

# Technical Program

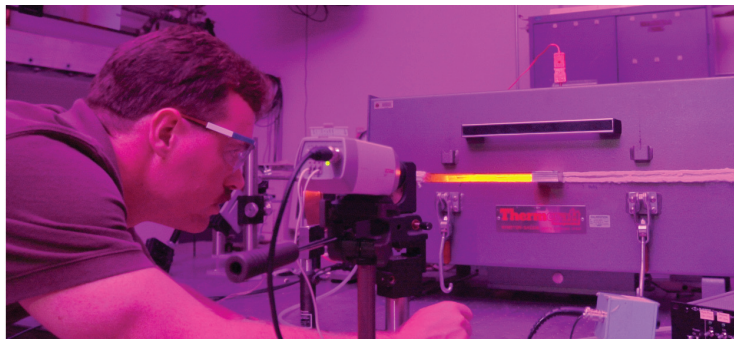
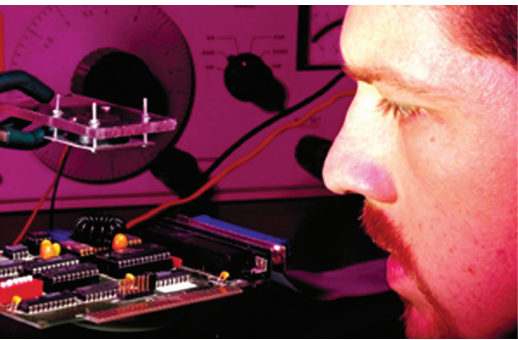
# SPIE



## Microelectronics, MEMS, and Nanotechnology

**Conferences: 4–7 December 2007**

The Australian National Univ. (ANU)  
The Manning Clarke Centre  
Canberra, Australia



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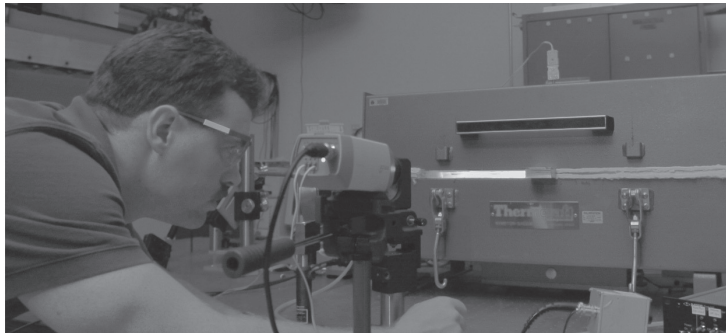
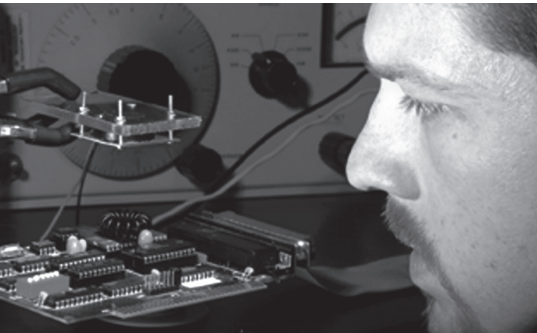
# Technical Program

# Welcome to

# SPIE



## Microelectronics, MEMS, and Nanotechnology



### **Conferences: 4–7 December 2007**

The Australian National Univ. (ANU)  
The Manning Clarke Centre  
Canberra, Australia

*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.*

*Cover Photos: (Left photo) Courtesy Georgia Tech Center for Low Cost Electronics Packaging Research. Photo by Stanley F. Leary. A researcher in the microelectronics thermal management program investigates the performance of microjet cooling technology developed at the Georgia Tech Packaging Research Center. The Georgia Tech PRC is a nonprofit consortia funded by the National Science Foundation's Engineering Research Centers program, the electronics industry and the state of Georgia. (Middle photo) Courtesy of Jefferson Lab. Nanotube production in a user lab.*

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Plenary Presentations . . . . . 4-7

Conferences

**6798 Microelectronics: Design, Technology, and Packaging III (Hariz)** . . . . . 8

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**6800 Device and Process Technologies for Microelectronics, MEMS, Photonics, and Nanotechnology IV (Tan)** . . . . . 14

**6801 Photonics: Design, Technology, and Packaging III (Krolikowski)** . . . . . 17

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## Welcome!

This Microelectronics, MEMS, and Nanotechnology Symposium gives you the opportunity for in-depth communication with researchers and developers in microelectronics, bioMEMS, nanotechnology, and medicine, device and process technologies, photonics, and complex systems.

These fields are multidisciplinary and make extensive use of micro and nanofabrication technologies. This symposium attracted 341 submissions from 27 countries. We welcome you to The Australian National University.



### *Symposium Chairs*



**Tiziana Di Matteo**

The Australian  
National Univ.  
(Australia)



**Vijay K. Varadan**

Univ. of Arkansas  
(USA)

## The Australian National University

The Australian National University (ANU) commands a magnificent position between lake and mountain in the centre of the nation's capital, Canberra. ANU is one of the world's foremost research universities and attracts leading academics and outstanding students from Australia and across the world.

The ANU's main campus is located in, and occupies most of the Canberra suburb of Acton. The campus covers 1.45 km (350 acres) adjoining native bushland, Black Mountain, Lake Burley Griffin, the suburb of Turner and the city centre. Eight of the university's nine affiliated halls and colleges are located on campus, while Fenner Hall is located on Northbourne Avenue in the nearby suburb of Braddon.

For more information on The Australian National Univ., please go to <http://www.anu.edu.au>

An ANU Campus map can be found at: <http://campusmap.anu.edu.au>

Manning Clark Centre complex is at 26a on the map.



Tuesday 4 December	Wednesday 5 December	Thursday 6 December	Friday 7 December
<b>Microelectronics, MEMS, and Nanotechnology</b>			
Welcome Reception and Registration 18.00 to 20.00, p. 3	Plenary Presentations p. 4	Plenary Presentations p. 5	Plenary Presentations p. 6-7
	6798 Microelectronics: Design, Technology, and Packaging III ( <i>Hariz</i> ) p. 8		
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	Poster Sessions 18.00 to 19.30 p. 3		
	Conference Dinner 19.30 to 22.00 p. 3		

## Special Events

### Welcome Reception and Registration

Tuesday 4 December . . . . . 18.00 to 20.00

**Location:** Manning Clark Centre Foyer

All registered attendees are cordially invited to relax, socialize, and enjoy light refreshments. Please remember to wear your conference registration badge. Dress is casual.

### Conference Dinner

Wednesday 5 December . . . . . 9.30 to 22.00

**Location:** The Parliament House

All registered attendees are invited to attend and enjoy one of Australia's and Canberra's historic buildings, The Parliament House. Additional Guest tickets can be purchased at time of pre-registration or before noon on Wednesday on site. Attendees must pick-up a ticket at the registration desk before noon on Wednesday to confirm attendance.

### Poster Sessions

Wednesday 5 December . . . . . 18.00 to 19.30  
Conferences **6800** and **6802**

Thursday 6 December . . . . . 18.00 to 19.30  
Conferences **6798**, **6799** and **6801**

**Location:** Manning Clark Centre Foyer

All symposium attendees are invited 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 authors can begin to set-up their posters after 10.00 in the scheduled day of their poster session. Posters must be placed by 16.00. Each poster presenter is provided a space 1 m x 1 m in which to display a summary of the paper. Authors must remain by their poster during the poster session to answer questions from attendees.



# Welcome and Plenary Presentations

Wednesday 5 December

08.30 to 09.00

## Opening Remarks and Welcome

Professor Lawrence Cram, Deputy Vice Chancellor, The Australian National Univ. (Australia)

## Plenary Presentations

### Introduction of Plenary Speakers

Prof. Jim Williams, Director, Research School of Physical Sciences,  
The Australian National Univ. (Australia)

09.00 to 09.45

### Conducting Organic Nanostructures and their use in Medical Bionics



**Gordon G. Wallace**, Executive Research Director, ARC Centre of Excellence for Electromaterials Science, Intelligent Polymer Research Institute, Univ. of Wollongong (Australia)

*Abstract:* Implantable medical bionics (such as the bionic ear or the bionic eye) depend critically on the ability to control the electrode - cellular interface. Until recently studies to date in this area have almost exclusively involved the use of inorganic (metal or metal oxide conductors).

However, the last three decades has seen a revolution in the electromaterials inventory now available to the bioengineer. Among the most exciting advances have been the discovery of new organic conductors in particularly inherently conducting polymers (ICPs) and new forms of carbon including nanotubes.

ICPs bring with them the ability to control, in real time, the localized environment at the electrode-cellular interface in an unprecedented way. The chemistry/biochemistry at the interface can be controlled by the imposition of small electrical stimulation to control the surface energy of the material, generate ion fluxes and even provide localized release of drugs or cell growth factors.

CNT arrangements can provide control over nanotopography of the electrode-cellular interface as well as high electronic conductivity and electrical switching speeds combined with extraordinary mechanical properties.

Together these materials provide some exciting new possibilities in terms of creating an interface that can respond to biological demands in a programmed or responsive fashion.

Our most recent work in the area of nerve cell and muscle cell interactions using these organic conductors and the implications in using nanostructures will be presented here.

*Biography:* **Gordon Wallace** is currently Executive Research Director of the ARC Centre of Excellence for Electromaterials Science. His research interests include organic conductors, nanomaterials and electrochemical probe methods of analysis. A current focus involves the use of these tools and materials in developing biocommunications from the molecular to skeletal domains in order to improve human performance via medical Bionics.

Gordon Wallace completed his undergraduate (1979) and PhD (1983) degrees at Deakin Univ. He was awarded a DSc from Deakin Univ. in 2000.

Gordon Wallace was appointed as a Professor at the Univ. of Wollongong in 1990. Professor Wallace was awarded an Australian Research Council (ARC) QEII Fellowship in 1991 and an ARC Senior Research Fellowship in 1995. In 2002 he was appointed to an ARC Professorial Fellowship. In 2006 he was awarded an ARC Federation Fellowship.

He is a Fellow of the Royal Australian Chemical Institute (RACI). He was elected as a Fellow of the Australian Academy of Technological Sciences and Engineering in 2003 and a Fellow of the Australian Academy of Science in 2007. He was elected as a

Fellow of the Institute of Physics (UK) in 2004.

He received the Inaugural Polymer Science and Technology award from the Royal Australian Chemical Institute (RACI) in 1992. He was awarded an ETS Walton Fellowship by Science Foundation Ireland in 2003. He received the RACI Stokes Medal for research in Electrochemistry in 2004.

09.45 to 10.30

### Recent Progress and Future Prospect of Photonic Crystals



**Prof. Susumu Noda**, Vice Director of Photonics and Electronics Science and Engineering, Kyoto Univ. (Japan)

*Abstract:* Photonic crystals provide exciting new tools for the manipulation of photons and have received keen interest from a variety of fields. In the present talk, I will review the recent progresses and future prospects of photonic crystals and their applications.

*Biography:* **Susumu Noda** received B.S., M.S., and Ph.D. degrees from Kyoto University, Japan, in 1982, 1984, and 1991, respectively, all in electronics. In 2006, he received an honorary degree from Gent University, Belgium. From 1984 to 1988, he was with the Mitsubishi Electric Corporation, and was engaged in research on optoelectronic devices. In 1988, he joined Kyoto University and is currently a Professor. His research interest covers physics and engineering of photonic and quantum nanostructures. He received various awards including the IBM Science Award (2000), the JSAP Achievement Award on Quantum Electronics (2005), and OSA Joseph Fraunhofer Award/Robert M. Burley Prize. From 2003-2005, he served as a distinguished lecturer for IEEE/LEOS. He is currently a chairman of IEEE/LEOS, Kansai Chapter, Japan.

# Plenary Presentations

Thursday 6 December

## Plenary Presentations

Introduction of Plenary Speakers

Prof. Derek Abbott, The Univ. of Adelaide (Australia)

09.00 to 09.45

### Photonic Metamaterials: Optics Starts Walking on Two Feet



**Prof. Martin Wegener**, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

*Abstract:* Metamaterials are man-made tailored materials composed of sub-wavelength metallic building blocks (“photonic atoms”) that are densely packed into an effective material. This allows for achieving optical material properties that simply do not occur in natural substances. Examples are magnetism at elevated frequencies, negative refractive indices, giant circular dichroism, and enhanced optical nonlinearities. Photonic metamaterials operate at optical frequencies. In this talk, we give an introduction into this emerging field and review recent progress.

#### Biography: Education

1987 PhD (Physics), Johann Wolfgang Goethe-Universität, Frankfurt am Main

1986 Diplom (Physics), Johann Wolfgang Goethe-Universität, Frankfurt am Main

1981 Abitur, Schwalbach am Taunus

#### Positions

2001- Coordinator of the DFG-Center for Functional nanostructures (CFN), Universität Karlsruhe (TH)

2001- Group leader, Institute of Nanotechnology, Forschungszentrum Karlsruhe

1995- Professor of Physics (C4), Universität Karlsruhe (TH)

1990-1995 Professor of Physics (C3), Universität Dortmund

1988-1990 Postdoctoral Associate, AT&T Bell Laboratories, Holmdel (NJ), U.S.A.

#### Awards & Honors

2006 Member of the Academy of Sciences Leopoldina

2006 Carl Zeiss Research Award (together with Kurt Busch)

2005 Research Award of the State of Baden-Württemberg 2005 European Union René Descartes Prize for Collaborative Research (together with Ekmel Ozbay, John Pendry, David Smith, Costas Soukoulis)

2005 CST University Publication Award

2000 Gottfried Wilhelm Leibniz Award of Deutsche Forschungsgemeinschaft (DFG)

1998 Teaching Award of the State of Baden-Württemberg

1993 Research Award of the Alfred Krupp von Bohlen und Halbach Foundation

1986-1987 PhD fellowship of the State of Hessen

09.45 to 10.30

### Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis



**Prof. Stephen Hyde**, Applied Mathematics Dept., The Australian National Univ. (Australia)

*Abstract:* Materials in the biological realm have many secrets remaining to be discovered. For example, the apparent colour of many insects is modulated by intricate structural designs. These structures grow under the most benign synthetic conditions: room temperature and pressure, using readily available molecular precursors. So-called ‘bicontinuous’ synthetic designs have been proposed for 3D photonic crystals in recent years: identical designs have now been found in some butterfly wings. We have done detailed 3D structural analysis of these patterns in one example, the European Green Hairstreak butterfly, *Callophrys rubi*, that reveals remarkable crystalline order, with spatial periods of hundreds of nm. The structure is a highly swollen version of patterns that are routinely found in lyotropic liquid crystals. That link suggests the possibility of self-assembly of these structures, using only soft (macro)molecular components in solution. A similar mechanism is likely to act in the butterfly chrysalis, giving rise to beautiful coloured wing.

*Biography:* **Stephen Hyde** is currently a Federation Fellow at the Department of Applied Mathematics, Australian National Univ., where he collaborates with physicists, mathematicians and physical chemists on molecular self-assembly, liquid crystal polymorphism and network theory. He obtained his PhD in 1986 from Monash University, after studying at the Univ. of Western Australia, Monash and Lund Univ.

# Plenary Presentations

Friday 7 December

## Plenary Presentations

*Introduction of Plenary Speakers*

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

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09.00 to 09.45

### Quantum Dots and Nano-wires for Optoelectronic Device Applications



**Prof. Chennupati Jagadish**, Head of the Semiconductor Optoelectronics and Nanotechnology Group in the Research School of Physical Sciences and Engineering, The Australian National Univ. (Australia)

*Abstract:* Quantum dots have great potential for next generation optoelectronic devices. In this talk, I will review our work on quantum dot lasers, quantum dot infrared photodetectors and quantum dot integrated optoelectronic devices. Issues of importance for various devices will be discussed. Nanowires are considered as building blocks for the next generation electronics and photonics. Our recent efforts to grow nanowires and controlling their size and shape will be discussed. Results on InGaAs ternary nanowires and issues related to ternary nanowire growth will be presented. Core-shell nanowires and heterostructure nanowires and their optical properties will be presented. Future prospects for nanowires will be discussed.

