: **Development of the electronic speckle shearing phase-shifting pattern interferometer,** J. Chao, Y. Zhang, G. Zhou, Tianjin Univ. (China) . . . . . [6488-14]

Coffee Break . . . . . 3:00 to 3:20 pm

3:20 pm: **Adaptive optics for holographic data storage,** N. Ishii, N. Kinoshita, T. Muroi, H. Shiino, K. Kamijo, N. Shimidzu, NHK Science & Technical Research Labs. (Japan) . . . . . [6488-15]

3:40 pm: **Novel diffraction grating light guide for LED backlight,** E. Miyamoto, S. Maruyama, A. Nagano, L. M. Murillo, T. Toda, F. Iwata, Toppan Printing Co., Ltd. (Japan) . . . . . [6488-16]

4:00 pm: **Holographic wavefront sensor: fast sensing without computing,** G. P. Andersen, U.S. Air Force Academy; F. Ghebremichael, K. S. Gurley, Lockheed Martin Corp. . . . . [6488-17]

4:20 pm: **Gratings-based modified Michelson interferometer for quadrature phase measurements,** Z. Yaqoob, J. Wu, X. Cui, X. Heng, C. Yang, California Institute of Technology . . . . . [6488-18]

4:40 pm: **Holographic lens array for future display screen,** F. C. Fan, S. Choi, K. Ko, Shenzhen AFC Technology Co., Ltd. (China) . . . . . [6488-45]

Monday 22 January

SESSION 3

Room: Conv. Ctr. Room B3 . . . . . Mon. 8:30 to 11:00 am

Display and Color Holography

8:30 am: **Holographic video display based on guided-wave acousto-optic devices** *(Invited Paper)*, D. E. Smalley, Q. Y. J. Smithwick, V. M. Bove, Jr., MIT Media Lab. . . . . [6488-19]

9:00 am: **Ethereal presences in holography and photography,** K. Byrne, M. J. Richardson, De Montfort Univ. (United Kingdom) . . . . . [6488-46]

9:20 am: **Holographic color display with wide visual field or viewing zone using in-line holograms,** K. Tsuji, Univ. of Hyogo (Japan) . . . . . [6488-21]

9:40 am: **Method of reduction of zero order intensity in computer generated holograms by use of phase addition technique,** D. W. K. Wong, G. C. K. Chen, Nanyang Technological Univ. (Singapore) . . . . . [6488-23]

Coffee Break . . . . . 10:00 to 10:20 am

10:20 am: **Full-color image-plane holographic video display,** T. Yamaguchi, G. Okabe, H. Yoshikawa, Nihon Univ. (Japan) . . . . . [6488-24]

10:40 am: **Quality evaluation of full color hologram,** M. Kurashige, T. Kumasawa, A. Kitamura, T. Yamauchi, M. Watanabe, K. Ueda, Dai Nippon Printing Co., Ltd. (Japan) . . . . . [6488-25]

SESSION 4

Room: Conv. Ctr. Room B3 . . . . . Mon. 11:00 am to 12:00 pm

Digital, Electronic and Computer Holography

11:00 am: **Simultaneous recording of practical 3D color images by phase-shifting in-line holography,** K. Sato, Univ. of Hyogo (Japan) . . . . . [6488-26]

11:20 am: **Digital holographic tomograph: the tool for microelements investigation,** A. Jozwicka, M. Kujawinska, Politechnika Warszawska (Poland) . . . . . [6488-27]

11:40 am: **Computer-generated holograms allowing 360-degree viewing,** Y. Sakamoto, A. Kashiwagi, Y. Murarya, Hokkaido Univ. (Japan) . . . . . [6488-28]

✔ Posters-Wednesday

All symposium attendees are invited to attend the poster sessions provided as an opportunity to enjoy refreshments while reviewing poster papers. Each evening will represent a different set of conferences to promote opportunities for networking with colleagues in your field. Attendees are encouraged to review the high-quality papers that are presented in this alternate format and to interact with the poster authors. Since poster sessions are technical events and part of the conference program, it is not appropriate for spouses and families to attend these events. Attendees are requested to wear their conference registration badges to the poster sessions.

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✔ **Three-dimensional TV using holographic stereogram,** K. Sato, Shonan Institute of Technology (Japan); K. Takano, Tokyo Metropolitan College of Aeronautical Engineering (Japan) . . . . . [6488-22]

✔ **A system of enlarging visual field and viewing zone simultaneously for electro-holography,** T. Nagai, Y. Yabe, Y. Sakamoto, Hokkaido Univ. (Japan) . . . . . [6488-29]

✔ **Holographic display system using combination of exchangeable holograms and intelligent illuminations,** A. Tanaka, K. Sakamoto, Shimane Univ. (Japan) . . . . . [6488-30]

✔ **Event driven illumination system for image reconstruction of hologram,** K. Sakamoto, K. Uchida, Shimane Univ. (Japan) . . . . . [6488-31]

