



AVS 68th INTERNATIONAL SYMPOSIUM & EXHIBITION

November 6-11, 2022 • Pittsburgh, PA

THE AVS 68TH INTERNATIONAL SYMPOSIUM & EXHIBITION

On behalf of the AVS, we invite you to submit an abstract to the AVS 68th International Symposium and Exhibition, which will be held November 6th-11th, 2022 in Pittsburgh, PA. The AVS Symposium is the premier forum for the presentation and discussion of the science and technology of materials, interfaces, and processing.

The theme for this year's Symposium is "**Imperfectly Perfect Materials.**" The theme reflects the cross-cutting importance of defects in materials across the different programs in AVS. In some cases, defects are undesired and can lead to deleterious consequences such as in electronic and optical devices where a defect can lead to a trap for charge carriers. In other cases, defects could be desired and lead to enhanced performance such as in catalysis where a defect increases activity towards adsorption or other surface reactions. Defects are also of emerging interest for applications in quantum information science. The Symposium will cover methods for controllable defect formation, studies of their stability, and techniques for their characterization. Specifically, here are some sessions that highlight the theme:

- **Applied Surface Science: Probing Defects at Surfaces and Interfaces**
- **Biomaterial Interfaces: Perfectly Imperfect Biology**
- **Electronic Materials and Photonics: Defect Engineering in Electronic and Photonic Materials and Devices**
- **Thin Film: Perfectly Imperfect Oxides**
- **2D Materials: Defects, Dopants, Edges, Functionalization, and Intercalation**
- **Light Sources: Role of Defects in Materials**
- **Quantum Information Science: Color Centers, from Materials to Quantum Technologies**

In addition, there will be sessions in several innovative topical areas. Focus Topics at this meeting include: 2D Materials; Actinides and Rare Earths; Atomic Scale Processing; Fundamental Discoveries in Heterogeneous Catalysis; Advanced Ion Microscopy and Ion Beam Nano-Engineering; New Trends in Structural and Electronic Characterization of Materials, Interfaces, and Surfaces Using Synchrotron and FEL Based Light Sources; Chemical Analysis and Imaging at Interfaces; Spectroscopic Ellipsometry; and for the first time, Radiation Effects on Materials. In addition, there will be a Quantum Information Science Focus Topic that is connected with the recently launched *AVS Quantum Science (AQS)* journal, and a Mini Symposium on Synthesis of 2D Materials and Device Structures jointly organized by the 2D Materials Focus Topic, the Electronic Materials and Photonics Division, and the Nanoscale Science and Technology Division.

These topics will complement our traditional strong core of fundamental surface science and interfacial phenomena, applied surface science, surface engineering, micro- and nano-electronics, nanoscale science and technology, manufacturing science and technology, thin films, plasma science and technology, micro- and nano-electromechanical systems, electronic and photonic materials, biomaterials, and vacuum science and technology.

As you examine the Call for Abstracts, we are sure that you will find many sessions that interest you as well as oral and poster sessions that will be opportunities to showcase your latest research. Poster presentations in particular, are a great way to promote your work and interact one-on-one with many scientists and engineers in a relaxed environment. In addition, some divisions plan to host "Flash" presentation sessions, in which poster presenters will each have 2-3 minutes to give an oral presentation summarizing their poster. Awards for posters and oral presentations given by students are also offered by many divisions and groups. AVS 68 will also have a special poster session to highlight undergraduate research with prizes for the top presentations.

As well as the technical program, there will be an extensive equipment and vendor exhibition, short courses, and many networking and career advancement and recruitment events for those launching their careers as well as for established researchers. If you are new to the AVS community, WELCOME! We are positive that you will find the symposium to be a great place to meet new colleagues and friends with whom to share ideas for years to come. We encourage you to participate in this year's Symposium by submitting an abstract before the deadline of **Monday, May 2, 2022**. Also, please note that for AVS 68 we are allowing you to present one oral abstract as well as one poster abstract so please consider submitting both!

We look forward to seeing you at AVS 68 in Pittsburgh!

Mohan Sankaran
2022 Program Chair

Virginia Wheeler
2022 Program Vice-Chair

AVS recognizes that the global COVID-19 pandemic continues to impact face-to-face meetings. We anticipate seeing you in Pittsburgh, PA, and we will continue to comply with COVID-19 guidelines (local, state, and federal). As a result, all meeting plans are subject to change to stay in compliance with these COVID-19 guidelines. Additional details will be made available as the event draws closer.