*Biography:* **Professor Chennupati Jagadish** is an Australian Federation Fellow and Head of the Semiconductor Optoelectronics and Nanotechnology Group in the Research School of Physical Sciences and Engineering at the Australian National University. Professor Jagadish is a winner of 2000 Institute of Electrical and Electronics Engineers, Inc (USA) (IEEE) Millennium Medal and received Distinguished Lecturer Awards from both IEEE Lasers and Electro-Optics Society (LEOS) and IEEE Electron Devices Society. He has published more than 500 research papers (330 journal papers), co-authored a book, co-edited a book and edited six conference proceedings. Prof. Jagadish is currently President-Elect of the IEEE Nanotechnology Council (NTC) and also Chair of the IEEE NTC Awards Committee. He is also serving as Vice-President (Membership and Region Activities -Asia Pacific) of LEOS. Professor Jagadish is a Fellow of IEEE, American Physical Society, Optical Society of America, the Electrochemical Society, SPIE-International Society for Optical Engineering, Australian Institute of Physics, the Institute of Physics (UK), the Institute of Nanotechnology (UK), the Australian Academy of Technological Sciences and Engineering and the Australian Academy of Science. Prof. Jagadish is also an Associate Editor of IEEE/OSA Journal of Lightwave Technology and serves on editorial boards of 8 journals. He received Peter Baume Award from the ANU in 2006. He is also convenor of the ARC Nanotechnology Network.



# Plenary Presentations

Friday 7 December

## Plenary Presentations

Introduction of Plenary Speakers

Prof. Dan V. Nicolau, The Univ. of Liverpool (United Kingdom)

09.45 to 10.30

### Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine



**Prof. Vijay K. Varadan**, Twenty-First Century Endowed Chair in Nano-and Bio-Technology and Medicine, and Distinguished Professor of Electrical Engineering and Distinguished Professor of Biomedical Engineering (College of Engineering) and Neurosurgery (College of Medicine) Univ. of Arkansas (USA)

**Abstract:** With the continuing increase in demand for electronic systems to be multifunctional, as well as light weight, compact and low in cost, future electronic systems will require unprecedented packaging technologies. Although the semiconductor industry continues to advance at dramatic rates in both productivity and performance, it is evident that packaging has become the limiting factor for continued growth. The Univ. of Arkansas' High Density Electronic Packaging Center (HiDEC) has been conducting research in advanced packaging methods for over 15 years. The Univ. of Arkansas' HiDEC is the only working laboratory of its kind in the United States located on a university campus. Since its inception in 1991, HiDEC personnel have pursued a program of excellence in research and education, which has earned the program an international reputation. Recently, the research center underwent an expansion with the addition of the following laboratories: Innovative Nano/Bio-Device & System Laboratories, Organic Thin Film Transistor and Devices Laboratory, Nanomaterials and Carbon Nanotube Laboratories and Brain Wave Monitoring and Control Laboratories.

With the addition of these laboratories, current research efforts have shown significant advances in the areas of bio and medical packaging. Areas of research including but not limited to advanced sensing devices using biocompatible materials, biomedical sensors, and flexible implantable neuroprobes used to minimize the symptoms of Parkinson's disease, Alzheimer's disease, and other neurological disorders. When dealing with the harsh environments such as the body, special attention is required on material selection and packaging. HiDEC research efforts explore the use of biocompatible polymer technologies to build nanoscale sensors and devices for biomedical applications. In response to industry demands for miniaturized and highly integrated devices, HiDEC also focuses on microsystems packaging technology development in ultra-thin package designs; flip-chip technology; 3D packaging; wafer level packaging; electrical, thermal, mechanical design and assembly. To cater to the needs of future IC package interconnects and assembly processes, we have also built up competencies and technologies in the area of nano-structured materials and self-assembly processes for device packaging. After an overview talk of the general packaging in micro and nanoelectronics, selected movies of the application of the nano-and micro-devices on patients will be presented.

**Biography:** **Vijay K. Varadan** is currently the Twenty-First Century Endowed Chair in Nano-and Bio-Technology and Medicine, and Distinguished Professor of Electrical Engineering and Distinguished Professor of Biomedical Engineering (College of Engineering) and Neurosurgery (College of Medicine) at Univ. of Arkansas. He joined the Univ. of Arkansas in January 2005 after serving on the faculty of Cornell Univ., Ohio State Univ., and Pennsylvania State Univ. for the past 32 years. He is also the Director of the Institute for Nano, Micro-, and Neuro-Electronics, Sensors and Systems and the Director of the High Density Electronics Center. He has concentrated on the design and development of various electronic, acoustic and structural com-

posites, smart materials, structures, and devices including sensors, transducers, Microelectromechanical Systems (MEMS), synthesis and large scale fabrication of carbon nanotubes, NanoElectroMechanical Systems (NEMS), microwave, acoustic and ultrasonic wave absorbers and filters. He has developed neurostimulator, wireless microsensors and systems for sensing and control of Parkinson's disease, epilepsy, glucose in the blood and Alzheimer's disease. He is also developing both silicon and organic based wireless sensor systems with RFID for human gait analysis and sleep disorders and various neurological disorders. He is an editor of the Journal of Wave-Materials Interaction and the Editor-in-Chief of the Journal of Smart Materials and Structures. He is an Associate Editor of the Journal of Microlithography, Microfabrication and Microsystem. He serves on the editorial board of International Journal of Computational Methods. He has published more than 500 journal papers and 13 books. He has 13 patents pertinent to conducting polymers, smart structures, smart antennas, phase shifters, carbon nanotubes, and implantable device for Parkinson's patients, MEMS accelerometers and gyroscopes. He is a fellow of SPIE, ASME, Institute of Physics, and the Acoustical Society of America. He has many visiting professorship appointments in leading schools overseas.

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# Microelectronics: Design, Technology, and Packaging III

Conference Chair: **Alex J. Hariz**, Univ. of South Australia (Australia)

Conference Co-Chair: **Vijay K. Varadan**, Univ. of Arkansas

Program Committee: **Derek Abbott**, The Univ. of Adelaide (Australia); **Said Fares Al-Sarawi**, The Univ. of Adelaide (Australia); **Neil W. Bergmann**, The Univ. of Queensland (Australia); **Yves Blanchard**, Groupe ESIEE Paris (France); **Abdesselam Salim Bouzerdoum**, Univ. of Wollongong (Australia); **Natalie Clark**, NASA Langley Research Ctr.; **Robert J. Clarke**, RADLogic Pty Ltd. (Australia); **Sorin D. Cotozana**, Technische Univ. Delft (Netherlands); **William G. Cowley**, Univ. of South Australia (Australia); **Ivan Curtis**, Keyworks Technologies Pty (Australia); **Sima Dimitrijevic**, Griffith Univ. (Australia); **Andrew S. Dzurak**, Univ. of New South Wales (Australia); **Manfred Glesner**, Technische Univ. Darmstadt (Germany); **Hedley J. Hansen**, Defence Science and Technology Organisation (Australia); **Herbert Barry Harrison**, Griffith Univ. (Australia); **Anthony Stephen Holland**, Royal Melbourne Institute of Technology (Australia); **Torsten Lehmann**, Univ. of New South Wales (Australia); **Kevin Charles Liddiard**, Electro-optic Sensor Design (Australia); **Michael Liebelt**, The Univ. of Adelaide (Australia); **Warren Marwood**, Defence Science and Technology Organisation (Australia); **Alireza Moini**, Silverbrook Research Pty. Ltd. (Australia); **Adam Osseiran**, Edith Cowan University (Australia); **Anthony Edward Parker**, Macquarie Univ. (Australia); **James Grantley Rathmell**, The Univ. of Sydney (Australia); **Olaf Reinhold**, Defence Science and Technology Organisation (Australia); **David Victor Thiel**, Griffith Univ. (Australia)

## Wednesday 5 December

<p style="text-align: center;"><b>Plenary Session</b> <b>Opening Remarks and Welcome</b></p> <p><b>Room: Manning Clark Ctr T1 . . . . . Wed. 08.30 to 09.00</b></p> <p><b>Professor Lawrence Cram</b>, Deputy Vice Chancellor, The Australian National Univ. (Australia)</p> <p><b>Plenary Presentations . . . . . Wed. 09.00 to 10.30</b></p> <p style="text-align: center;"><b>Introduction of Plenary Speakers</b></p> <p><b>Prof. Jim Williams</b>, Director, Research School of Physical Sciences, The Australian National Univ. (Australia)</p> <p>09.00: <b>Conducting Organic Nanostructures and their use in Medical Bionics (Presentation Only)</b>, Gordon G. Wallace, Univ. of Wollongong (Australia)</p> <p>09.45: <b>Recent Progress and Future Prospect of Photonic Crystals (Presentation Only)</b>, Susumu Noda, Kyoto Univ. (Japan)</p>
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### SESSION 1

**Room: Manning Clark Ctr T4 . . . . . Wed. 11.00 to 12.20**

#### Process Technologies

Session Chair: **Alex J. Hariz**, Univ. of South Australia (Australia)

11.00: **Novel thin film technology for hybrid opto-electronics integration (Invited Paper)**, Roberto A. Morandotti, Luca Razzari, Robin Helsten, Marcello Ferrara, Paul F. Ndione, Mounir Gaidi, Mohamed Chaker, Michael Zaezjev, Chandra S. Manda, Alain Pignolet, Institut National de la Recherche Scientifique (Canada) . . . . . [6798-01]

11.40: **Patterning techniques for next-generation IC's**, Artur P. Balasinski, Cypress Semiconductor Corp. . . . . [6798-02]

12.00: **New type of dummy layout pattern to control the ILD etch rate**, Oliver Pohland, Julie Spieker, Chih Ta Huang, Srikanth Govindaswamy, Artur P. Balasinski, Cypress Semiconductor Corp. . . . . [6798-03]

**Lunch Break . . . . . 12.20 to 13.30**

### SESSION 2

**Room: Manning Clark Ctr T4 . . . . . Wed. 13.30 to 15.10**

#### Digital and Analog Design

Session Chair: **Hedley J. Hansen**, Defence Science and Technology Organisation (Australia)

13.30: **Photonic crystal, photonic wire, and metamaterial structures and devices (Invited Paper, Presentation Only)**, Richard M. De La Rue, Univ. of Glasgow (United Kingdom) . . . . . [6798-68]

14.10: **A 6-18.5 GHz dynamic frequency divider in 0.25µm SOI CMOS**, Leigh E. Milner, Defence Science and Technology Organisation (Australia) . . . . . [6798-05]

14.30: **Nonlinearity of antiparallel Schottky diodes for mixer applications**, Venkata K. Gutta, Macquarie Univ. (Australia); Anthony Fattorini, Mimix Broadband (Australia); Anthony E. Parker, Macquarie Univ. (Australia) . . . . . [6798-06]

14.50: **48 GHz frequency synthesizer for a 60 GHz radio**, Yingbo Zhu, The Univ. of Adelaide (Australia) . . . . . [6798-07]

**Refreshment Break . . . . . 15.10 to 15.40**

### SESSION 3

**Room: Manning Clark Ctr T4 . . . . . Wed. 15.40 to 18.00**

#### RF and Wireless

Session Chair: **Neil W. Bergmann**, The Univ. of Queensland (Australia)

15.40: **A multipurpose transceiver module using RFIC technology (Invited Paper)**, Said F. Al-Sarawi, The Univ. of Adelaide (Australia); Hedley J. Hansen, Defence Science and Technology Organisation (Australia); Yingbo Zhu, The Univ. of Adelaide (Australia) . . . . . [6798-08]

16.20: **An ultrawideband transceiver for biotelemetry systems**, Chul Kim, Univ. of New South Wales (Australia) . . . . . [6798-09]

16.40: **Geometric dependence of the parasitic components and thermal properties of HEMTs**, Peter V. Vun, Macquarie Univ. (Australia) and Mimix Broadband (Australia); Anthony E. Parker, Macquarie Univ. (Australia); Simon Mahon, Mimix Broadband (Australia) . . . . . [6798-10]

17.00: **Design and optimization of antennas with wireless sensor networks applications**, Marco Mussetta, Alessandro Gandelli, Riccardo E. Zich, Politecnico di Milano (Italy) . . . . . [6798-11]

17.20: **Optimization techniques for smart integrated sensor networks in environmental monitoring**, Alessandro Gandelli, Francesco Grimalaccia, Riccardo E. Zich, Politecnico di Milano (Italy) . . . . . [6798-12]

17.40: **A SiGe 7/8 dual modulus prescaler for a 60-GHz frequency synthesizer**, Noorfazila Kamal, The Univ. of Adelaide (Australia) . . . . . [6798-13]

## Thursday 6 December

### Plenary Session

**Room: Manning Clark Ctr T1 . . . . . Thurs. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Derek Abbott**, The Univ. of Adelaide (Australia)

09.00: **Photonic Metamaterials: Optics Start Walking on Two Feet (Presentation Only)**, Martin Wegener, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

09.45: **Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis (Presentation Only)**, Stephen Hyde, The Australian National Univ. (Australia)

### SESSION 4

**Room: Manning Clark Ctr T4 . . . . . Thurs. 11.00 to 12.20**

#### New Frontiers

Session Chair: **Andrew S. Dzurak**, Univ. of New South Wales (Australia)

11.00: **Performance and applications of GaN MMICs (Invited Paper)**, Jonathan B. Scott, The Univ. of Waikato (New Zealand); Anthony E. Parker, Macquarie Univ. (New Zealand) . . . . . [6798-14]

11.40: **Single-shot qubit control electronics for sub-Kelvin operation (Invited Paper)**, Sobhath R. Ekanayake, Torsten Lehmann, Andrew S. Dzurak, Robert G. Clark, Univ. of New South Wales (Australia) . . . . . [6798-15]

**Lunch Break . . . . . 12.20 to 13.30**

**SESSION 5**

**Room: Manning Clark Ctr T4. . . . .Thurs. 13.30 to 15.10**

**System on Chip**

*Session Chair: Herbert Barry Harrison, Griffith Univ. (Australia)*

13.30: **Design for 3D integration (Invited Paper)**, Paul D. Franzon, North Carolina State Univ. . . . . [6798-16]

14.10: **Device variability reduction In SoC**, Artur P. Balasinski, Cypress Semiconductor Corp.; Michael C. Smayling, Tela Innovations, Inc.; Valery Axelrad, Sequoia Design Systems, Inc. . . . . [6798-17]

14.30: **Comparison framework for low-swing on-chip interconnect circuits**, Astria Nur Irfansyah, Torsten Lehmann, Saeid Nooshabadi, Univ. of New South Wales (Australia) . . . . . [6798-18]

14.50: **A vibratory gyro chip with waveguide readout**, Bohua Sun, Cape Peninsula Univ. of Technology (South Africa). . . . . [6798-19]

**Refreshment Break** . . . . . 15.10 to 15.40

**SESSION 6**

**Room: Manning Clark Ctr T4. . . . .Thurs. 15.40 to 18.00**

**Modelling and Simulations**

*Session Chair: Warren Marwood, Defence Science and Technology Organisation (Australia)*

15.40: **Advances in nonlinear characterization of millimeter-wave devices for telecommunications (Invited Paper)**, Anthony E. Parker, Macquarie Univ. (Australia) . . . . . [6798-20]

16.20: **A new total static leakage current estimation model for UDSM-based transistor stacks**, Hussam Al-Hertani, Dhamin Al-Khalili, Come Rozon, Royal Military College of Canada (Canada) . . . . . [6798-21]

16.40: **A complementary logic partitioning algorithm for a library-free logic synthesis paradigm**, Hisham El-Masry, Canadian Microelectronics Corp. (Canada) and Royal Military College of Canada (Canada); Dhamin Al-Khalili, Royal Military College of Canada (Canada) . . . . . [6798-22]

17.00: **Nonlinear behavioral modeling of SOI micromechanical free-free beam resonators**, Lichun Shao, Moorthi Palaniapan, National Univ. of Singapore (Singapore) . . . . . [6798-23]

17.20: **Simulation of hydrogel micro-actuation**, Kamlesh J. Suthar, Muralidhar K. Ghantasala, Western Michigan Univ. . . . . [6798-43]

17.40: **A CAD tool for the automatic generation of synthesizable parallel prefix adders in VHDL**, Asim J. Al-Khalili, Konstantinos Vitoroulis, Concordia Univ. (Canada) . . . . . [6798-25]