✔ **Development of lighting system for hologram using high power LEDs,** J. Baba, A. Yaeda, Tokai Univ. (Japan); H. Asakawa, Marumo Electric Co.,Ltd (Japan); T. Shibuya, M. Wakaki, Tokai Univ. (Japan) . . . . . [6488-32]

✔ **Holographic data calculating algorithm and new digital hologram recorder,** M. Cruz-López, J. Báez-Rojas, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); D. Kang, Holotec Inc. . . . . [6488-33]

✔ **Nanocrosslinked photopolymers for volume holographic storage,** S. Lee, Y. Jeong, H. Hah, J. Park, Korea Advanced Institute of Science and Technology (South Korea) . . . . . [6488-34]

✔ **Optical encryption of binary data information with 2-step phase-shifting digital holography,** S. Gil, Univ. of Suwon (South Korea); S. Jeon, Univ. of Incheon (South Korea); J. Jeong, Suwon Science College (South Korea) . . . . . [6488-35]

✔ **Computer generated hologram for phase-only optical encryption,** T. V. Vu, N. Kim, Chungbuk National Univ. (South Korea); S. Gil, Univ of Suwon (South Korea); E. Kim, Yonsei Univ. (South Korea) . . . . . [6488-36]

✔ **Chirp volume grating recorded in photopolymer for the optical demultiplexer,** D. Do, N. Kim, Chungbuk National Univ. (South Korea); S. H. Jeon, Univ. of Incheon (South Korea); K. Y. Lee, Sunchon National Univ. (South Korea) . . . . . [6488-37]

✔ **Field of view extender for a novel camera system,** S. H. Lim, R. K. Kostuk, M. A. Neifeld, The Univ. of Arizona . . . . . [6488-38]

✔ **Photoluminescent conductor polymer holograms,** J. B. R. Ruiz-Limón, A. Olivares-Pérez, E. L. Ponce-Lee, M. P. Hernández-Garay, S. Toxqui-López, I. Fuentes-Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6488-39]

✔ **Hologram's in colored dichromate gelatin with natural colorant,** G. P. Trujillo Páez, A. Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [6488-40]

✔ **Processing techniques for quality improvement of phase added stereogram,** H. Kang, T. Yamaguchi, H. Yoshikawa, Nihon Univ. (Japan) . . . . . [6488-41]

✔ **Polyvinyl alcohol and crystal violet as photosensitive film,** M. Ortiz-Gutiérrez, K. Alemán, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); M. Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico); J. C. Ibarra-Torres, Univ. de Guadalajara (Mexico); A. Olivares-Pérez, Instituto Nacional de Astrofísica, Optica y Electrónica (Mexico) . . . . . [6488-42]

✔ **Fabrication of high diffraction efficiency DOE using a laser direct lithography system,** N. Ikemoto, S. Nakahara, S. Hisada, T. Fujita, S. Shingubara, Kansai Univ. (Japan) . . . . . [6488-43]

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Projection Displays XII

Conference Chairs: **Ming H. Wu**, Hamamatsu Corp.; **Hoang Y. Lin**, National Taiwan Univ. (Taiwan)

Program Committee: **David Armitage**, Consultant; **Patrick Candry**, Barco Projection Systems (Belgium); **Dah Yu Cheng**, Cheng Technology & Services; **Stephen K. Eckhardt**, 3M Co.; **Fang Chuan Ho**, Delta Electronics, Inc. (Taiwan); **Larry J. Hornbeck**, Texas Instruments Inc.; **Robert J. Martinsen**, nLight Corp.; **Mark D. Peterson**, InFocus Corp.; **Ting-Chung Poon**, Virginia Polytechnic Institute and State Univ.

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OPTICAL RESEARCH ASSOCIATES

Wednesday 24 January

SESSION 1

Room: Conv. Ctr. Room D . . . . . Wed. 8:30 to 10:00 am

Light Source and the Screen Technologies I

8:30 am: **Dual paraboloid reflector technology development on the commercialization for projection display** *(Invited Paper)***,** K. K. Li, Wavien, Inc. . . . . [6489-01]

9:00 am: **Brightness increase in LED by recycling of light for projection applications** *(Invited Paper)***,** K. K. Li, S. Inatsugu, G. X. Ouyang, Wavien, Inc. . . . . [6489-02]

9:30 am: **Personal projection with Ujoy technology** *(Invited Paper)***,** H. Moench, U. Mackens, P. Pekarski, A. Ritz, Philips Research Labs. (Germany); G. S'heeren, W. Verbeek, Philips Lighting N.V. (Belgium) . . . . . [6489-03]

Coffee Break . . . . . 10:00 to 10:30 am

Tuesday 23 January

Optoelectronics Plenary Presentation

8:30 to 10:00 am · Convention Center, A7-A8

8:30 am: **Introduction and Opening Remarks**

8:40 am: **Transformative Advances in Electro-Optic and All-Optical Materials and Devices**
Speaker: **Larry R. Dalton,** Univ. of Washington

9:20 am **Optofluidics**
Speaker: **Demetri Psaltis,** California Institute of Technology

See page 20 for more information.