**Posters-Thursday**

**Room: Manning Clark Ctr Foyer . . . . .Thurs. 18.00 to 19.30**

**Poster Presentation/Oral Standby**

**Very uniform and high-aspect ratio anisotropy through Si via etching process in magnetic neutral loop discharge plasma**, Yasuhiro Morikawa, Takahide Murayama, Koukou Suu, ULVAC, Inc. (Japan) . . . . . [6798-40]

**Poster Presentations**

**An astable multivibrator formed by a novel NDRHBT**, Pingjuan Niu, Tianjin Polytechnic Univ. (China); Weilian Guo, Tianjin Polytechnic Univ. (China) and Tianjin Univ. (China); Changyun Miao, Xin Yu, Wei Wang, Tianjin Polytechnic Univ. (China); Haitao Qi, Shilin Zhang, Tianjin Univ. (China); Xiao-Yun Li, Tianjin Polytechnic Univ. (China) . . . . . [6798-44]

**Classification of lactose and mandelic acid THz spectra using subspace and wavelet-packet algorithms**, Xiaoxia Yin, The Univ. of Adelaide (Australia) . . . . . [6798-45]

**A robust motion detection estimation algorithm targeted for VLSI technology**, Lachlan Horne, Mohammad Salehi, Tamath J. Rainsford, Said F. Al-Sarawi, The Univ. of Adelaide (Australia) . . . . . [6798-47]

**Fabrication of an electrostatically actuated MEMS diaphragm micropump**, Buyong Muhd Ramdzan, MIMOS Berhad (Malaysia). . . . . [6798-48]

**A 4-8GHz CMOS active balun using a compensated single-FET topology**, Leigh E. Milner, Defence Science and Technology Organisation (Australia) . . . . . [6798-49]

**A high-performance read-out IC design for IR image sensor applications**, Sang Joon Hwang, Ho Hyun Shin, EunSik Jung, Seung Woo Yu, Man-Young Sung, Korea Univ. (South Korea) . . . . . [6798-50]

**Novel 3D modeling of In(0.53)Ga(0.47)As lateral PIN photodiode**, P. Susthitha Menon, Muhammad Syuhaimi Ab-Rahman, Kumarajah Kandiah, Sahbudin B. H.Shaari, Univ. Kebangsaan Malaysia (Malaysia). . . . . [6798-51]

**Linearity asymmetry in FET resistive mixers**, Lindsay Powles, Macquarie Univ. (Australia) and Mimix Broadband (Australia); Anthony E. Parker, Macquarie Univ. (Australia); Simon Mahon, Mimix Broadband (Australia) . . . . . [6798-52]

**Spark plasma sintering of tungsten nanopowder**, Christopher Shearwood, Hui-Beng Ng, Liujiang Yu, Kham Aik Khor, Nanyang Technological Univ. (Singapore) . . . . . [6798-53]

**Mechanical properties measurement of silicon-nitride thin films using the bulge test**, Hun Kee Lee, Seonghyun Ko, Bongbu Jung, Hyun C. Park, Pohang Univ. of Science and Technology (South Korea) . . . . . [6798-54]

**Flexible pressure sensor on polymeric materials**, Ming-Foey Teng, Univ. of South Australia (Australia) . . . . . [6798-55]

**Grating light modulators for use as demultiplexer and switching device in wavelength-selective switching systems**, Araya Pothisorn, Alex Harriz, Univ. of South Australia (Australia) . . . . . [6798-56]

**Analysis of the resistive network in a bio-inspired CMOS vision chip**, Jae-Sung Kong, Dong-Kyu Sung, Hyo-Young Hyun, Jang-Kyoo Shin, Kyungpook National Univ. (South Korea). . . . . [6798-58]

**CMOS process-compatible thermopile detector released by frontside dry etching**, Hengzhao Yang, Bin Xiong, Tie Li, Yuelin Wang, Shanghai Institute of Microsystem and Information Technology (China) . . . . . [6798-60]

**Fabrication of extended gate ion-sensitive field-effect transistor for biosensor application**, Mohd R. Mat-Hussin, Rozina Abdul-Rani, Nor-Azhadi Ngah, Mohd I. Syono, Mimos Berhad (Malaysia); Razali Ismail, Univ. Teknologi Malaysia (Malaysia) . . . . . [6798-61]

**Surface topography in mechanical polishing of 6H-SiC (0001) substrate**, Ling Yin, The Australian National Univ. (Australia); Han Huang, The Univ. of Queensland (Australia) . . . . . [6798-62]

**The stress-induced leakage currents of the silicon oxides for EEPROM transistor**, Chang Soo Kang, Yuhan College (South Korea) . . . . . [6798-63]

**Determination of charge traps of Al<sub>2</sub>O<sub>3</sub> layers in nonvolatile memory device with oxide-nitride-Al<sub>2</sub>O<sub>3</sub> structures**, Hoon Young Cho, Woo Sung Cho, Jong Soo Oh, Woo Cheol Yang, Dongguk Univ. (South Korea); Won Sik Kim, Doowon Technical College (South Korea). . . . . [6798-64]

**Angular dependence of defect formation in ion-implanted silicon**, Byron J. Willis, Jeffrey C. McCallum, The Univ. of Melbourne (Australia) . . . . . [6798-66]

**Design and implementation of wafer transporting system for photolithographer**, Kai Wang, Tsinghua Univ. (China) . . . . . [6798-67]

**Friday 7 December**

**Plenary Session**

**Room: Manning Clark Ctr T1. . . . .Fri. 09.00 to 10.30**

**Introduction of Plenary Speakers**

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

09.00: **Quantum Dots and Nanowires for Optoelectronic Device Applications (Presentation Only)**, Chennupati Jagadish, The Australian National Univ. (Australia)

09.45: **Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine (Presentation Only)**, Vijay K. Varadan, Univ. of Arkansas

**SESSION 7**

**Room: Manning Clark Ctr T4. . . . .Fri. 11.00 to 12.00**

**Materials and Packaging**

*Session Chair: Anthony Edward Parker, Macquarie Univ. (Australia)*

11.00: **Circuit implementation of a theoretical model of trap centers in GaAs and GaN devices**, James G. Rathmell, The Univ. of Sydney (Australia); Anthony E. Parker, Macquarie Univ. (Australia). . . . . [6798-26]

11.20: **Reliability evaluation for solder joints in embed electronic packages**, Masashi Yamabe, Quang Yu, Tadahihiro Shibutani, Masaki Shiratori, Yokohama National Univ. (Japan). . . . . [6798-27]

11.40: **Interconnect enhancement for advanced 3D sensor packaging**, Silke A. Spiesshoefer, Engineering Systems Solutions, Inc.; Vijay K. Varadan, Univ. of Arkansas. . . . . [6798-28]

**Lunch Break** . . . . . 12.00 to 13.30

**SESSION 8**

**Room: Manning Clark Ctr T4. . . . . Fri. 13.30 to 15.10**

**Advanced Devices**

*Session Chair: James Grantley Rathmell, The Univ. of Sydney (Australia)*

13.30: **Smart optical sensors and actuators for space exploration** (*Invited Paper*), Natalie Clark, NASA Langley Research Ctr. . . . . [6798-30]

14.10: **Using over-sampled single-bit representation for velocity estimation in vision systems**, Brian W. H.Ng, Si T. Nguyen, The Univ. of Adelaide (Australia) . . . . . [6798-31]

14.30: **Implementation of millimeter-wave power amplifiers in silicon germanium**, Michael J. Boers, Macquarie Univ. (Australia); Neil Weste, NHEW R&D Pty Ltd. (Australia); Anthony E. Parker, Macquarie Univ. (Australia). [6798-32]

14.50: **Reconfigurable RFID reader**, Behnam Jamali, The Univ. of Adelaide (Australia) . . . . . [6798-33]

**Refreshment Break** . . . . . 15.10 to 15.40

**SESSION 9**

**Room: Manning Clark Ctr T4. . . . . Fri. 15.40 to 17.20**

**Sensors and Actuators**

*Session Chair: Alireza Moini, Silverbrook Research Pty. Ltd. (Australia)*

15.40: **Semiconductor terahertz emitters** (*Invited Paper*), Stuart Hargreaves, Roger A. Lewis, Univ. of Wollongong (Australia) . . . . . [6798-34]

16.20: **Wireless acoustic communications for autonomous agents in structural health monitoring sensor networks**, Graham Wild, Steven Hinckley, Edith Cowan Univ. (Australia) . . . . . [6798-35]

16.40: **Low-voltage organic strain sensor on plastic using polymer/high-K inorganic hybrid gate dielectrics**, Soyoun Jung, Taeksoo Ji, Vijay K. Varadan, Univ. of Arkansas . . . . . [6798-36]

17.00: **Electromagnetic micro-actuators, micro-motors, and micro-robots**, Marco Feldmann, Andreas Waldschik, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany) . . . . . [6798-38]



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# BioMEMS and Nanotechnology III

Conference Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

Conference Co-Chairs: **Derek Abbott**, The Univ. of Adelaide (Australia); **Kouros Kalantar-Zadeh**, Royal Melbourne Institute of Technology (Australia); **Tiziana Di Matteo**, The Australian National Univ. (Australia); **Sergey M. Bezrukov**, National Institutes of Health

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## Wednesday 5 December

### Plenary Session

Opening Remarks and Welcome

Room: Manning Clark Ctr T1 ..... Wed. 08.30 to 09.00

**Professor Lawrence Cram**, Deputy Vice Chancellor, The Australian National Univ. (Australia)

Plenary Presentations ..... 09.00 to 10.30

#### Introduction of Plenary Speakers

**Prof. Jim Williams**, Director, Research School of Physical Sciences, The Australian National Univ. (Australia)

09.00: **Conducting Organic Nanostructures and their use in Medical Bionics (Presentation Only)**, Gordon G. Wallace, Univ. of Wollongong (Australia)

09.45: **Recent Progress and Future Prospect of Photonic Crystals (Presentation Only)**, Susumu Noda, Kyoto Univ. (Japan)

### SESSION 1

Room: Manning Clark Ctr T2 ..... Wed. 11.00 to 12.30

#### Nanoscale Interactions and Devices I

Session Chair: **Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

11.00: **A symmetry breaking model for X-chromosome inactivation (Invited Paper)**, Mario Nicodemi, Univ. degli Studi di Napoli Federico II (Italy) ... [6799-01]

11.30: **AFM study on the attachment of bacteria to a patterned surface with a particular hydrophobicity/hydrophilicity**, Hailong Zhang, Andras Komaromy, Monash Univ. (Australia); Peter J. Livingston, Monash Univ. (Australia) and Swinburne Univ. of Technology (Australia); Reinhard Boysen, Milton Hearn, Monash Univ. (Australia); Dan V. Nicolau, Monash Univ. (Australia) and The Univ. of Liverpool (United Kingdom) ..... [6799-02]

11.50: **The molecular adsorption-type endotoxin detection system using immobilized ε-polylysine**, Katsutoshi Ooe, Akihito Tsuji, Shun Ito, Ritsumeikan Univ. (Japan); Naoki Nishishita, Yoshiaki Hirano, Osaka Institute of Technology (Japan) ..... [6799-03]

12.10: **Analysis and feasibility of chemical recording using thermally sensitive liposomes**, Maria E. Tanner, Jonathan Protz, Duke Univ. .... [6799-04]

Lunch Break ..... 12.30 to 13.30

### SESSION 2

Room: Manning Clark Ctr T2 ..... Wed. 13.30 to 15.20

#### Nanoscale Interactions and Devices II

Session Chair: **Nicolas H. Voelcker**, Flinders Univ. (Australia)

13.30: **DNA-conjugated metal nanoparticle for bioanalytics, nanophotonics, and nano-electronics (Invited Paper)**, Wolfgang Fritzsche, Andrea Csaki, IPHT Jena (Germany); Robert Moeller, Friedrich-Schiller-Univ. Jena (Germany); Andrea Steinbrueck, Grit Festag, Andreas Wolff, IPHT Jena (Germany); Thomas Schueler, Friedrich-Schiller-Univ. Jena (Germany) ..... [6799-05]

14.00: **Investigations of novel surface chemistry for the development of optical-based porous silicon biosensors**, Martin J. Sweetman, Nicolas H. Voelcker, Sean Graney, Flinders Univ. (Australia) ..... [6799-06]

14.20: **Development of a porous silicon biosensor for the detection of autoimmune diseases**, Andrew O. Jane, Nicolas H. Voelcker, Endre J. Szili, Flinders Univ. (Australia) ..... [6799-07]

14.40: **Control over wettability via surface modification of porous gradients**, Yit-lung Khung, Flinders Univ. (Australia); Martin A. Cole, Univ. of South Australia (Australia); Steve J. McInnes, Nicolas H. Voelcker, Flinders Univ. (Australia) ..... [6799-08]

15.00: **The effect of precipitates on the thermal and mechanical properties of Ni50Ti50 nanopowders and compacts**, Hui-Beng Ng, Christopher Shearwood, Nanyang Technological Univ. (Singapore) ..... [6799-09]

Refreshment Break ..... 15.20 to 15.50

### SESSION 3

Room: Manning Clark Ctr T2 ..... Wed. 15.50 to 17.50

#### Nanoscale Interactions and Devices III

Session Chair: **David J. G. Bakewell**, The Univ. of Liverpool (United Kingdom)

15.50: **Synthesis of silver nanopowder by spark plasma sintering**, Hui-Beng Ng, Christopher Shearwood, Timothy J. White, Nanyang Technological Univ. (Singapore) ..... [6799-10]

16.10: **Effects of surfactants on the formation of microdroplets in the flow focusing microfluidic device**, Yonggang Zhu, Commonwealth Scientific and Industrial Research Organisation (Australia); Nan Wu, The Australian National Univ. (Australia) and Commonwealth Scientific and Industrial Research Organisation (Australia); Mohamed N. Noui-Mehidi, Sue Brown, Commonwealth Scientific and Industrial Research Organisation (Australia); Chris Easton, The Australian National Univ. (Australia); Patrick Leech, Brett Sexton, Commonwealth Scientific and Industrial Research Organisation (Australia) ..... [6799-11]

16.30: **Mechanisms of formation of nanostructures with atomic force microscopy**, Hyungoo Lee, Luohan Peng, Ke Wang, Murat Yapici, Jun Zou, Hong Liang, Texas A&M Univ. .... [6799-12]

16.50: **Influence of addition of larger particles into 3-nm particles of TiO<sub>2</sub> film on the performance of dye-sensitized solar cells**, H. Wang, J. M. Bell, Queensland Univ. of Technology (Australia) ..... [6799-21]

17.10: **Superhydrophobic and superhydrophilic surfaces with Mo and MoOx submicron structures**, Jos L. Campbell, Michael Breedon, Kourosh Kalantar-Zadeh, Royal Melbourne Institute of Technology (Australia) . . . . . [6799-15]

17.30: **Preparation of polymer microdomes containing DNA and their optical property**, Masahiro Wada, Olaf Karthaus, Chitose Institute of Science and Technology (Japan) . . . . . [6799-16]

### Standby Presentations

18.11: **Surface acoustic-wave-device based wireless passive microvalve for microfluidic applications**, Don W. Dissanayake, Said F. Al-Sarawi, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6799-17]

16.50: **Novel electromagnetic micropump**, Marco Feldmann, Stefanie Demming, Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany) . . . . . [6799-32]

17.10: **Induced movement of the magnetic beads in a microfluidic channel**, Bakir Babic, Rajesh Ghai, Krassen Dimitrov, The Univ. of Queensland (Australia) . . . . . [6799-33]

### Posters-Thursday

**Room: Manning Clark Ctr Foyer . . . . . Thurs. 18.00 to 19.30**

**Investigation of biological complexes using THz spectroscopy**, Inke Jones, Bernd M. Fischer, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6799-48]

**Improved protein-adsorption resistance of digital microfluidic device via surface coating and structure modification**, Shun-Yuan Chen, Chih-Sheng Yu, Heng-Cang Hu, Yi-Chiu Hu, Instrument Technology Research Ctr. (Taiwan) . . . . . [6799-51]

**Hydrogen gas sensors fabricated from polyanisidine nanofibers deposited on layered SAW transducer**, Laith Al-Mashat, Royal Melbourne Institute of Technology (Australia); Henry Tran, Richard B. Kaner, Univ. of California/Los Angeles; Wojtek B. Wlodarski, Kourosh Kalantar-Zadeh, Royal Melbourne Institute of Technology (Australia) . . . . . [6799-52]

**Portable multi-immunosensing LOC triggered by air bladder**, Taeho Kang, SinWook Park, JunHwang Lee, Hyun C. Yoon, Sang Sik Yang, Ajou Univ. (South Korea) . . . . . [6799-53]

**Nanostructured transfection micro-arrays: enhancement of transfection efficiency of mammalian cells by combining DNA surface adsorption and electroporation**, Rhiannon Creasey, Flinders Univ. (Australia); Andrew L. Hook, Flinders Univ. (Australia) and Commonwealth Scientific and Industrial Research Organisation (Australia); Nicolas H. Voelcker, Flinders Univ. (Australia) and Australia CSIRO Food Futures Flagship (Australia); Helmut W. Thissen, Flinders Univ. (Australia) and Australia CSIRO Food Futures Flagship (Australia) and Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6799-54]

**Toward quality control of food using Terahertz**, Benjamin S. Y. Ung, Bernd M. Fischer, Brian W. Ng, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6799-55]

**Simple micropatterning of proteins using polyelectrolyte multilayers and microcontact printing**, Chang-Soo Lee, Ji-Hye Lee, Chungnam National Univ. (South Korea) . . . . . [6799-57]

**Degradation behaviors of electrospun resorbable polymeric nanofibers for tissue engineering**, Yixiang Dong, Susan Liao, Casey Chan, Seeram Ramakrishna, National Univ. of Singapore (Singapore) . . . . . [6799-58]

**Effect of nanomaterials on electrical and mechanical properties of epoxy composites**, Anil Chinnabhandar, Royal Melbourne Institute of Technology (Australia) . . . . . [6799-59]

## Thursday 6 December

### Plenary Session

**Room: Manning Clark Ctr T1 . . . . . Thurs. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Derek Abbott**, The Univ. of Adelaide (Australia)

09.00: **Photonic Metamaterials: Optics Start Walking on Two Feet** (*Presentation Only*), Martin Wegener, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

09.45: **Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis** (*Presentation Only*), Stephen Hyde, The Australian National Univ. (Australia)

### SESSION 4

**Room: Manning Clark Ctr T2 . . . . . Thurs. 11.00 to 12.10**

#### BioMEMS, Biosensors, and Microfluids I

*Session Chair: Mario Nicodemi*, Univ. degli Studi di Napoli Federico II (Italy)

11.00: **Reconstructive approach for on-chip tissue/organ model screening optical-/electric-monitoring system for drug discovery and toxicology** (*Invited Paper*), Kenji Yasuda D.D.S., Tokyo Medical and Dental Univ. (Japan) . . . . . [6799-19]

11.30: **The interaction of cells with microstructured surfaces**, Andras Komaromy, Monash Univ. (Australia) . . . . . [6799-20]

11.50: **Temperature in microfabricated cell electro-rotation chip**, Guolin Xu, Daniel Lee, Vyshnavi Mohanraj, Institute of Bioengineering and Nanotechnology (Singapore); Jackie Y. Ying, Massachusetts Institute of Technology . . . . . [6799-22]

**Lunch Break . . . . . 12.10 to 13.30**

### SESSION 5

**Room: Manning Clark Ctr T2 . . . . . Thurs. 13.30 to 17.30**

#### BioMEMS, Biosensors, and Microfluids II

*Session Chair: Dan V. Nicolau*, The Univ. of Liverpool (United Kingdom)

13.30: **Biological applications of microscope profiler** (*Invited Paper*), Sen Han, Veeco Instruments, Inc. . . . . [6799-23]

14.00: **Thermocapillary actuation and temperature cycling of liquid plugs**, Jiao Zhenjun, Nanyang Technological Univ. (Singapore) . . . . . [6799-24]

14.20: **Development of a blood-extraction device for a miniature SMBG system**, Yoshimitsu Matsuura, Osaka Institute of Technology (Japan); Toshiyuki Uenoya, Advanced Software Technology & Mechatronics Research Institute of Kyoto (Japan); Kazuyoshi Tsuchiya, Tokai Univ. (Japan); Yasutomo Uetsuji, Osaka Institute of Technology (Japan) . . . . . [6799-25]

14.40: **A novel technique for fabricating high-aspect ratio silicon microneedles for transdermal drug delivery**, Hui-Beng Ng, Christopher Shearwood, Nanyang Technological Univ. (Singapore); Ai-Ling Teo, Shabbir Mochhala, DSO National Labs. (Singapore) . . . . . [6799-26]

15.00: **Ultra-small volume interdigital sensors for the measurement of human breast milk**, Adrian J. Keating, Wei W. Pang, Peter Hartmann, The Univ. of Western Australia (Australia) . . . . . [6799-27]

**Refreshment Break . . . . . 15.20 to 15.50**

15.50: **Design of painless microneedle for blood-extraction system**, Kazuyoshi Tsuchiya, Keisuke Isobata, Miho Sato, Tokai Univ. (Japan); Yasutomo Uetsuji, Osaka Institute of Technology (Japan); Eiji Nakamachi, Doshisha Univ. (Japan); Kagemasa Kajiwara, Ninoru Kimura, Tokai Univ. (Japan) . . . . . [6799-28]

16.10: **Experimental investigation of fluidic penetration into microchannels**, Salvatore Girardo, Istituto Nazionale per la Fisica della Materia (Italy); Elisa Mele, Univ. degli Studi di Lecce (Italy); Lucia Caprioli, Roberto Cingolani, Dario Pisignano, Istituto Nazionale per la Fisica della Materia (Italy) . . . . . [6799-29]

16.30: **Low-cost optical particle detection for lab-on-chip systems based on DVD technology**, Andrew L. Clow, Univ. of Canterbury (New Zealand); Rainer Künemeyer, The Univ. of Waikato (New Zealand); Paul Gaynor, Univ. of Canterbury (New Zealand); John C. Sharpe, The Horticulture and Food Research Institute of New Zealand Ltd. (New Zealand) . . . . . [6799-31]

## Friday 7 December

### Plenary Session

**Room: Manning Clark Ctr T1 . . . . . Fri. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

09.00: **Quantum Dots and Nanowires for Optoelectronic Device Applications** (*Presentation Only*), Chennupati Jagadish, The Australian National Univ. (Australia)

09.45: **Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine** (*Presentation Only*), Vijay K. Varadan, Univ. of Arkansas

### SESSION 6

**Room: Manning Clark Ctr T2 . . . . . Fri. 11.00 to 12.30**

#### BioMEMS, Biosensors, and Microfluids III

*Session Chair: Maan M. Alkaiis*, Univ. of Canterbury (New Zealand)

11.00: **Bio-imprint replication of single cells on a biochip** (*Invited Paper*), Maan M. Alkaiis, Univ. of Canterbury (New Zealand); John J. Evans, Univ. of Otago (New Zealand) . . . . . [6799-34]

11.30: **Preparation of 2D gradient surfaces for the analysis of cell-surface interactions**, Lauren R. Clements, Flinders Univ. (Australia) and Commonwealth Scientific and Industrial Research Organisation (Australia) and CSIRO Food Futures Flagship (Australia); Helmut W. Thissen, Commonwealth Scientific and Industrial Research Organisation (Australia) and CSIRO Food Futures Flagship (Australia) and Flinders Univ. (Australia); Nicolas H. Voelcker, Flinders Univ. (Australia) and CSIRO Food Futures Flagship (Australia) . . . . . [6799-35]

11.50: **Characterization of microflows using micro-PIV and CFD to study the protein aggregation process**, Francisco J. Tovar-Lopez, Arnan Mitchell, Royal Melbourne Institute of Technology (Australia); Gary Rosengarten, Univ. of New South Wales (Australia) . . . . . [6799-36]

12.10: **Micropatterning of polymer-based optical oxygen sensors for lab-on-chip applications**, Volker M. Nock, Richard J. Blaikie, Tim David, Univ. of Canterbury (New Zealand) ..... [6799-37]

**Lunch Break** ..... 12.30 to 13.30

**SESSION 7**

**Room: Manning Clark Ctr T2. .... Fri. 13.30 to 14.10**

**BioMEMS, Biosensors, and Microfluids IV**

*Session Chair: David J. G. Bakewell*, The Univ. of Liverpool (United Kingdom)

13.30: **Microfluidic device for controlled dilution and sorting of droplets by electrokinetic driving forces**, Maria P. Carreras, Stephan Mohr, Peter R. Fielden, Nicholas J. Goddard, The Univ. of Manchester (United Kingdom) ..... [6799-38]

13.50: **Design and fabrication of polymer microfluidic chip for ESI-MS**, Sana Malahat, Pio G. Iovenitti, Igor Sbarski, Swinburne Univ. of Technology (Australia) ..... [6799-39]

**SESSION 8**

**Room: Manning Clark Ctr T2. .... Fri. 14.10 to 17.20**

**Modelling and THZ Technology**

*Session Chair: Dan V. Nicolau*, The Univ. of Liverpool (United Kingdom)

14.10: **Neural network prediction of protein adsorption**, Dan V. Nicolau, Jr., Univ. of Oxford (United Kingdom); Ewa Paszek, Elena Vasina, Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) ..... [6799-40]

14.30: **Neurobiological-inspired visual velocity estimation system**, Muamar M. Ahmad, Andre Paus, Klaus Obermayer, Technische Univ. Berlin (Germany) ..... [6799-41]

14.50: **Signal compression in biological sensory systems: information theoretic performance limits**, Mark D. McDonnell, The Univ. of Adelaide (Australia) ..... [6799-42]

**Refreshment Break** ..... 15.10 to 15.40

15.40: **Nanosize particle movement in time-modulated nonuniform electric fields: a Fourier-Bessel series model**, David J. Bakewell, The Univ. of Liverpool (United Kingdom); Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) and Monash Univ. (Australia) ..... [6799-43]

16.00: **Finite element modeling of SAW correlator**, Ajay C. Tikka, Said F. Al-Sarawi, Derek Abbott, The Univ. of Adelaide (Australia) ..... [6799-44]

16.20: **Estimation of atomic hydrophobicities using molecular dynamics simulation of peptides**, Marie Held, Dan V. Nicolau, The Univ. of Liverpool (United Kingdom) ..... [6799-45]

16.40: **Feature extraction of elite half-pipe snowboarding key performance variables using body mounted inertial sensors**, Jason W. Harding D.D.S., Australian Institute of Sport (Australia) and Griffith Univ. (Australia) and Olympic Winter Institute of Australia (Australia); James W. Small, Daniel A. James, Griffith Univ. (Australia) ..... [6799-46]

17.00: **The Einstein relation for the diffusivity mobility ratio**, Subhamoy Singharoy, JIS College Of Engineering (India) ..... [6799-47]

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# Device and Process Technologies for Microelectronics, MEMS, Photonics, and Nanotechnology IV

Conference Chair: **Hark Hoe Tan**, The Australian National Univ. (Australia)

Conference Co-Chairs: **Jung-Chih Chiao**, The Univ. of Texas/Arlington; **Lorenzo Faraone**, The Univ. of Western Australia (Australia); **Chennupati Jagadish**, The Australian National Univ. (Australia); **Jim Williams**, The Australian National Univ. (Australia); **Alan R. Wilson**, Defence Science and Technology Organisation (Australia)

Program Committee: **Tomaso Aste**, The Australian National Univ. (Australia); **Richard J. Blaikie**, Univ. of Canterbury (New Zealand); **Andrés Cuevas**, The Australian National Univ. (Australia); **John M. Dell**, The Univ. of Western Australia (Australia); **Andrew S. Dzurak**, Univ. of New South Wales (Australia); **Robert G. Elliman**, The Australian National Univ. (Australia); **Catherine P. Foley**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Paul D. Franzon**, North Carolina State Univ.; **Lan Fu**, The Australian National Univ. (Australia); **Qiang Gao**, The Australian National Univ. (Australia); **Martin Andrew Green**, Univ. of New South Wales (Australia); **Cläs-Göran Granqvist**, Uppsala Univ. (Sweden); **Alex R. Hamilton**, Univ. of New South Wales (Australia); **Alex J. Hariz**, Univ. of South Australia (Australia); **Laszlo Bela Kish**, Texas A&M Univ.; **Ronald Albert Lawes**, Imperial College London (United Kingdom); **Chantal G. Khan-Malek**, Ctr. National de la Recherche Scientifique (France); **Ajay P. Malshe**, Univ. of Arkansas; **Massimiliano Polichetti**, Univ. degli Studi di Salerno (Italy); **Harry E. Ruda**, Univ. of Toronto (Canada); **Petra Rudolf**, Univ. of Groningen (Netherlands); **Michelle Y. Simmons**, Univ. of New South Wales (Australia); **Michael S. Shur**, Rensselaer Polytechnic Institute; **William C. Tang**, ; **Ugo Valbusa**, Univ. degli Studi di Genova (Italy); **Vasundara V. Varadan**, Univ. of Arkansas; **Nicolas H. Voelcker**, Flinders Univ. (Australia)

## Wednesday 5 December

### Plenary Session

#### Opening Remarks and Welcome

Room: Manning Clark Ctr T1 . . . . . Wed. 08.30 to 09.00

**Professor Lawrence Cram**, Deputy Vice Chancellor, The Australian National Univ. (Australia)

Plenary Presentations . . . . . 09.00 to 10.30

#### Introduction of Plenary Speakers

**Prof. Jim Williams**, Director, Research School of Physical Sciences, The Australian National Univ. (Australia)

09.00: **Conducting Organic Nanostructures and their use in Medical Bionics (Presentation Only)**, Gordon G. Wallace, Univ. of Wollongong (Australia)

09.45: **Recent Progress and Future Prospect of Photonic Crystals (Presentation Only)**, Susumu Noda, Kyoto Univ. (Japan)

### SESSION 1

Room: Manning Clark Ctr T3 . . . . . Wed. 11.00 to 12.00

#### Electrochromic and Microfluidics

Session Chair: **Hark Hoe Tan**, The Australian National Univ. (Australia)

11.00: **Electrochromic device technology based on nanoporous nanocrystalline thin films**, Cläs-Göran Granqvist, Sr., Uppsala Univ. (Sweden) . . . . . [6800-01]

11.20: **Microfluidic photonic crystal nanocavities**, Cameron L. C. Smith, The Univ. of Sydney (Australia) . . . . . [6800-02]

11.40: **Controllable wetting of TiO<sub>2</sub> surfaces**, Alicia G. Toh, Nanyang Technological Univ. (Singapore); Mark G. Nolan, Singapore Institute of Manufacturing Technology (Singapore); David L. Butler, Nanyang Technological Univ. (Singapore) . . . . . [6800-03]

Lunch Break . . . . . 12.00 to 13.30

### SESSION 2

Room: Manning Clark Ctr T3 . . . . . Wed. 13.30 to 15.10

#### Organic Devices and C-based Nanostructures

Session Chair: **Richard J. Blaikie**, Univ. of Canterbury (New Zealand)

13.30: **New routes to organic electronic devices (Invited Paper)**, Adam P. Micolich, Laurence Bell, Jason Chen, Rifat Ullah, Alex R. Hamilton, Univ. of New South Wales (Australia) . . . . . [6800-04]

14.00: **Toward the origin of positive magnetisation in carbon nanoclusters (Invited Paper)**, Andrei V. Rode, The Australian National Univ. (Australia); Denis Arcon, Andrej Zorko, Institute Jozef Stefan (Slovenia); Zvonko Jaglicic, Univ. v Ljubljani (Slovenia); Andrew G. Christy, Nathan R. Madsen, Barry Luther-Davies, The Australian National Univ. (Australia); Desmond Lau, Dougal McCulloch, RMIT Univ. (Australia) . . . . . [6800-05]

14.30: **Inkjet printing: a viable tool for processing polymer carbon nanotube composites**, Marc in het Panhuis, Univ. of Wollongong (Australia) . . . . . [6800-06]

14.50: **Fabrication of carbon nanotube arrays for field emission and sensor devices by nano-imprint lithography**, Yucheng Ding, Hongzhong Liu, Yin Lei, Hongbo Lan, Bingheng Lu, Xi'an Jiaotong Univ. (China) . . . . . [6800-07]