Lunch/Exhibition Break . . . . . 12:30 to 1:30 pm

SESSION 2

Room: Conv. Ctr. Room D . . . . . Wed. 1:30 to 3:10 pm

Light Source and the Screen Technologies II

1:30 pm: **Measuring screen captures for cross-display technology video motion analysis,** J. W. Roberts, National Institute of Standards and Technology . . . . . [6489-04]

1:50 pm: **Recent advances in microlens-based projection display screens** *(Invited Paper)***,** G. M. Morris, T. R. M. Sales, S. H. Chakmakjian, D. J. Schertler, RPC Photonics, Inc. . . . . [6489-05]

2:20 pm: **High collecting efficiency of an LED projection system,** S. Chung, C. Lin, C. Tseng, H. Lo, Industrial Technology Research Institute (Taiwan) . . . . . [6489-06]

2:40 pm: **Visible laser sources for projection displays** *(Invited Paper)***,** M. Jansen, B. D. Cantos, G. P. Carey, R. Dato, R. Carico, A. M. Earman, M. J. Finander, G. Giaretta, S. Hallstein, W. R. Hitchens, J. H. Hofler, C. P. Kocot, S. Lim, A. Mooradian, G. T. Niven, Y. Okuno, F. G. Patterson, A. Tandon, A. Umbrasas, Novalux Inc. . . . . [6489-07]

Coffee Break . . . . . 3:10 to 3:40 pm

SESSION 3

Room: Conv. Ctr. Room D . . . . . Wed. 3:40 to 4:40 pm

Critical Components and Novel Projection Technologies I

3:40 pm: **DVimage spatial light modulator: a new real-time interface for the TI DMD 3000 chipset,** S. J. Saggese, T. L. Thomas, Apogen Technologies . . . . . [6489-08]

4:00 pm: **Latest developments and future opportunities with MEMS based displays,** J. Bouchaud, Wicht Technologie Consulting (Germany) . . . [6489-09]

4:20 pm: **Compact design of a polarized head mounted projective display using FLCOS microdisplays,** R. Zhang, H. Hua, The Univ. of Arizona [6489-10]

✔ Posters-Wednesday

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✔ **Floating-image display based on the combination of two-lens system and the stereoscopic polarization-multiplexing display,** G. Baasantseren, N. Kim, D. Do, Y. Lim, Chungbuk National Univ. (South Korea) . . . . [6489-16]

Thursday 25 January

SESSION 4

Room: Conv. Ctr. Room D . . . . . Thurs. 8:10 to 9:30 am

Critical Components and Novel Projection Technologies II

8:10 am: **Dynamic optics for digital projection,** F. P. Shevlin, Dyoptyka Ltd. (Ireland) . . . . . [6489-11]

8:30 am: **Tilt compensated MOEMS projector as input device,** H. Grueger, A. Heberer, C. Gerwig, P. Nauber, M. Scholles, H. Lakner, Fraunhofer-Institut für Photonische Mikrosysteme (Germany) . . . . . [6489-12]

8:50 am: **A LED-based full color stereoscopic projection system,** L. Bogaert, Y. Meuret, B. Vangiel, H. Thienpont, Vrije Univ. Brussel (Belgium) . . . . [6489-13]

9:10 am: **Supercompact projection display for HDTV based on MEMS,** S. M. Shamaev, Bauman Moscow State Technical Univ. (Russia) . . . . [6489-14]

SESSION 5

Room: Conv. Ctr. Room D . . . . . Thurs. 9:30 am to 12:10 pm

Relevant Applications

9:30 am: **Micro-displacement measurements with Moiré patterns of fresnel zone plates films,** M. Pérez-Cortés, Univ. Autónoma de Yucatán (Mexico); M. Ortíz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); J. C. Ibarra-Torres, Univ. de Guadalajara (Mexico); A. Olivares-Pérez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); J. Becerra-Macías, Digital Optics and Quantum Electronics Devices (Mexico) . . . . . [6489-15]

9:50 am: **Color performance of the color separation gratings,** H. Y. Lin, J. Yeh, C. Chen, National Taiwan Univ. (Taiwan) . . . . . [6489-22]

Coffee Break . . . . . 10:10 to 10:30 am

10:30 am: **Computer simulation of spatial light modulators with micro-optical elements,** M. A. Golub, M. Aloni, G. Manor, Explay (Israel) . . [6489-17]

10:50 am: **Pseudoscopic-free and multi-view 3D displays using invisible area generated by polarized slit barrier,** K. Uchida, K. Sakamoto, Shimane Univ. (Japan) . . . . . [6489-18]

11:10 am: **Modulating method of linear and circular polarized illuminations for field-lens 3D display,** K. Sakamoto, H. Morimoto, Shimane Univ. (Japan) . . . . . [6489-19]

11:30 am: **Optical design of near diffraction limited,** M. Negarchi, Consultant . . . . . [6489-20]

11:50 am: **Research of two issues about true colour digital holography,** J. Li, Kunming Univ. of Science and Technology (China); Y. Li, Purple Labs., S.A. (France) . . . . . [6489-21]