Refreshment Break . . . . . 15.10 to 15.40

### SESSION 3

Room: Manning Clark Ctr T3 . . . . . Wed. 15.40 to 17.20

#### Nanowires

Session Chairs: **Shuji Hasegawa**, The Univ. of Tokyo (Japan); **Michelle Y. Simmons**, Univ. of New South Wales (Australia)

15.40: **Cluster-based electronic devices (Invited Paper)**, Simon A. Brown, Univ. of Canterbury (New Zealand) . . . . . [6800-08]

16.10: **Engineering of hole-spin polarization in nanowires (Invited Paper)**, Ulrich Zuelicke, Dan Csontos, Massey Univ. (New Zealand) . . . . . [6800-09]

16.40: **Synthesis, structure, and optical doping of silica nanowires**, Robert G. Elliman, Tae Hyun Kim, Andrew Wilkinson, The Australian National Univ. (Australia); Praveen Sekhar, Shekhar Bhansali, Univ. of South Florida . . . . . [6800-12]

17.00: **Local electronic structure and luminescence properties of ZnO nanowires**, Matthew Foley, Cuong Ton-That, Matthew R. Phillips, Univ. of Technology/Sydney (Australia) . . . . . [6800-13]

### Posters-Wednesday

Room: Manning Clark Ctr Foyer . . . . . Wed. 18.00 to 19.30

**Photovoltaic properties of ferroelectrics and its applications to optical sensor**, Masaaki Ichiki, Harumi Furue, Takeshi Kobayashi, Yasushi Morikawa, Kazuhiro Nonaka, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-37]

**Optical and conductivity dependence on doping concentration of polyaniline nanofibers**, Hasan Qasim, Iouri Belski, Abu Z. Sadek, Wojtek B. Wlodarski, RMIT Univ. (Australia); Richard B. Kaner, Univ. of California/Los Angeles; Kourosh Kalantar Zadeh, RMIT Univ. (Australia) . . . . . [6800-39]

**Optical characteristics of coated long-period fiber grating and its sensing application**, Zhengtian Gu, Univ. of Shanghai for Science and Technology (China) . . . . . [6800-41]

**Process development of integrated SOI star couplers for waveguide scattering loss measurement**, Kuan Pei Yap, Carleton Univ. (Canada); Jean Lapointe, Boris Lamontagne, André Delâge, Siegfried Janz, National Research Council Canada (Canada); Barry A. Syrett, Carleton Univ. (Canada) . . . . . [6800-43]

**Investigation of the growth mechanism of ZnO nanorods from sodium hydroxide solutions**, Michael Breedon, Wojtek B. Wlodarski, Kourosh Kalantar-Zadeh, Royal Melbourne Institute of Technology (Australia) . . . . . [6800-44]

**Development of a multifunctional substrate process using novel liquid-crystal polymer materials**, Haijing Lu, Lai Lai Wai, Lim Lay Huat, Zheng Sun, Albert C. W.Lu, Singapore Institute of Manufacturing Technology (Singapore) . . . . . [6800-45]

**Improved device performance of thermally annealed InGaAs/GaAs quantum dot infrared photodetectors by using of GaP strain compensation layers**, Lan Fu, Ian Mckerracher, Hark Hoe Tan, Chennupati Jagadish, The Australian National Univ. (Australia); Nenad V. Vukmirovic, P. Harrison, Univ. of Leeds (United Kingdom) . . . . . [6800-46]



- Substrate temperature effects on optical and electrical properties of Al-doped ZnO**, Deuk Young Kim, Junje Seong, Hoon Young Cho, Youn Hwan Lee, Woochul Yang, Dongguk Univ. (South Korea) . . . . . [6800-47]
- Selective deposition of carbon nanotubes on SiO<sub>2</sub> surface using parylene lift-off technique**, Tran T. Hong, Lee J. Woo, Ju B. Kwon, Korea Univ. (South Korea) . . . . . [6800-49]
- A micro-solar heater for portable energy generation**, Raul E. Zimmerman, Owen The, Gary Rosengarten, Univ. of New South Wales (Australia) . . . . . [6800-50]
- Development of a flexible luminous device using hollow cathode discharge**, Geunyoung Kim, Kang-il Kim, Inho Lim, Sang Sik Yang, Soo-ghee Oh, Ajou Univ. (South Korea) . . . . . [6800-51]
- Positron annihilation lifetime spectroscopy (PALS) and small angle x-ray scattering (SAXS) of self-assembled amphiphiles**, Aurelia W. Dong, Monash Univ. (Australia); Carlos Pascual-Izarrar, Commonwealth Scientific and Industrial Research Organisation (Australia); Yao-Da Dong, Monash Univ. (Australia); Steven J. Pas, Anita J. Hill, Commonwealth Scientific and Industrial Research Organisation (Australia); Ben J. Boyd, Monash Univ. (Australia); Calum Drummond, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6800-53]
- Characterization of epi-ready n+-GaAs (100) surfaces by SPV transient**, Juha A. T. Sinkkonen, Sergei Novikov, Aapo Varpula, Teknillinen Korkeakoulu (Finland); Rami Pellikka, Coherent Finland Oy (Finland) . . . . . [6800-54]
- The investigations of InAs quantum dots overgrown on In<sub>0.1</sub>Ga<sub>0.9</sub>As surfactant layer and 10° off-angle (100) GaAs substrate**, Shiang-Feng Tang, Chung-Shan Institute of Science and Technology (Taiwan); Min-Yu Hsu, National Taipei Univ. of Technology (Taiwan); Cheng-Der Chiang, Chung-Shan Institute of Science and Technology (Taiwan); C. C. Su, National Taipei Univ. of Technology (Taiwan) . . . . . [6800-55]
- X-ray lithography of a fast-removable positive photoresist for fabrication of high-aspect-ratio microstructures**, Naphat Chathirat, Prayoon Songsiririthigul, Prapong Klysubun, National Synchrotron Research Ctr. (Thailand); Nimit Chomnawang, Suranaree Univ. of Technology (Thailand) and National Synchrotron Research Ctr. (Thailand) . . . . . [6800-56]
- Nucleation and interface chemistry of ZnO/SiC heterostructure**, Almamun Ashrafi, H. H. Tan, Chennupati Jagadish, The Australian National Univ. (Australia); Y. Segawa, The Institute of Physical and Chemical Research (RIKEN) (Japan) . . . . . [6800-57]
- Effect of thermal stress and diameter on I-V characteristics of template synthesized Cu-Se heterostructures**, Shiv K. Chakarvarti, National Institute of Technology/Kurukshetra (India); Meeru Chaudhri, Kurukshetra Univ. (India) . . . . . [6800-58]
- SDOE optimization tunes CCVD of MWCNTs for specialized applications**, Barry W. Halstead, Narelle Brack, La Trobe Univ. (Australia); Andrew Rider, Defense Science and Technology Organisation (Australia); Paul J. Pigram, La Trobe Univ. (Australia) . . . . . [6800-59]
- Etching lithium niobate during Ti diffusion process**, Vijay Prasad Sivan, Lam Bui, Dinesh Venkatachalam, Anthony S. Holland, Suresh Bhargava, Royal Melbourne Institute of Technology (Australia); Timothy S. Priest, Defence Science and Technology Organisation (Australia); Arnan Mitchell, Royal Melbourne Institute of Technology (Australia) . . . . . [6800-60]
- Structural and magnetic properties of nanocrystalline NiZn ferrite synthesized by reverse micelle technique**, Sangeeta Thakur, S. C. Katyal, Jaypee Univ. of Information Technology (India); Mahavir Singh, Himachal Pradesh Univ. (India) . . . . . [6800-62]
- Quantum transport and multiple scattering in two-dimensional electron and hole systems**, Sarah MacLeod, Theodore P. Martin, Adam P. Micolich, Alex R. Hamilton, Univ. of New South Wales (Australia) . . . . . [6800-63]
- Optical properties of template synthesized nowalled ZnS microtubules**, Rajesh Kumar, Haryana College of Technology and Management (India); Shiv K. Chakarvarti, National Institute of Technology/Kurukshetra (India) . . . . . [6800-64]
- Photonic crystal laser devices coupled to single-mode waveguides**, Haroldo T. Hattori, Hark Hoe Tan, Chennupati Jagadish, The Australian National Univ. (Australia) . . . . . [6800-65]
- The synthesis and structure of silica nanowires**, Tae Hyun Kim, Andrew Wilkinson, Robert G. Elliman, The Australian National Univ. (Australia) . . . . . [6800-66]
- Characteristics of hetero-junction diodes based on ion-beam sputtered ZnO thin films**, John V. Kennedy, Jim Pithie, Andreas Markwitz, Institute of Geological & Nuclear Sciences (New Zealand) . . . . . [6800-67]
- A surface-plasmon resonance phase modulation bio-reaction detection system with (5,1) phase-shifting algorithm**, Yi-Hung Chen, National Taiwan Univ. (Taiwan); Shu-Sheng Lee, National Taiwan Ocean Univ. (Taiwan); Chih-Kung Lee, National Taiwan Univ. (Taiwan); Wei-Zhe Tseng, Yi-Hung Hsu, National Taiwan Ocean Univ. (Taiwan) . . . . . [6800-68]
- A novel fabrication method of needle array combined x-ray gray mask with LIGA process**, Harutaka Mekar, Takayuki Takano, Koichi Awazu, Masaharu Takahashi, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-69]
- Design, fabrication, and testing of 3C-SiC sensors for high-temperature applications**, Michele Pozzi, Alun J. Harris, James S. Burdess, Univ. of Newcastle Upon Tyne (United Kingdom); Petros Argyrakis, Kin K. Lee, Rebecca Cheung, Univ. of Edinburgh (United Kingdom); Gordon J. Phelps, Nicholas G. Wright, Univ. of Newcastle Upon Tyne (United Kingdom) . . . . . [6800-70]
- Modeling of high-sensitivity capacitive MEMS microphone with spring-supported diaphragm**, Norizan Mohamad, Pio G. Iovenitti, Swinburne Univ. of Technology (Australia); Thurai Vinay, RMIT Univ. (Australia) . . . . . [6800-73]
- Prototype and demonstration of self-actuating and detecting MEMS gas sensor based on microresonating cantilever**, Zheng You, Jiahao Zhao, Shijie Yu, Qin Zhou, Ke Li, Yan Gang Bi, Tsinghua Univ. (China) . . . . . [6800-74]
- Novel MEMS-based thermometer with low power consumption for health-monitoring network application**, Yi Zhang, Tsuyoshi Ikehara, Jian Lu, Takeshi Kobayashi, Masaaki Ichiki, Toshihiro Itoh, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-75]
- Fabrication of 45° micromirror using TMAH solution on <100> silicon**, Yi Wei Xu, Chee Yee Kwok, Aron Michael, Univ. of New South Wales (Australia) [6800-76]
- Measurements of silicon dry-etching rates and profiles in MEMS foundries and their application to MEMS design software**, Takayuki Takano, Tsuyoshi Ikehara, Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-77]
- Mechanical quality factor of micro-cantilevers for mass-sensing applications**, Jian Lu, Tsuyoshi Ikehara, Yi Zhang, National Institute of Advanced Industrial Science and Technology (Japan); Takashi Mihara, Olympus Corp. (Japan); Ryutaro Maeda, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-78]
- Sensing gap reconfigurable capacitive type MEMS accelerometer**, Chang H. Je, Myunglae Lee, Sunghye Jung, Sungsik Lee, Gunn Hwang, Changauck Choi, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6800-79]
- Study on in-situ measuring method for average stress gradient of a MEMS film**, Hua Rong, Ming Wang, Nanjing Normal Univ. (China) . . . . . [6800-80]
- Diamond-like carbon films prepared by periodic pulsed laser deposition and laser irradiation**, Jaanus Eskusson, Raivo Jaanisoo, Enn Lust, Tartu Ülikool (Estonia) . . . . . [6800-81]
- The micropump using bulk Pb(Zr,Ti)O<sub>3</sub> for microfluidic devices**, Ryohei Sakamoto, Van T. Dau, Dzung V. Dao, Katsuhiko Tanaka, Susumu Sugiyama, Ritsumeikan Univ. (Japan) . . . . . [6800-82]
- Design of MEMS gyroscope for wide-range resonance frequency adjustment**, Azrif Manut, Agus Santoso Tamsir, M. Alias Dzuzlindah, Suraya Sulaiman, MIMOS Berhad (Malaysia) . . . . . [6800-83]
- The effect of deposition and processing conditions on the thermal stability of sputter-deposited hafnium oxide and hafnium-silicate films**, Nawaz S. Muhammad, Kidane Belay, Robert G. Elliman, The Australian National Univ. (Australia) . . . . . [6800-84]
- The effect of deposition and processing conditions on the optical properties of sputter-deposited hafnium oxide thin films**, Kidane Belay, Nawaz S. Muhammad, Robert G. Elliman, The Australian National Univ. (Australia) [6800-85]
- RF-MEMS switches with new beam geometries: improvement of yield and lowering of actuation voltage**, King Y. Chan, Univ. of New South Wales (Australia); Mojgan Daneshmand, Raafat R. Mansour, Univ. of Waterloo (Canada); Rodica Ramer, Univ. of New South Wales (Australia) . . . . . [6800-87]
- RF-MEMS switches for wireless applications: design and performance**, Hamood Khawaja, Jafar H. Babaei, Rodica Ramer, Univ. of New South Wales (Australia) . . . . . [6800-88]
- Nanometric material removal using the electrokinetic phenomenon**, Cheng-Seng Leo, Nanyang Technological Univ. (Singapore); Travis L. Blackburn, Georgia Institute of Technology; Gary S. H. Ng, Singapore Institute of Manufacturing Technology (Singapore); Chun Yang, David L. Butler, Nanyang Technological Univ. (Singapore); Steven Danyluk, Georgia Institute of Technology . . . . . [6800-90]
- Schottky diode fabrication on cellulose electro-active paper using polymer semi-conducting material**, Jaehwan Kim, Sang Yeol Yang, Kwang Sun Kang, Inha Univ. (South Korea) . . . . . [6800-91]

**Thursday 6 December**

**Plenary Session**

**Room: Manning Clark T1 . . . . . Thurs. 09.00 to 10.30**

**Introduction of Plenary Speakers**

**Prof. Derek Abbott**, The Univ. of Adelaide (Australia)

09.00: **Photonic Metamaterials: Optics Start Walking on Two Feet** (*Presentation Only*), Martin Wegener, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

09.45: **Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis** (*Presentation Only*), Stephen Hyde, The Australian National Univ. (Australia)

**SESSION 4**

**Room: Manning Clark Ctr T3 . . . . . Thurs. 11.00 to 12.00**

**MEMS I**

*Session Chair: Lorenzo Faraone*, The Univ. of Western Australia (Australia)

11.00: **A novel 3D low-voltage electrostatic RF switch with two movable electrodes**, Jafar H. Babaei, Rodica Ramer, Timothy Hesketh, Univ. of New South Wales (Australia) . . . . . [6800-72]

11.20: **The influence of random surface roughness on capillary and Casimir forces**, Peter V. Zwol, George Palasantzas, Jeff de Hosson, Univ. of Groningen (Netherlands) . . . . . [6800-15]

11.40: **Low-temperature deposition of ferroelectric PZT films by hybrid processing: sol-gel method and pulsed laser deposition**, Zhanjie Wang, Tohoku Univ. (Japan) . . . . . [6800-16]

**Lunch Break** . . . . . 12.00 to 13.30

**SESSION 5**

**Room: Manning Clark Ctr T3 . . . . . Thurs. 13.30 to 15.00**

**Transport in Nanostructures and Quantum Computing**

*Session Chair: Robert G. Elliman*, The Australian National Univ. (Australia)

13.30: **Four-tip scanning tunneling microscope for measuring transport in nanostructures** (*Invited Paper*), Shuji Hasegawa, The Univ. of Tokyo (Japan) . . . . . [6800-17]

14.00: **Nuclear spin manipulation in semiconductor nanostructures** (*Invited Paper*), Koji Muraki, NTT Basic Research Labs. (Japan) . . . . . [6800-18]

14.30: **Electron transport through STM-patterned dopants in silicon** (*Invited Paper*), Michelle Y. Simmons, Univ. of New South Wales (Australia) . . . . . [6800-19]