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X

Y

Bold = SPIE Members

Z

20-25 January 2007
San Jose McEnery Convention Center
408 Almaden Blvd
San Jose CA 95110

Onsite Registration Hours

San Jose Convention Center, Street Level

Saturday 20 January	7:15 am to 5:00 pm
Sunday 21 January	7:15 am to 5:00 pm
Monday 22 January	7:00 am to 5:00 pm
Tuesday 23 January	7:30 am to 5:00 pm
Wednesday 24 January	7:30 am to 5:00 pm
Thursday 25 January	7:30 am to 4:00 pm

Multiple facilities in downtown San Jose are used for conferences and courses, so please allow yourself enough time to pick up your materials and possibly walk to a nearby facility before your meeting or course begins.

Exhibition Hours

Biomedical Optics Exhibition

San Jose Convention Center, Exhibition Hall 1

Saturday 20 January	1:00 to 5:00 pm
Sunday 21 January	10:00 am to 4:00 pm

Photonics West Exhibition

San Jose Convention Center, Exhibition Halls 1-3, Exhibition foyer, South Hall

Tuesday 23 January	10:00 am to 5:00 pm
Wednesday 24 January	10:00 am to 5:00 pm
Thursday 25 January	10:00 am to 4:00 pm

Speaker Audiovisual Desk/Preview Station

San Jose Convention Center, Concourse 1

Saturday through Thursday, 20-25 January	7:30 am to 5:00 pm

All conference rooms will have a computer, LCD projector, screen, lapel microphone, and laser pointer. All Presenters are requested to come to the speaker audiovisual desk to confirm display settings of their presentations from their memory devices or laptops with the audiovisual equipment being used at this symposium.

Important Laser Pointer Safety Information

SPIE supplies tested and safety approved laser pointers for all conference meeting rooms, and for short course rooms if instructors request one. For safety reasons, SPIE requests that presenters use our provided laser pointers available in each meeting room.

- If using your own laser pointer, have it tested at your facility to make sure it has <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct – but don't automatically trust the labeling. Commercially available laser pointers, red or green (or any color), could be incorrectly labeled as to their wavelength and power output.
- Presenters intending to use their own laser pointer for presentations are required to come to the Audiovisual Desk onsite and test their pointer on our power meter. If the pointer fails the safe power level you may not use the pointer at the conference. You will be required to sign a waiver releasing SPIE of any liability for use of potentially non-safe laser pointers.
- **Use of a personal laser pointer at an SPIE event represents user's acceptance of liability for use of a non-SPIE supplied laser pointer device.** Misuse of any laser pointer could lead to eye damage. In California, it is a criminal misdemeanor to shine a laser pointer at individuals "who perceive they are at risk."

Interactive Poster Sessions Setup Instructions

Parkside Hall, Civic Auditorium Complex

Tuesday 23 January for BiOS conferences

Wednesday 24 January for OPTO, LASE, and MOEMS/MEMS conferences

SETUP

Poster presenters may set up starting at 10:00 am on your respective poster day. Poster authors should be at their papers from 6 to 7:30 pm to answer questions from attendees.

Poster numbers will be posted on the poster boards; authors need to find their applicable poster number and post their paper on the appropriate board space. Presenters who have not placed their papers on their assigned board by 5:30 pm on the day of their presentation will be considered a "no show," and their manuscript will not be published.

REMOVAL

Presenters must remove their posters immediately after their respective poster session. Posters not removed will be considered unwanted and will be discarded. SPIE assumes no responsibility for posters left up after the end of a poster session.

DISPLAY HOURS

Posters will be on display for each session from 10:00 am to 7:30 pm.

Course Materials Desk

SPIE Registration Area

Open during Registration hours

If you have registered to attend a short course or workshop, stop by the Course Materials Desk AFTER you have picked up your badge to pick up your course notes and to find out where the class will be located.

Message Center

San Jose Convention Center, located near registration
Messages will be taken during registration hours Saturday through Thursday by calling: 408-271-6000

SPIE Marketplace

Convention Center, Street Level Arcade

The SPIE Marketplace is your source for the latest SPIE Press books, Proceedings, and Education and Professional Development materials. You can become a member of SPIE, explore the Digital Library, and take home a souvenir. SPIE offers FREE shipping on site.

Internet Access

Convention Center – Arcade Area, Street Level

Saturday – Wednesday . . . . . 7:30 am to 6:00 pm
Thursday . . . . . 7:30 am to 4:00 pm

In South Hall

Tuesday . . . . . 10:00 am to 5:00 pm
Wednesday . . . . . 10:00 am to 5:00 pm
Thursday . . . . . 10:00 am to 4:00 pm

SPIE offers multiple workstations allowing attendees to access their Internet e-mail during the conference, and several Ethernet connections to use with your personal laptop. There is a 10-minute time limit per session.

WiFi

Complimentary WiFi access for attendees with wireless-enabled laptops and PDAs will be available Saturday through Thursday in the Ballroom Concourse (east end) and in the Arcade (lower level) of the Convention Center near the SPIE Marketplace.

SPIE Copy Center

Convention Center, Street Level registration area

Saturday through Thursday

SPIE will provide a copy service for attendees during registration hours for the week of the symposium. The rates are 5 cents per copy and $1 per transparency ($2.50 for color).

Underage Persons on Show Floor

For safety and insurance reasons, no persons under the age of 16 will be allowed in the exhibition area during move-in and move-out. During open exhibition hours, only children over the age of 12 accompanied by an adult will be allowed in the exhibition area.

Photography

Personal photographs and video taping of individual booths (and their displays) is not allowed without the explicit permission from the company representative on-site. Failure to obtain consent could result in losing your film and being asked to leave the Exhibition Hall.

Audio/Video/Digital Recording Policy

Due to copyright restrictions, strictly no recordings of any kind are permitted without prior written consent of the presenter in any conference session, short course or posters. Consent forms are available at the SPIE Audiovisual Desk and anyone wishing to record must have a written consent form signed and filed for each presenter being recorded. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their film or recording media.

In the Exhibition Hall: For security and courtesy reasons, photographing or videotaping individual booths and displays in the exhibit hall is allowed ONLY with explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their film and to leave the exhibition hall.

Photonics West Media Center

Mezzanine Level West End (Hilton end) of Convention Center

The onsite Media Center provides press conference facilities, refreshments, and convenient one stop shopping for press releases. Credentialed media members are invited to communicate news via the provided telephone and computer connections. Registration and exhibition fees are waived for credentialed media representatives.

Luggage/Package Storage/Coat Check

Convention Center, Street Level Arcade

Saturday through Monday,
and Thursday . . . . . 7:30 am to 6:30 pm
Tuesday and Wednesday . . . . . 7:30 am to 7:45 pm

Complimentary luggage/package and coat storage will be available to attendees.

Please note hours of operation. If you intend to stay later than closing time, you will need to claim your checked items before it closes.

Cash Continental Breakfast

Cash continental breakfast service will be available Saturday through Thursday in the Convention Center Concourse 1.

Coffee Breaks

Complimentary Coffee will be served at the following times and locations. Please check the individual technical conference listingts for exact times.

Saturday morning . . . . . 10:00 to 11:00 am
San Jose Convention Center, Ballroom Concourse

Saturday afternoon . . . . . 3:00 to 4:00 pm
Sunday . . . . . 10:00 to 11:00 am; 3:00 to 4:00 pm
San Jose Convention Center, Hall 1

Monday . . . . . 10:00 to 11:00 am
San Jose Convention Center, Ballroom Concourse & Almaden Concourse

Tuesday-Thursday . . . . . 10:00 to 11:00 am
San Jose Convention Center, Hall 1-3 & South Hall 3:00 to 4:00 pm

Wednesday . . . . . 10:00 to 11:00 am
Montgomery Theater

Concessions at Exhibition Halls 1-3 and South Hall

Food concession booths and concession seating will be located in all exhibition halls. Concessions will be open during exhibit hours for your convenience and serve a variety of items including hot entree, salads, hot and cold snacks, pastries, and beverages on a cash basis.

Free lunch at South Hall

Tuesday – Thursday
Starting at 12:00 noon, while supply lasts

Each day, Tuesday through Thursday, a limited supply of a free lunch item will be available to attendees on a first-come, first-served basis until those limited quantities are gone. The free lunch item will vary per day.

Free Popcorn

Popcorn carts will be located in Exhibition Hall 3 and South Hall and will be open from 11:00 am to 4:00 pm Tuesday through Thursday.

Desserts

BiOS Exhibition Hall, Saturday and Sunday

Photonics West, Tuesday through Thursday

Dessert snacks will be served from 3:00 to 3:30 pm. Complimentary tickets for the dessert snacks will be included in attendee registration packets.

Sightseeing / Shopping / Restaurants

Visit San Jose's visitor site online at:

http://www.photonics.sanjose.org

The San Jose Convention and Visitors Bureau will be operating an Information Desk on the street level of the Convention Center near the main entrance. The desk will be open during core hours of the convention to help attendees with lodging, sightseeing, shopping, and restaurant arrangements.

Child Care

A few child sitting services available in San Jose as follows.

1. Bay Area 2nd MOM Inc., Hotel Nanny Service,
   Toll Free Phone: 1-888-926-3666, or
   (650) 858-2469, ext. 109. Fax: (650) 493-6598,
   Email: oncall@2ndmom.com or parentcounselor@2ndmom.com,
   Website: www.2ndmom.com
2. Sitters Unlimited: Toll Free Phone: (408) 452-0225, E-mail:
   info@bayareasittersunlimited.com or
   www.bayareasittersunlimited.com

NOTE: SPIE does not imply an endorsement or recommendation of these services. They are provided on an information-only basis for your further analysis and decision. Other services may be available.