**Refreshment Break** . . . . . 15.00 to 15.40

**SESSION 6**

**Room: Manning Clark Ctr T3 . . . . . Thurs. 15.40 to 18.00**

**Nanofabrication Techniques**

*Session Chairs: Simon A. Brown*, Univ. of Canterbury (New Zealand); *Jung-Chih Chiao*, The Univ. of Texas at Arlington

15.40: **Nano-indentation for patterning and processing of silicon-based materials** (*Invited Paper*), Simon Ruffell, The Australian National Univ. (Australia) . . . . . [6800-20]

16.10: **Nanoscale pattern formation on metal surfaces and films induced by growth and erosion instabilities** (*Invited Paper*), Francesco Buatier de Mongeot, Univ. degli Studi di Genova (Italy) . . . . . [6800-21]

16.40: **Imprinting and electrospinning nanotechnologies for active organic photonics**, Luana Persano, Francesca Di Benedetto, Elisa Mele, Andrea Camposo, Giovanni Paladini, Roberto Cingolani, Dario Pisignano, Istituto Nazionale per la Fisica della Materia (Italy) . . . . . [6800-22]

17.00: **Fabrication of sub-wavelength periodic structures upon high-refractive-index glasses by precision glass molding**, Toshiharu Mori, Kento Hasegawa, Takuji Hatano, Konica Minolta Opto, Inc. (Japan); Haruya Kasa, Kenji Kintaka, Junji Nishii, National Institute of Advanced Industrial Science and Technology (Japan) . . . . . [6800-23]

17.20: **Damage-free focused ion-beam milled ferroelectric nanostructures as building blocks for self assembly**, Michael Hambe, Samantha Wicks, Nagarajan Valanoor, Univ. of New South Wales (Australia); LiWu Chan, Marty Gregg, Queen's Univ. Belfast (Ireland) . . . . . [6800-24]

17.40: **Novel group IV nanomaterials produced by low-energy ion implantation and electron-beam annealing**, Damain Carder, Andreas Markwitz, Institute of Geological and Nuclear Sciences (New Zealand) . . . . . [6800-25]

**Friday 7 December**

**Plenary Session**

**Room: Manning Clark Ctr T1 . . . . . Fri. 09.00 to 10.30**

**Introduction of Plenary Speakers**

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

09.00: **Quantum Dots and Nanowires for Optoelectronic Device Applications** (*Presentation Only*), Chennupati Jagadish, The Australian National Univ. (Australia)

09.45: **Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine** (*Presentation Only*), Vijay K. Varadan, Univ. of Arkansas

**SESSION 7**

**Room: Manning Clark Ctr T3 . . . . . Fri. 11.00 to 12.00**

**MEMS II**

*Session Chair: Sarath D. Gunapala*, Jet Propulsion Lab.

11.00: **Specialized hybrid batch fabrication process for MEMS RF voltage sensors**, Jan Dittmer, Physikalisch-Technische Bundesanstalt (Germany) and Technische Univ. Braunschweig (Germany); Rolf Judaschke, Physikalisch-Technische Bundesanstalt (Germany); Stephanus Büttgenbach, Technische Univ. Braunschweig (Germany) . . . . . [6800-26]

11.20: **A novel out-of-plane micromirror actuator**, Aron Michael, Chee Yee Kwok, Univ. of New South Wales . . . . . [6800-27]

11.40: **Mechanical characteristics of filter structures for MEMS adaptive infrared detectors**, Han Huang, The Univ. of Queensland (Australia); John M. Dell, Laurie Faraone, The Univ. of Western Australia (Australia) . . . . . [6800-28]

**Lunch Break** . . . . . 12.00 to 13.30

**SESSION 8**

**Room: Manning Clark Ctr T3 . . . . . Fri. 13.30 to 15.10**

**Photonics/Optoelectronics**

*Session Chair: Lan Fu*, The Australian National Univ. (Australia)

13.30: **Solid state quantum memory for light based on gradient Stark echoes** (*Invited Paper*), Matthew J. Sellars, Gabriel Hétet, The Australian National Univ. (Australia); Jevon J. Longdell, Univ. of Otago (New Zealand); Annabel L. Alexander, Ping Koy Lam, The Australian National Univ. (Australia) . . . . . [6800-29]

14.00: **Point defect engineered Si sub-bandgap light-emitting diode** (*Invited Paper*), Jiming Bao, Harvard Univ.; Malek Tabbal, American Univ. of Beirut (Lebanon); Supakit Charnvanichborikarn, James S. Williams, The Australian National Univ. (Australia); Michael J. Aziz, Federico Capasso, Harvard Univ. . . . . [6800-30]

14.30: **Dependence of optical properties on the spacer growth temperature of the quantum dot laser structures**, Nurul F. Hasbullah, Jo Shien Ng, Hui-Yun Liu, Mark Hopkinson, John P. David, Tom J. Badcock, David J. Mowbray, Maurice S. Skolnick, Univ. of Sheffield (United Kingdom) . . . . . [6800-31]

14.50: **Photodarkening study of gratings written into rare earth doped optical fibers using a femtosecond laser**, Mattias L. Aslund, The Univ. of Sydney (Australia); Nemanja Jovanovic, Macquarie Univ. (Australia); Nathaniel Groothoff, The Univ. of Sydney (Australia); Graham D. Marshall, Macquarie Univ. (Australia); John Canning, Stuart Jackson, The Univ. of Sydney (Australia); Alexander Feurbach, Michael J. Withford, Macquarie Univ. (Australia) . . . . . [6800-32]

**Refreshment Break** . . . . . 15.10 to 15.40

**SESSION 9**

**Room: Manning Clark Ctr T3 . . . . . Fri. 15.40 to 17.40**

**Detectors, PV, and Sensors**

*Session Chairs: Alex R. Hamilton*, Univ. of New South Wales (Australia); *Hark Hoe Tan*, The Australian National Univ. (Australia)

15.40: **Toward very large format infrared detector arrays** (*Invited Paper*), Sarath D. Gunapala, Cory J. Hill, Sumith V. Bandara, David Z. Ting, Jet Propulsion Lab. . . . . [6800-33]

16.10: **Impurities in low-cost crystalline silicon for photovoltaics** (*Invited Paper*), Daniel H. MacDonald, The Australian National Univ. (Australia) . . . . . [6800-34]

16.40: **Microstructured humidity sensors fabricated by glancing angle deposition: characterization and performance evaluation**, Kathleen M. Krause, Andy C. van Popta, John J. Steele, Jeremy C. Sit, Michael J. Brett, Univ. of Alberta (Canada) . . . . . [6800-35]

17.00: **Femtosecond laser-assisted synthesis of colloidal nanomaterials and their applications in biosensing**, Andrei V. Kabashin, Sebastien Besner, Michel Meunier, École Polytechnique de Montréal (Canada); Andrey N. Kuzmin, Alexander Kachynsky, Paras N. Prasad, Univ. at Buffalo . . . . . [6800-36]

17.20: **Sliver solar cells**, Andrew W. Blakers, The Australian National Univ. (Australia) . . . . . [6800-38]

# Photonics: Design, Technology, and Packaging III

*Conference Chair:* **Wieslaw Z. Krolikowski**, The Australian National Univ. (Australia)

*Conference Co-Chairs:* **Costas M. Soukoulis**, Iowa State Univ.; **Ping Koy Lam**, The Australian National Univ. (Australia); **Timothy J. Davis**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Shanhui Fan**, Stanford Univ.; **Yuri S. Kivshar**, The Australian National Univ. (Australia)

*Program Committee:* **Derek Abbott**, The Univ. of Adelaide (Australia); **Kamal Alameh**, Edith Cowan Univ. (Australia); **David D. Awschalom**, Univ. of California/Santa Barbara; **Hans Albert Bachor**, The Australian National Univ. (Australia); **Kenneth G. H. Baldwin**, The Australian National Univ. (Australia); **Ole Bang**, Danmarks Tekniske Univ. (Denmark); **Jung-Chih Chiao**, The Univ. of Texas/Arlington; **Annette Dowd**, Univ. of Technology/Sydney (Australia); **Benjamin J. Eggleton**, The Univ. of Sydney (Australia); **Bernd Michael Fischer**, The Univ. of Adelaide (Australia); **Kenneth J. Grant**, Defence Science and Technology Organisation (Australia); **Min Gu**, Swinburne Univ. of Technology (Australia); **Kodo Kawase**, Nagoya Univ. (Japan); **Roger A. Lewis**, Univ. of Wollongong (Australia); **Andre Luiten**, The Univ. of Western Australia (Australia); **Barry Luther-Davies**, The Australian National Univ. (Australia); **Neil B. Manson**, The Australian National Univ. (Australia); **Robert E. Miles**, Univ. of Leeds (United Kingdom); **Tanya M. Monro**, The Univ. of Adelaide (Australia); **Jesper Munch**, Univ. of Adelaide (Australia); **Roger Pryce Netterfield**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Keith A. Nugent**, The Univ. of Melbourne (Australia); **Krassimir P. Panayotov**, Vrije Univ. Brussel (Belgium); **Concita Sibilia**, Univ. degli Studi di Roma/La Sapienza (Italy); **Graham E. Town**, Macquarie Univ. (Australia); **Michael J. Withford**, Macquarie Univ. (Australia)

## Wednesday 5 December

### Plenary Session

#### Opening Remarks and Welcome

Room: Manning Clark Ctr T1. . . . . Wed. 08.30 to 09.00

**Professor Lawrence Cram**, Deputy Vice Chancellor, The Australian National Univ. (Australia)

Plenary Presentations . . . . . 09.00 to 10.30

#### Introduction of Plenary Speakers

**Prof. Jim Williams**, Director, Research School of Physical Sciences, The Australian National Univ. (Australia)

09.00: **Conducting Organic Nanostructures and their use in Medical Bionics** (*Presentation Only*), Gordon G. Wallace, Univ. of Wollongong (Australia)

09.45: **Recent Progress and Future Prospect of Photonic Crystals** (*Presentation Only*), Susumu Noda, Kyoto Univ. (Japan)

### SESSION 1

Room: Manning Clark Ctr T5. . . . . Wed. 11.00 to 12.00

#### Plasmonic Nanophotonics

*Session Chair:* **Wieslaw Z. Krolikowski**, The Australian National Univ. (Australia)

11.00: **Imaging through plasmonic superlenses** (*Invited Paper*), Richard J. Blaikie, Ciaran P. Moore, Univ. of Canterbury (New Zealand); Matthew D. Arnold, Univ. of Technology/Sydney (Australia) . . . . . [6801-01]

11.30: **Transparent metallo-dielectric stacks for tunable subwavelength focusing** (*Invited Paper*), Joseph W. Haus, Univ. of Dayton; Michael Scalora, Mark J. Bloemer, U.S. Army Aviation and Missile Command; Marco Centini, Concita Sibilia, Mirko G. Cappelletti, Univ. degli Studi di Roma/La Sapienza (Italy); Nkorni C. Katte, Qiwen Zhan, Univ. of Dayton. . . . . [6801-02]

Lunch Break . . . . . 12.00 to 13.30

### SESSION 2

Room: Manning Clark Ctr T5. . . . . Wed. 13.30 to 15.10

#### Photonic Devices I

*Session Chair:* **Ole Bang**, Danmarks Tekniske Univ. (Denmark)

13.30: **Recent advances in high-power silica-fiber lasers operating at 2 microns** (*Invited Paper*), Stuart D. Jackson, The Univ. of Sydney (Australia) . . . . . [6801-03]

14.00: **Direct-write photonics: creating photonic circuitry on demand** (*Invited Paper*), Graham D. Marshall, Peter Dekker, Martin Ams, Macquarie Univ. (Australia) . . . . . [6801-04]

14.30: **Reversible photomodification of LiNbO<sub>3</sub> and LiTaO<sub>3</sub> by femtosecond laser pulses**, Vygantas Mizeikis, Saulius Juodkazis, Hiroaki Misawa, Hokkaido Univ. (Japan); Eugene G. Gamaly, Andrei V. Rode, Wieslaw Z. Krolikowski, The Australian National Univ. (Australia); Kenji Kitamura, National Institute for Materials Science (Japan) . . . . . [6801-05]

14.50: **Patterning of inorganic polymer glass waveguiding films by dry etching**, Stephen J. Madden, Matthew Zhang, Barry Luther-Davies, The Australian National Univ. (Australia); Robbie B. Charters, RPO Inc. (Australia) . . . . . [6801-06]

Refreshment Break . . . . . 15.10 to 15.40

### SESSION 3

Room: Manning Clark Ctr T5. . . . . Wed. 15.40 to 18.00

#### Nonlinear Effects and Devices

*Session Chair:* **Barry Luther-Davies**, The Australian National Univ. (Australia)

15.40: **Supercontinuum generation in microstructure fibers, waveguides, and waveguide arrays** (*Invited Paper*), Joachim Herrmann, Anton Husakou, Igor Babushkin, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-07]

16.10: **Accurate nonlocal theory for cascaded quadratic soliton compression** (*Invited Paper*), Ole Bang, Morten Bache, Danmarks Tekniske Univ. (Denmark); Jeffrey Moses, Massachusetts Institute of Technology; Frank W. Wise, Cornell Univ.; Wieslaw Z. Krolikowski, The Australian National Univ. (Australia) . . . . . [6801-08]

16.40: **Nonlinear localization of supercontinuum light in periodic photonic structures**, Dragomir N. Neshev, Andrey A. Sukhorukov, The Australian National Univ. (Australia); Alexander Dreischuh, Univ. of Sofia (Bulgaria); Wieslaw Z. Krolikowski, The Australian National Univ. (Australia); Jeremy A. Bolger, Benjamin J. Eggleton, The Univ. of Sydney (Australia); Lam Bui, Anran Mitchell, Royal Melbourne Institute of Technology (Australia); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-09]

17.00: **Tunable narrow-band spectral peak imposed onto a soliton with an acoustic long-period grating**, Jeremy A. Bolger, Feng Luan, Dong-Il Yeom, Eduard Tsoy, Martijn de Sterke, Benjamin J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6801-10]

17.20: **Ultra-low-threshold bistable transmission of slow light in photonic-crystal waveguides**, Sergei F. Mingaleev, Bogolyubov Institute for Theoretical Physics (Ukraine); Andrey E. Miroshnichenko, Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-11]

17.40: **Linear and nonlinear properties of the hexagonal matrix of coupled waveguides based on the photonic liquid-crystal fiber structure**, Urszula A. Laudyn, Katarzyna A. Rutkowska, Robert T. Rutkowski, Mirosław A. Karpierz, Politechnika Warszawska (Poland); Jan Wojcik, Univ. Marii Curie-Skłodowskiej (Poland) . . . . . [6801-12]

**Thursday 6 December**

**Plenary Session**

**Room: Manning Clark Ctr T1. . . . . Thurs. 09.00 to 10.30**

**Introduction of Plenary Speakers**

**Prof. Derek Abbott**, The Univ. of Adelaide (Australia)

09.00: **Photonic Metamaterials: Optics Start Walking on Two Feet** (*Presentation Only*), Martin Wegener, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

09.45: **Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis** (*Presentation Only*), Stephen Hyde, The Australian National Univ. (Australia)

**SESSION 4**

**Room: Manning Clark Ctr T5. . . . . Thurs. 11.00 to 12.00**

**Surface Waves in Bandgap Materials**

*Session Chair: Joachim Herrmann*, Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie (Germany)

11.00: **Surface-plasmon polaritons launched by subwavelength slits: transmission enhancement, sensing, switching, and negative refraction** (*Invited Paper*), Henri J. Lezec, Domenico Pacifici, California Institute of Technology; John Weiner, Univ. Paul Sabatier (France); Robert J. Walters, Babak Hassibi, Jose Luis Riechmann, Haris Vikalo, Jennifer A. Dionne, Harry A. Atwater, California Institute of Technology. . . . . [6801-13]

11.30: **Surface modes of photonic crystals for waveguiding and lasing applications** (*Invited Paper*), Igor V. Zozoulenko, Aliaksandr I. Rahachou, Linköpings Univ. (Sweden) . . . . . [6801-14]

**Lunch Break** . . . . . 12.00 to 13.30

**SESSION 5**

**Room: Manning Clark Ctr T5. . . . . Thurs. 13.30 to 15.10**

**Materials and Structures**

*Session Chair: Joseph W. Haus*, Univ. of Dayton

13.30: **All-optical processing using chalcogenide glass waveguides** (*Invited Paper*), Barry Luther-Davies, The Australian National Univ. (Australia) . . . . . [6801-15]