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spieeurope@spieeurope.org • www.spieeurope.org

SPIE in Russia/FSU Office
53, Leninsky prospect, 119991, Moscow, Russia
Tel/Fax: +7 495 135 7824 • edmund.spierus@relcom.ru

Headquarters Hotel

Fairmont Hotel
170 South Market St.
Hotel Phone: 408 998 1900
Hotel Fax: 408 287 1648

Other Accommodations

San Jose Marriott
301 South Market St.
Hotel Phone: 408 280 1300
Hotel Fax: 408 278 4444

Hilton San Jose and Towers
300 Almaden Blvd.
Hotel Phone: 408 287 2100
Hotel Fax: 408 947 4489

Crowne Plaza San Jose Hotel
282 Almaden Blvd.
Hotel Phone: 408 998 0400
Hotel Fax: 408 289 9081

The Sainte Claire, a Larkspur Hotel
302 South Market St.
Hotel Phone: 408 885 1234
Hotel Fax: 408 977 0403

Ramada Ltd.
455 South Second St.
Hotel Phone: 408 298 3500
Hotel Fax: 408 298 2477

Hotel Montgomery
211 South First St.
Hotel Phone: 408 282 8800
Hotel Fax: 408 282 8850

Wyndham Hotel San Jose
1350 North First St.
Hotel Phone: 408 453 6200
Hotel Fax: 408 437 9693

Holiday Inn San Jose
1740 North First St.
Hotel Phone: 408 993 1234
Hotel Fax: 408 453 0259

Clarion San Jose Hotel
1355 North Fourth St.
Hotel Phone: 408 453 5340
Hotel Fax: 408 453 5208

Radisson Plaza Hotel
1471 North Fourth St.
Hotel Phone: 408 452 0200
Hotel Fax: 408 437 8819

Best Western-Gateway Inn
2585 Seaboard Ave.
Hotel Phone: 408 435 8800
Hotel Fax: 408 435 8879

Fairfield Inn & Suites
1755 North First St.
Hotel Phone: 408 453 3133
Hotel Fax: 408 452 1849

Hertz Car Rental is the official car rental agency for this Symposium. To reserve a car, identify yourself as a **Photonics West Conference attendee** using the **Hertz Meeting Code CV# 029B0010.**

In the United States call 1-800-654-2240.

Shuttles, Taxis and Limo Services

From San Jose International Airport (3 miles) to downtown San Jose Hotels & Convention Center

Carrier Rate (subject to change)

The South and East Bay Airport Shuttle: $19.00 for the first person and $6.00 for each additional person in the same group, one way. Credit cards, cash & local checks accepted (408) 225-4444 or from courtesy phone in the baggage area dial #66; shuttle arrives within 15-20 minutes. www.sjc.org

Taxi: $15 - $20. Credit cards or cash. No checks. Rate is an estimate and fares can vary with traffic conditions. Rates are per taxi, not per person www.sjc.org

From San Francisco International Airport to San Jose Convention Center or downtown San Jose Hotels (1 hour)

Carrier Rate (subject to change)

Airport Commuter Limo Service: Lincoln exec town car flat rate $85 + $15% tax + gratuity 15-20% Arrivals from 10 pm to 6 am, add $10 - $30 based on arrival time. **Reservations required 24 hours in advance.** Cash or credit cards accepted (no checks) 1-888-876-1777 or 650-876-1777 24 hrs/day, 7 days/wk. www.airportcommuter.com. Up to three passengers can ride for the price of one; maximum 3 per car.

The South and East Bay Airport Shuttle: $34.00 for the first person and $6.00 for each additional person in the same group, one way. Credit cards, cash & local checks accepted. From SFO 408-225-4444. From SJC 1-800-548-4664. www.flysfo.comCall from Baggage claim area; shuttle picks up in 10-20 min.

Taxi: $134(+ gratuity)one way Credit cards or cash (no checks). Rate is an estimate and fares can vary with traffic conditions. Rates are per taxi, not per person. www.flysfo.com

From San Francisco International Airport To San Jose International Airport(1 hour 15 minutes)

Carrier Rate (subject to change)

The South and East Bay Airport Shuttle: $37.00 for the first person and $6.00 for each additional person. Credit cards, cash & local checks accepted. From SFO 408-225-4444. From SJC 1-800-548-4664. www.flysfo.com. Call from Baggage claim area; shuttle picks up in 10-20 min.

Airport Commuter Limo Service: Lincoln exec town car flat rate $85 + $15% tax + grats 15-20%. Arrivals from 10 pm to 6 am, add $10 - $30 based on arrival time. **Reservations are required 24 hours in advance.** Cash or credit cards (no checks). 1-888-876-1777 or 650-876-177724 hrs/day, 7 days/wk. www.airportcommuter.com. Up to three passengers can ride for the price of one; maximum 3 per car.

Taxi: $124 Estimate based on traffic conditions. Credit cards or cash (no checks). Rates are per taxi, not per person. www.flysfo.com

Airport Flyer and Light Rail Transportation

From San Jose International Airport to San Jose Convention Center

Free AIRPORT FLYER #10 Bus to/from San Jose International Airport travels between the San Jose International Airport, the Metro/Airport Light Rail stop and the Santa Clara Caltrain Bus Station, daily from 5:00 am until midnight, every 15 minutes. [link to SJC airport with Airport Flyer #10 pickup locations http://www.sjc.org/travelers/ground_trans.html]

From the San Jose International Airport

Take the free Airporter Flyer and transfer to the **Metro/Airport Light Rail Station** (see light rail fares below). Via the Light Rail, go southbound and take either the Santa Teresa Line the Winchester Transit Center Line and get off at the Convention Center Station. The San Jose Convention Center is adjacent to the light rail line that extends from South San Jose to Milpitas and East San Jose.

For guests staying at the Hotel Montgomery, from the San Jose International Airport take the free Airporter Flyer and transfer to the **Metro/Airport Light Rail Station** (see light rail fares below). Via the Light Rail, go southbound and get off at the Paseo de San Antonio Station, which is directly in front of the Hotel Montgomery. Northbound trains are serviced by the Paseo de San Antonio Station on 2nd Street, about 1 block east of the hotel.

Light rail transit stations connect with a number of bus routes. See the Downtown San Jose map for location (www.sjdowntownparking.com) in relationship to the convention center and the hotels. For more information on light rail stops, connections, and transit times, please call Santa Clara Valley Transportation Authority (VTA) Customer Service at (408) 321-2300. Information Service Representatives are available Monday through Friday, 6:00 a.m. am to 7:00 p.m., and weekends, 7:30 a.m. to 4:00 p.m. Automated schedule information is available 24 hours a day by calling the same number. You may also find this information on the web at www.vta.org.

Fares

The adult single-ride fare for regular service buses and light rail is $1.75. A single-ride ticket purchased at a ticket vending machine (TVM) is valid on light rail for two hours. An adult Day Pass will be $5.25. Day passes are valid for unlimited rides on both light rail and regular service buses for a one-day period and can be purchased on the light rail platforms at the ticket vending machines. *Rates are subject to change without notice.*

Park and Ride Via the Light Rail

Parking Lots

Since parking at the Convention Center can fill up early, try the Park-and-Ride alternative transportation method: use VTA's **complimentary** Park-and-Ride parking lots to commute to the Convention Center. To see a full listing of Park-and-Ride lots, visit www.vta.org and click on "Schedules, Maps & Fares" and then "Park-and-Ride." Free regular Park & Ride parking is limited to 72 hours.

Parking

http://www.sjdowntownparking.com
(click on the area on the corner of San Carlos and Woz Way)

At the Convention Center
$14 per day for 24 hours with no in/out privileges. $20 with in/out privileges. 650 spaces for public use.

Alternate Parking Downtown San Jose - River Park Tower Garage
$1.25 per 20 minutes, $18 daily maximum. Rates and hours subject to change without notice.Click on link below for all alternate parking lots.

http://www.sjdowntownparking.com/parking_map.php

Located on the corner of San Carlos and Woz Way, 333 W. San Carlos St.1,000 spaces available. Open 6:30 am to 12:00 midnight, Mon to Frid, 8:00 am to 12 midnight Sat; (Sunday varies).

Parking at the Downtown Hotels

HOTEL RATES: Rates are subject to change without notice.

FAIRMONT HOTEL: No self-parking available. Valet parking for **overnight guests** (on space-available basis) is $24 with in/out privileges. Valet parking for **visitors** (on space-available basis): 1st 30 min is $5, each additional 20 minutes is $1.50, maximum per day is $24. Parking garage is beneath the hotel

MARRIOTT HOTEL: Parking for guests is available for $21 per day with in/out privileges. Non-guests pay $4.00 per hour with a maximum of $21/day.