14.00: **Opto-electronic control of terahertz metamaterials** (*Invited Paper*), Willie J. Padilla, Boston College; Hou-Tong Chen, John F. O'Hara, Los Alamos National Lab.; Joshua M. O.Zide, Arthur C. Gossard, Univ. of California/Santa Barbara; Clark Highstrete, Mark Lee, Sandia National Labs.; Antoinette J. Taylor, Los Alamos National Lab.; Richard D. Averitt, Boston Univ. . . . . [6801-16]

14.30: **Plasmonic nanoresonant materials**, Shannon M. Orbons, Claire Rollinson, Brant C. Gibson, Shane T. Huntington, David N. Jamieson, Ann Roberts, The Univ. of Melbourne (Australia); Barry Luther-Davies, Darren Freeman, The Australian National Univ. (Australia); Michael I. Haftel, Naval Research Lab.; Carl Schlockermann, Munich Univ. of Applied Sciences (Germany); Timothy J. Davis, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6801-17]

14.50: **Diamond waveguides: toward an all-diamond platform**, Francois Ladouceur, Mark Hiscocks, Christopher Kaalund, Univ. of New South Wales (Australia) . . . . . [6801-18]

**Refreshment Break** . . . . . 15.10 to 15.40

**SESSION 6**

**Room: Manning Clark Ctr T5. . . . . Thurs. 15.40 to 17.40**

**Photonic Devices II**

*Session Chair: Henri J. Lezec*, California Institute of Technology

15.40: **Comparison of microspectrometer technologies for near and mid-infrared applications** (*Invited Paper*), John M. Dell, Adrian J. Keating, Jarek Antoszewski, Charles A. Musca, Lorenzo Faraone, The Univ. of Western Australia (Australia) . . . . . [6801-19]

16.10: **Advances in radio-frequency laser modulation techniques in optical spectroscopy** (*Invited Paper*), Malcolm B. Gray, Jong H. Chow, Ian C. Littler, Glenn de Vine, David E. McClelland, The Australian National Univ. (Australia) . . . . . [6801-20]

16.40: **T-ray spectroscopy of complex biomolecules**, Bernd M. Fischer, The Univ. of Adelaide (Australia) . . . . . [6801-22]

17.00: **A transmit reflect detection system for fiber Bragg grating photonic sensors**, Graham Wild, Steven Hinckley, Paul V. Jansz, Edith Cowan Univ. (Australia) . . . . . [6801-23]

17.20: **Linearly polarized, single-mode Ytterbium-doped fiber laser utilizing point-by-point inscribed intra-core fiber Bragg gratings**, Nemanja Jovanovic, Alexander Fuerbach, Graham E. Town, Graham D. Marshall, Michael J. Withford, Macquarie Univ. (Australia); Shayne P. Bennetts, David G. Lancaster, Defence Science and Technology Organisation (Australia) . . . . . [6801-24]

**Posters-Thursday**

**Room: Manning Clark Ctr Foyer . . . . . Thurs. 18.00 to 19.30**

**Dynamics and instabilities of nonlinear Fano resonances in photonic crystals**, Andrey E. Miroshnichenko, Yuri S. Kivshar, The Australian National Univ. (Australia); Rumen Iliev, Christoph Etrich, Falk L. Lederer, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [6801-39]

**Generation of conical second harmonic waves by nonlinear Bragg diffraction in two-dimensional nonlinear photonic structures**, Solomon M. Saltiel, Univ. of Sofia (Bulgaria); Dragomir N. Neshev, Wieslaw Z. Krolikowski, Robert O. Fischer, The Australian National Univ. (Australia); Ady Arie, Tel-Aviv Univ. (Israel); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-40]

**Defining self collimation and its low index limit**, Aaron F. Matthews, Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-42]

**Rigorous analysis method for extraneous self-imaging phenomenon in multimode waveguides using improved analytic formula for effective width**, Jong-Kyun Hong, Sang-Sun Lee, Hanyang Univ. (South Korea) . . . . . [6801-43]

**Energy exchange between two orthogonally polarized waves by cascading of two quasi-phase-matched quadratic processes**, Benjamin F. Johnston, Peter Dekker, Michael J. Withford, Macquarie Univ. (Australia); Solomon M. Saltiel, Univ. of Sofia (Bulgaria); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-45]

**Liquid infiltrated planar waveguide array**, Tanveer Mahmud, Arnan Mitchell, Royal Melbourne Institute of Technology (Australia) . . . . . [6801-46]

**Selectively filled hybrid ARROW fibers**, Jeremy A. Bolger, Darran K. C. Wu, Boris T. Kuhlmei, The Univ. of Sydney (Australia); Harald W. Giessen, Univ. Stuttgart (Germany); Benjamin J. Eggleton, The Univ. of Sydney (Australia) . . . . . [6801-47]

**Characterization of fs-laser written refractive index changes using near-field scanning optical microscopy**, Douglas J. Little, Graham D. Marshall, Peter Dekker, Macquarie Univ. (Australia); Adel Rahmani, Univ. of Technology/Sydney (Australia); Judith M. Dawes, Michael J. Withford, Macquarie Univ. (Australia) . . . . . [6801-48]

**Self-assembly around curved surfaces**, Luke Stewart, Michael J. Withford, Judith Dawes, Graham D. Marshall, Macquarie Univ. (Australia); Adel Rahmani, Univ. of Technology/Sydney (Australia) . . . . . [6801-50]

**All-optically tunable Goos-Hanchen effect in photonic crystals**, Aaron F. Matthews, Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-51]

**Dynamic displacement measurement of low-E membrane reactor by PSD based on laser-triangulation method**, B. Li, Y. Zhang, T. Liu, Tianjin Univ. (China) . . . . . [6801-53]

**Flatness and defect measurements for a plane glass using a heterodyne SPR sensor**, Ming-Hung Chiu, Chih-Wen Lai, Zhen-Qin Lin, National Formosa Univ. (Taiwan) . . . . . [6801-54]

**Optimization of all optical switching devices based on the nonlinear photonic crystals structures**, Leila Dekkiche, Rafah Naoum, Lab. of Optical Communication and Microwaves (Algeria) . . . . . [6801-55]

**Enhancement on the signal-to-noise of T-ray liquid spectroscopy via double-modulated differential time-domain spectroscopy**, Jegathisvaran Balakrishnan, Bernd M. Fischer, Samuel P. Mickan, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6801-56]

**Dynamic laser-beam stabilization for terahertz systems**, Gin-Han Chua, Wee Kiat Tan, Ian Linke, Tamath J. Rainsford, The Univ. of Adelaide (Australia) . . . . . [6801-57]

**Transmission characteristic of T-ray multilayer interference filter**, Withawat Withayachumnankul, Bernd M. Fischer, Samuel P. Mickan, Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6801-58]

**A novel microphotonic structure for generating true time delays with application to optical coherence tomography**, Paul V. Jansz, Graham Wild, Steven Hinckley, Edith Cowan Univ. (Australia) . . . . . [6801-59]

**Temporal nonlinear beam dynamics in infiltrated photonic-crystal fibers**, Francis H. Bennet, Christian R. Rosberg, Dragomir N. Neshev, The Australian National Univ. (Australia); Per D. Rasmussen, Ole Bang, Danmarks Tekniske Univ. (Denmark); Wieslaw Z. Krolikowski, The Australian National Univ. (Australia); Anders O. Bjarklev, Danmarks Tekniske Univ. (Denmark); Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-60]

**Dynamic control of photonic crystal surface states**, Steven K. Morrison, Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-61]

**Mechanical and dynamic tuning of metamaterials**, David A. Powell, Ilya V. Shadrivov, Steven K. Morrison, Yuri S. Kivshar, The Australian National Univ. (Australia) . . . . . [6801-62]

**Fabrication and characterisation of metal-clad optical waveguides**, Timothy S. Lunn, Vijay P. Sivan, Geethaka C. Devendra, Arnan Mitchell, Royal Melbourne Institute of Technology (Australia) . . . . . [6801-63]

**Chip-to-chip optical link system by using optical wiring method**, In K. Cho, Electronics and Telecommunications Research Institute (South Korea) . . . . . [6801-64]

**Characterization of a novel electro-optic polymer for modulator applications**, Geethaka C. Devendra, Royal Melbourne Institute of Technology (Australia); Andrew J. Kay, Industrial Research Ltd. (New Zealand); Anthony S. Holland, Arnan Mitchell, Royal Melbourne Institute of Technology (Australia) . . . . . [6801-65]

**Dispersion of the complex cubic nonlinearity in two-photon absorbing organic and organometallic chromophores**, Marek J. Samoc, Anna Samoc, Gulliver T. Dalton, Marie P. Cifuentes, Mark G. Humphrey, The Australian National Univ. (Australia) ..... [6801-66]

**Field propagation with constant Gaussian beam parameters in unbiased self-defocusing media**, Michael W. Jones, Esa Jaatinen, Queensland Univ. of Technology (Australia) ..... [6801-67]

**Luminescence properties of poly(phenylene vinylene) derivatives**, Cuong Ton-That, Geoffrey Stockton, Matthew R. Phillips, Univ. of Technology/Sydney (Australia); Thien-Phap Nguyen, Chun-Hao Huang, Univ. de Nantes (France) ..... [6801-68]

**Aspherical lenses for Terahertz spectroscopy**, Yat Hei Lo, Rainer Leonhardt, The Univ. of Auckland (New Zealand) ..... [6801-69]

## Friday 7 December

### Plenary Session

**Room: Manning Clark Ctr T1. .... Fri. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

09.00: **Quantum Dots and Nanowires for Optoelectronic Device Applications** (*Presentation Only*), Chennupati Jagadish, The Australian National Univ. (Australia)

09.45: **Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine** (*Presentation Only*), Vijay K. Varadan, Univ. of Arkansas

### SESSION 7

**Room: Manning Clark Ctr T5. .... Fri. 11.00 to 12.00**

#### Quantum Effects in Nanostructures

*Session Chair: Yuri S. Kivshar*, The Australian National Univ. (Australia)

11.00: **Quantum-optomechanics: from laser-cooling to quantum entanglement of micromechanical systems** (*Invited Paper*), Markus Aspelmeyer, Univ. Wien (Austria) ..... [6801-25]

11.30: **Control of radiation emission from three-dimensional photonic crystals in nanocomposites** (*Invited Paper*), Min Gu, Swinburne Univ. of Technology (Australia) ..... [6801-26]

**Lunch Break** ..... 12.00 to 13.30

### SESSION 8

**Room: Manning Clark Ctr T5. .... Fri. 13.30 to 15.10**

#### Bandgap Structures

*Session Chair: Min Gu*, Swinburne Univ. of Technology (Australia)

13.30: **The three-dimensional colloidal crystals growth on the end face of optical fiber: method and characterization**, Haitao Yan, Ming Wang, Nanjing Normal Univ. (China) ..... [6801-27]

13.50: **Excitation of ultra-slow light modes with focused beams in nonlinear periodic structures**, Andrey A. Sukhorukov, Yuri S. Kivshar, The Australian National Univ. (Australia) ..... [6801-28]

14.10: **Dispersionless tunneling of slow light in antisymmetric photonic-crystal couplers**, Sangwoo Ha, Andrey A. Sukhorukov, The Australian National Univ. (Australia); Kokou B. Dossou, Lindsay C. Botten, Univ. of Technology/Sydney (Australia); Yuri S. Kivshar, The Australian National Univ. (Australia) ..... [6801-29]

14.30: **Fine tuning of single-row photonic crystal extended cavities embedded in photonic wire waveguides**, Ahmad Rifqi Md Zain, Harold M. H.Chong, Nigel P. Johnson, Richard M. De La Rue, Univ. of Glasgow (United Kingdom) ..... [6801-30]

14.50: **Diffraction control in modulated photonic lattices**, Ivan L. Garanovich, Andrey A. Sukhorukov, Yuri S. Kivshar, The Australian National Univ. (Australia) ..... [6801-31]

**Refreshment Break** ..... 15.10 to 15.40

### SESSION 9

**Room: Manning Clark Ctr T5. .... Fri. 15.40 to 17.50**

#### Photonic Devices III

*Session Chair: John M. Dell*, The Univ. of Western Australia (Australia)

15.40: **Tunable photonic structures based on silicon and liquid crystals** (*Invited Paper*), Tatiana S. Perova, The Univ. of Dublin, Trinity College (Ireland); Vladimir A. Tolmachev, Ekaterina V. Astrova, A.F. Ioffe Physico-Technical Institute (Russia) ..... [6801-32]

16.10: **Tunable all-optical devices based on liquid-filled photonic crystal fibers**, Christian R. Rosberg, Francis H. Bennet, Dragomir N. Neshev, The Australian National Univ. (Australia); Per D. Rasmussen, Ole Bang, Danmarks Tekniske Univ. (Denmark); Wieslaw Z. Krolikowski, The Australian National Univ. (Australia); Anders O. Bjarklev, Danmarks Tekniske Univ. (Denmark); Yuri S. Kivshar, The Australian National Univ. (Australia) ..... [6801-33]

16.30: **Microresonator-based optical frequency stabilization**, Matthew McGovern, Warwick P. Bowen, Terry G. McRae, Univ. of Otago (New Zealand) ..... [6801-35]

16.50: **The classical resolution limit of optical tweezers**, Jian-Wei Tay, Xue Jiang, Warwick P. Bowen, Univ. of Otago (New Zealand) ..... [6801-36]

17.10: **Pulse monitoring based on transverse SHG in periodic and disordered media**, Robert O. Fischer, Dragomir N. Neshev, The Australian National Univ. (Australia); Solomon M. Saitiel, Univ. of Sofia (Bulgaria); Andrey A. Sukhorukov, Wieslaw Z. Krolikowski, Yuri S. Kivshar, The Australian National Univ. (Australia) ..... [6801-37]

17.30: **Acceleration sensing MOEMS system design**, Zoran Salcic, The Univ. of Auckland (New Zealand) ..... [6801-38]



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## Complex Systems II

Conference Chair: **Derek Abbott**, The Univ. of Adelaide (Australia)

Conference Co-Chairs: **Tomaso Aste**, The Australian National Univ. (Australia); **Murray Batchelor**, The Australian National Univ. (Australia); **Robert Dewar**, The Australian National Univ. (Australia); **Tiziana Di Matteo**, The Australian National Univ. (Australia); **Tony Guttman**, The Univ. of Melbourne (Australia)

Program Committee: **Michael F. Barnsley**, The Australian National Univ. (Australia); **David Batten**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Axel Bender**, Defence Science and Technology Organisation (Australia); **Terry Bossomaier**, Charles Sturt Univ. (Australia); **Julyan H. E. Cartwright**, Univ. de Granada (Spain); **Silvano Cincotti**, Univ. degli Studi di Genova (Italy); **A. Coniglio**, Univ. degli Studi di Napoli Federico II (Italy); **Michel M. Dacorogna**, Converium Ltd. (Switzerland); **J. Doyne Farmer**, Santa Fe Institute; **John Finnigan**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Leon Glass**, McGill Univ. (Canada); **David G. Green**, Monash Univ. (Australia); **Peter Hall**, The Univ. of Melbourne (Australia); **Markus Hegland**, The Australian National Univ. (Australia); **Chris O. Heyde**, The Australian National Univ. (Australia); **David Hill**, The Australian National Univ. (Australia); **Janusz Holyst**, Politechnika Warszawska (Poland); **Plamen C. H. Ivanov**, Boston Univ.; **Neil F. Johnson**, Univ. of Oxford (United Kingdom); **János Kertész**, Budapest Univ. of Technology and Economics (Hungary); **Peter A. Lindsay**, The Univ. of Queensland (Australia); **Seth Lloyd**, Massachusetts Institute of Technology; **Rosario Nunzio Mantegna**, Univ. degli Studi di Palermo (Italy); **Giuseppe Mussardo**, Scuola Internazionale Superiore di Studi Avanzati (Italy); **Luciano Pietronero**, Univ. degli Studi di Roma/La Sapienza (Italy); **Eckhard Platen**, Univ. of Technology/Sydney (Australia); **Peter Richmond**, The Univ. of Dublin, Trinity College (Ireland); **Peter A. Robinson**, The Univ. of Sydney (Australia); **Alex Ryan**, Defence Science and Technology Organisation (Australia); **Enrico Scalas**, Univ. degli Studi del Piemonte Orientale (Italy); **Frank Schweitzer**, ETH Zürich (Switzerland); **David Sherrington**, Univ. of Oxford (United Kingdom); **H. Eugene Stanley**, Boston Univ.; **Stefan Thurner**, Univ. Wien (Austria); **Constantino Tsallis**, Ctr. Brasileiro de Pesquisas Fisicas (Brazil); **Yoshiharu Yamamoto**, The Univ. of Tokyo (Japan); **Aibing Yu**, Univ. of New South Wales (Australia)

### Wednesday 5 December

**Plenary Session**  
**Opening Remarks and Welcome**

**Room: Manning Clark Ctr T1. . . . . Wed. 08.30 to 09.00**

**Professor Lawrence Cram**, Deputy Vice Chancellor, The Australian National Univ. (Australia)

**Plenary Presentations . . . . . 09.00 to 10.30**

**Introduction of Plenary Speakers**

**Prof. Jim Williams**, Director, Research School of Physical Sciences, The Australian National Univ. (Australia)

09.00: **Conducting Organic Nanostructures and their use in Medical Bionics (Presentation Only)**, Gordon G. Wallace, Univ. of Wollongong (Australia)

09.45: **Recent Progress and Future Prospect of Photonic Crystals (Presentation Only)**, Susumu Noda, Kyoto Univ. (Japan)

#### SESSION 1

**Room: Manning Clark Ctr T6. . . . . Wed. 11.00 to 12.10**

##### Econophysics and Econo-Engineering I

Session Chair: **Tiziana Di Matteo**, The Australian National Univ. (Australia)

11.00: **Income distributions in society: a tale of fat tails (Keynote Presentation)**, Peter Richmond, The Univ. of Dublin, Trinity College (Ireland). . . . . [6802-01]

11.40: **Optimal waiting times and imbalance dynamics in high-frequency future markets (Invited Paper)**, Marco Bartolozzi, Grinham Managed Funds Pty. Ltd. (Australia) and The Univ. of Adelaide (Australia); Christopher P. Mellen, Grinham Managed Funds Pty. Ltd. (Australia) . . . . . [6802-02]

**Lunch Break . . . . . 12.10 to 13.40**

#### SESSION 2

**Room: Manning Clark Ctr T6. . . . . Wed. 13.40 to 14.50**

##### Games and Evolutionary Processes I

Session Chair: **David H. Wolpert**, Stanford Univ.