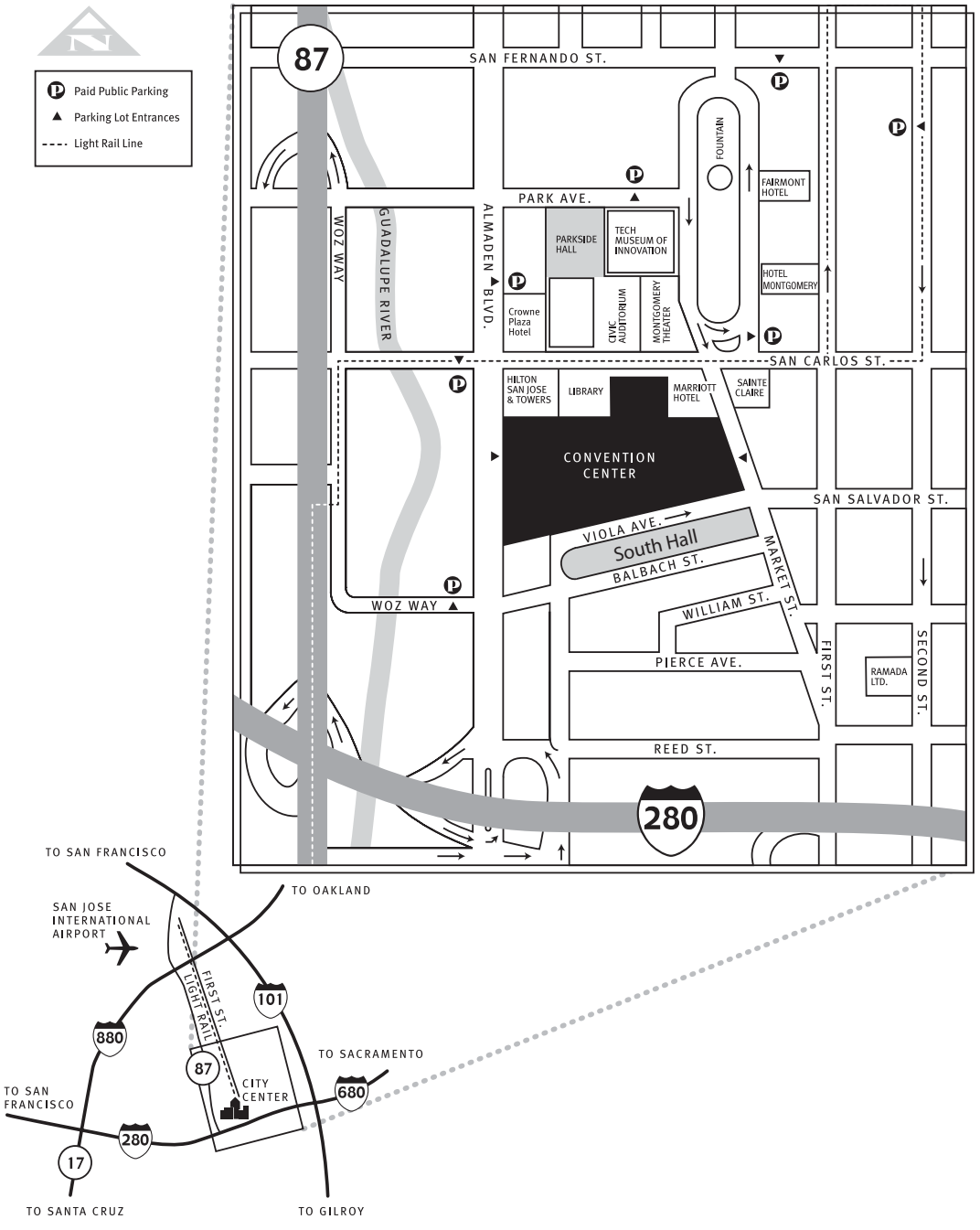
HILTON SAN JOSE & TOWERS: For Guests Self-parking $14 max. with in/out privilegesValet-parking $19 max. with in/out privileges & with validation at City Bar & Grille, $8 for up to 5 hrs. For Non-Guests Self-parking - $6 for 1st hr., $1 each add'l 30 min up to 7 hrs with a max of $18 per 12 hr. period. Valet parking - $8 for up to 1st hr, $12 1-2 hrs, $18 2-5 Hrs, $20 over 5 hrs, & with validation from City Bar & Grille, $8 for up to 5 hrs.

CROWNE PLAZA: For Guests – self-parking, $14 per day (subject to change) with in/out privileges. No valet. For non-guests – $6. for 1st hr., $1. every half hr. thereafter - max. $20 per day.

SAINTE CLAIRE: For Guests only, valet parking only for $18 overnight. In/out privileges are available to guests who charge their parking to their room.

RAMADA LTD.: Guest parking is complimentary.

HOTEL MONTGOMERY: For Guests – Self-parking $17 per day, Valet parking $20 per day (24-hour period), both with in/out privileges.



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BiOS

Biomedical Optics

Vol#	Title (Editor)	Prepublication Price
6424	**Photonic Therapeutics and Diagnostics III** *(Kollias/Choi/Zeng/Malek/Wong/Ilgner/ Gregory/Tearney/ Hirschberg/Madsen)*	$120
6425	**Lasers in Dentistry XIII** *(Rechmann/Fried)*	$60
6426	**Ophthalmic Technologies XVII** *(Manns/Soederberg/Ho/ Stuck/Belkin)*	$105
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6446	**Biomedical Applications of Light Scattering** *(Wax/Backman)*	$60
6447	**Nanobiophotonics and Biomedical Applications IV** *(Cartwright/Nicolau)*	$53
6448	**Colloidal Quantum Dots for Biomedical Applications II** *(Osiński/Jovin/Yamamoto)*	$60
6449	**Genetically Engineered and Optical Probes for Biomedical Applications IV** *(Achilefu/Bornhop/Raghavachari/ Savitsky/Wachter)*	$70
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LASE

Lasers and Applications in Science and Engineering

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MOEMS-MEMS

Micro & Nanofabrication

Vol#	Title (Editor)	Prepublication Price
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*6463	**Reliability, Packaging, Testing, and Characterization of MEMS/MOEMS VI** *(Hartzell/Ramesham)*	$53
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OPTO

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