13.40: **Socio- and econodynamics as exactly solvable spin models on dynamical co-evolving networks (Invited Paper)**, Stefan Thurner, Rudolf Hanel, Christoly Biely, Medizinische Univ. Wien (Austria) . . . . . [6802-03]

14.10: **Evolving hierarchical rules to play combinatorial games**, Terry Bossomaier, Charles Sturt Univ. (Australia); Anthony E. Knittel, Michael Harre, Allan Snyder, The Univ. of Sydney (Australia) . . . . . [6802-04]

14.30: **Studies in the physics of evolution: creation, formation, destruction**, Rudolf A. Hanel, Peter Klimek, Medizinische Univ. Wien (Austria); Stefan Thurner, Medizinische Univ. Wien (Austria) and Santa Fe Institute . . . . . [6802-05]

**Refreshment Break . . . . . 14.50 to 15.20**

#### SESSION 3

**Room: Manning Clark Ctr T6. . . . . Wed. 15.20 to 17.10**

##### Quantum Perspectives

Session Chair: **Derek Abbott**, The Univ. of Adelaide (Australia)

15.20: **Quantum metabolism: a cellular level explanation of allometric scaling laws in biology (Keynote Presentation)**, Lloyd Demetrius, Harvard University . . . . . [6802-06]

16.00: **Sum uncertainty relation for complex systems (Invited Paper)**, Arun K. Pati, Institute of Physics (India) . . . . . [6802-07]

16.30: **Quantum minority game utilizing various forms of entanglement**, Adrian P. Flitney, School of Physics, University of Melbourne (Australia) [6802-08]

16.50: **Constructing multi-player quantum games from non-factorizable probabilities**, Azhar Iqbal, Kochi Univ. of Technology (Japan) and National Univ. of Sciences & Technology (Pakistan); Taksu Cheon, Kochi Univ. of Technology (Japan) . . . . . [6802-09]

#### SESSION 4

**Room: Manning Clark Ctr T6. . . . . Wed. 17.10 to 18.30**

##### Econophysics and Econo-Engineering II

Session Chair: **Peter Richmond**, The Univ. of Dublin, Trinity College (Ireland)

17.10: **Self-organization of agent strategies in a financial market model (Keynote Presentation)**, Luciano Pietronero, Univ. degli Studi di Roma/La Sapienza (Italy) and Institute of Complex Systems/CNR (Italy) . . . . . [6802-10]

17.50: **Persistence and the Nikkei Index**, Sudhir Jain, Aston Univ. (United Kingdom); Takuya Yamano, Ochanomizu Univ. (Japan) . . . . . [6802-11]

18.10: **Nonstationarity and nonlinearity in a multi-asset market model**, Francois Ghoulmie, Tiziana Di Matteo, The Australian National Univ. (Australia) . . . . . [6802-12]

##### Posters-Wednesday

**Room: Manning Clark Ctr Foyer . . . . . Wed. 18.00 to 19.30**

**Classification of osteosarcoma t-ray responses using adaptive and rational wavelets for feature extraction**, Desmond Ng, Fu Tian Wong, Withawat Withayachumnankul, Derek Abbott, The Univ. of Adelaide (Australia) . . . [6802-39]

**Hierarchical properties of biological data**, Won-Min Song, The Australian National Univ. (Australia) . . . . . [6802-40]

**Study of the alignment of multiwalled carbon nanotubes using dielectrophoresis**, Chen Zhang, Michael Breedon, Wojtek B. Wlodarski, Kourosh Kalantar-Zadeh, Royal Melbourne Institute of Technology (Australia) . . . [6802-41]

**Reconfigurable high-speed infrared scene simulation**, Vinay B. Sriram, Univ. of South Australia (Australia) . . . . . [6802-42]

**The application of nonlinear bistable detectors to DCT-domain watermarking schemes**, Fabing Duan, Qingdao Univ. (China); Derek Abbott, The Univ. of Adelaide (Australia) . . . . . [6802-43]

**Effect of epidemic dynamics on evolutionary prisoner's dilemma game in scale-free networks**, Rui Jiang, Mao-Bin Hu, Qing-Song Wu, Univ. of Science and Technology of China (China) . . . . . [6802-44]

**Dynamic prisoner's dilemma on scale-free network**, MaoBin Hu, Univ. of Science and Technology of China (China) . . . . . [6802-46]

**Modeling of dynamic targeting in the Air Operations Centre**, Andrew Au, Edward Lo, Defence Science and Technology Organisation (Australia) . . . [6802-47]

**Complexity: new opportunities for understanding consumption**, Carmen Costea, Academy of Economic Studies Bucharest (Romania) . . . . . [6802-49]

**Multiscaling modelling of financial markets**, Ruipeng Liu, Tiziana Di Matteo, The Australian National Univ. (Australia); Thomas Lux, Christian-Albrechts-Univ. zu Kiel (Germany) . . . . . [6802-50]

**Differences and similarities between Japanese and Chinese companies**, Toshihiro Iwata, Kansai Univ. (Japan) . . . . . [6802-51]

**Two-dimensional beams of dissipative antisolitons**, Adrian Ankiewicz, The Australian National Univ. (Australia); Jose-Maria Soto-Crespo, Instituto de Optica (Spain); Natasha Devine, Nail Akhmediev, The Australian National Univ. (Australia) . . . . . [6802-52]

**Multiplicity of soliton transformations in the vicinity of the boundaries of their existence**, Wonkeun Chang, The Australian National Univ. (Australia); Jose-Maria Soto-Crespo, Instituto de Optica (Spain); Adrian Ankiewicz, Nail Akhmediev, The Australian National Univ. (Australia) . . . . . [6802-53]

**Dynamical correlations in financial systems**, Francesco Pozzi, Tiziana Di Matteo, Tomaso Aste, The Australian National Univ. (Australia) . . . . . [6802-54]

**Co-ordinate transforms underpin multiscale modeling and reduction in deterministic and stochastic systems**, Anthony J. Roberts, Univ. of Southern Queensland (Australia) . . . . . [6802-55]

**Seasonality, size effect, and delisting bias**, Qi Zeng, Xiao Cao, The Univ. of Melbourne (Australia) . . . . . [6802-58]

## Thursday 6 December

### Plenary Session

**Room: Manning Clark Ctr T1 . . . . . Thurs. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Derek Abbott**, The Univ. of Adelaide (Australia)

09.00: **Photonic Metamaterials: Optics Start Walking on Two Feet** (*Presentation Only*), Martin Wegener, Institut für Angewandte Physik, Univ. Karlsruhe (Germany)

09.45: **Self-assembly In Vivo: Manufacturing Photonic Devices in a Butterfly Chrysalis** (*Presentation Only*), Stephen Hyde, The Australian National Univ. (Australia)

### SESSION 5

**Room: Manning Clark Ctr T6 . . . . . Thurs. 11.00 to 12.10**

#### Complex Materials and Surfaces I

*Session Chair: Janusz Holyst*, Politechnika Warszawska (Poland)

11.00: **A deductive statistical mechanics approach for complex materials** (*Keynote Presentation*), Tomaso Aste, The Australian National Univ. (Australia) . . . . . [6802-14]

11.40: **The thermodynamic switch for homologous chromosome recognition at meiosis** (*Invited Paper*), Mario Nicodemi, Univ. degli Studi di Napoli Federico II (Italy) . . . . . [6802-15]

**Lunch Break** . . . . . 12.10 to 13.40

### SESSION 6

**Room: Manning Clark Ctr T6 . . . . . Thurs. 13.40 to 14.20**

#### Complex Materials and Surfaces II

*Session Chair: Tomaso Aste*, The Australian National Univ. (Australia)

13.40: **DEM investigations of the properties of granular packings: bringing together simulation and experiment**, Gary W. Delaney, Tomaso Aste, The Australian National Univ. (Australia) . . . . . [6802-16]

14.00: **Wang-Landau Monte Carlo: a new key for unlocking structure in complex physical systems**, Drew F. Parsons, The Australian National Univ. (Australia) . . . . . [6802-57]

### SESSION 7

**Room: Manning Clark Ctr T6 . . . . . Thurs. 14.20 to 15.00**

#### Transport Processes

*Session Chair: Kevin Burrage*, Univ. of Queensland (Australia)

14.20: **Chemical and biological transport in deforming porous media**, Guy Metcalfe, Daniel R. Lester, Alison Ord, Mike Trefry, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6802-18]

14.40: **Complete parametric scalar dispersion**, Daniel R. Lester, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6802-19]

**Refreshment Break** . . . . . 15.00 to 15.30

### SESSION 8

**Room: Manning Clark Ctr T6 . . . . . Thurs. 15.30 to 17.10**

#### Physical Systems I

*Session Chair: Andrea Rapisarda*, Univ. degli Studi di Catania (Italy)

15.30: **Thermodynamic forces, flows, and Onsager coefficients in complex networks** (*Keynote Presentation*), Janusz Holyst, Agata Fronczak, Piotr Fronczak, Politechnika Warszawska (Poland) . . . . . [6802-20]

16.10: **Lattice statistics studies of massless phases**, Ian G. Enting, The Univ. of Melbourne (Australia) . . . . . [6802-21]

16.30: **Self organization in a complex plasma** (*Invited Paper*), Sergey V. Vladimirov, The Univ. of Sydney (Australia) . . . . . [6802-22]

16.50: **Non-Hamiltonian and fractional dynamics in a complex plasma**, James D. E. Stokes, Sergey V. Vladimirov, Alex A. Samarian, The Univ. of Sydney (Australia) . . . . . [6802-23]

### SESSION 9

**Room: Manning Clark Ctr T6 . . . . . Thurs. 17.10 to 18.50**

#### Games and Evolutionary Processes II

*Session Chair: Stefan Thurner*, Medizinische Univ. Wien (Austria)

17.10: **Predictive game theory** (*Keynote Presentation*), David H. Wolpert, Stanford Univ. . . . . [6802-24]

17.50: **Visions of evolution: self-organization proposes what natural selection disposes**, David F. Batten, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6802-25]

18.10: **Network dynamics in the evolution of trust**, Terry Bossomaier, Charles Sturt Univ. (Australia) . . . . . [6802-26]

18.30: **Network characteristics that facilitate the stable evolution of cooperation**, Markus Brede, Commonwealth Scientific and Industrial Research Organisation (Australia) . . . . . [6802-27]

## Friday 7 December

### Plenary Session

**Room: Manning Clark Ctr T1 . . . . . Fri. 09.00 to 10.30**

#### Introduction of Plenary Speakers

**Prof. Dan V. Nicolau**, The Univ. of Liverpool (United Kingdom)

09.00: **Quantum Dots and Nanowires for Optoelectronic Device Applications** (*Presentation Only*), Chennupati Jagadish, The Australian National Univ. (Australia)

09.45: **Micro- and Nano-electronic Packaging in Engineering, Life Sciences, and Medicine** (*Presentation Only*), Vijay K. Varadan, Univ. of Arkansas

### SESSION 10

**Room: Manning Clark Ctr T6 . . . . . Fri. 11.00 to 12.00**

#### Neural and Cardio Systems I

*Session Chair: Lloyd Demetrius*, Max Planck Institute for Molecular Genetics (Germany) and Harvard Univ.

11.00: **Stability constraints on structural and functional network connectivity** (*Keynote Presentation*), Peter A. Robinson, Richard Gray, Candy K. Fung, The Univ. of Sydney (Australia) . . . . . [6802-28]

11.40: **Compact continuum model for human electro-encephalogram**, Jong Won Kim, The Univ. of Sydney (Australia); Hong-Beom Shin, Eulji Univ. (South Korea); Peter A. Robinson, The Univ. of Sydney (Australia) . . . . . [6802-29]

**Lunch Break** . . . . . 12.00 to 13.30

**SESSION 11**

**Room: Manning Clark Ctr T6. . . . . Fri. 13.30 to 14.10**

**Neural and Cardio Systems II**

*Session Chair: Peter A. Robinson, The Univ. of Sydney (Australia)*

13.30: **Modeling high-order synchronization epochs and transitions in the cardiovascular system**, David Garcia-Alvarez, Aneta Stefanovska, Peter V. E.McClintock, Lancaster Univ. (United Kingdom) . . . . . [6802-30]

13.50: **Symbiotic relationship between neuronal dynamics and brain architectures**, Mikail Rubinov, Kelton Temby, Univ. of New South Wales (Australia); Olaf Sporns, Indiana Univ.; Cees van Leeuwen, The Institute of Physical and Chemical Research (Japan); Michael Breakspear, Univ. of New South Wales (Australia). . . . . [6802-31]

**SESSION 12**

**Room: Manning Clark Ctr T6. . . . . Fri. 14.10 to 15.00**

**Physical Systems II**

*Session Chair: Janusz Holyst, Politechnika Warszawska (Poland)*

14.10: **Nonergodicity and central limit behavior of systems with long-range interactions** (*Invited Paper*), Andrea Rapisarda, Univ. degli Studi di Catania (Italy) and INFN sez. di Catania (Italy) . . . . . [6802-32]

14.40: **Physical limits of inference**, David H. Wolpert, NASA Ames Research Ctr. . . . . [6802-33]

**Refreshment Break** . . . . . 15.00 to 15.30

**SESSION 13**

**Room: Manning Clark Ctr T6. . . . . Fri. 15.30 to 17.00**

**Modelling and Applications**

*Session Chair: Terry Bossomaier, Charles Sturt Univ. (Australia)*

15.30: **Natural geometry (Keynote Presentation)**, Michael F. Barnsley, The Australian National Univ. (Australia) . . . . . [6802-34]

16.10: **Stochastic delay models for molecular clocks and somite formation** (*Invited Paper*), Kevin Burrage, Univ. of Queensland (Australia). . . . . [6802-35]

16.40: **Simulation model for urban ternary mix traffic flow**, Lalit Deo, Faisal Akkawi, Northwestern Univ.; Puspita Deo, Dublin City Univ. (Ireland) . . . [6802-38]



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