PROGRAM COMMITTEE

PROGRAM CHAIR

Prof. Dr. Mohan Sankaran
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PROGRAM VICE CHAIR

Dr. Virginia Wheeler
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2D MATERIALS TECHNICAL GROUP

Topic Co-Chair: Batzill, Matthias,
University of South Florida
Topic Co-Chair: Gunlycke, Daniel,
Naval Research Laboratory
Topic Co-Chair: Katoch, Jyoti, Carnegie
Mellon University
Mannix, Andrew, Stanford Univ.
Raja, Archana, Lawrence Berkeley Lab
Kotakoski, Jani, Univ. of Vienna, Austria
Liu, Xiaolong, University of Notre Dame
Mo, Sung-Kwan, Lawrence Berkeley
Lab, University of California, Berkeley
Schwingenschloegl, Udo, King Abdullah
University of Science and Technology,
Saudi Arabia
Whitener, Keith, Naval Research Lab

ACTINIDES AND RARE EARTHS FOCUS TOPIC

Topic Co-Chair: Shuh, David, Lawrence
Berkeley National Lab
Topic Co-Chair: Tobin, James G.,
University of Wisconsin-Oshkosh
Denecke, Melissa, International Atomic
Energy Agency, Vienna, Austria
Durakiewicz, Tomasz, National Science
Foundation
Geeson, David, AWE, UK
Gofryk, Krzysztof, Idaho National Lab
Havela, Ladislav, Charles University,
Prague, Czech Republic
Petit, Leon, Daresbury Lab, UK
Pugmire, Alison, LANL
Tereshina-Chitrova, Evgeniya, Charles
University, Czech Republic
Zwicknagl, Gertrud, Technische
Universität Braunschweig, Germany

ADVANCED ION MICROSCOPY AND ION BEAM NANO-ENGINEERING FOCUS TOPIC

Topic Co-Chair: Tan, Shida, Intel Corp.
Topic Co-Chair: Wolff, Lena, Caltech

ADVANCED SURFACE ENGINEERING DIVISION

Topic Chair: Lin, Jianliang, Southwest
Research Institute
Topic Co-Chair: Kodambaka, Suneel,
Univ. of California Los Angeles
Lee, Jyh-Wei, Ming Chi University of
Technology, Taiwan
Mangolini, Filippo, The University of
Texas at Austin
Matjaz, Panjan, Jožef Stefan Institute,
Slovenia

APPLIED SURFACE SCIENCE DIVISION

Topic Chair: Engelhard, Mark, EMSL,
Environmental Molecular Sciences Lab
Topic Co-Chair: Ventrice, Jr., Carl A.,
SUNY Polytechnic Institute
Consiglio, Steve, Tokyo Electron
Counsell, Jonathan, Kratos Analytical
Limited, UK
Fisher, Gregory L., Physical Electronics
Grzeskowiak, Jody, Tokyo Electron
Harrison, Elisa, Ford Motor Company
Lerach, Jordan, ImaBiotech Corp.
Piao, Hong, FUJIFILM Electronic
Materials USA., Inc.
Robinson, Zachary, SUNY Brockport
Rosenberg, Samantha, Sandia National
Laboratories
Shard, Alexander, National Physical
Laboratory, UK
Thevuthasan, Theva, Pacific Northwest
National Laboratory
Zakel, Julia, IONTOFGmbH, Germany

ATOMIC SCALE PROCESSING FOCUS TOPIC

Topic Chair: Joseph, Eric A., IBM
Research Division, T.J. Watson
Research Center
Agarwal, Sumit, Colorado School of
Mines
Altman, Eric, Yale University
Barry, Seán, Carleton University, Canada
Chang, Jane, University of California Los
Angeles
Chen, Donna, Univ. of South Carolina
Clendenning, Scott B., Intel Corp.
Creatore, Adriana, Eindhoven University
of Technology, Netherlands
deMarneffe, Jean-Francois, IMEC,
Belgium
Dendooven, Jolien, Ghent Univ., Belgium

Detavernier, Christophe, Ghent
University, Belgium
Engelmann, Sebastian, IBM T.J. Watson
Research Center
George, Steven M., University of
Colorado at Boulder
Hamaguchi, S., Kyoto University, Japan
Hilton, Jessica, SPECS-TII, Inc.
Hofmann, Tino, University of North
Carolina at Charlotte
Huffman, Craig, Micron
Kachian, Jessica, Intel Corporation
Kanarik, Keren J., Lam Research Corp.
Kessels, Erwin, TU / Eindhoven, Netherlands
King, Sean W., Intel Corporation
Lill, Thorsten, Lam Research Corporation
Myers-Ward, Rachael L., U.S. Naval
Research Laboratory
Paquette, Michelle M., University of
Missouri-Kansas City
Parsons, Gregory N., North Carolina
State University
Poodt, Paul, SALDtech B.V., Netherlands
Reinke, Petra, University of Virginia
Walker, Amy, University of Texas at Dallas
Wheeler, Virginia, U.S. Naval Research Lab
Yanguas-Gil, Angel, Argonne National Lab

BIOMATERIAL INTERFACES DIVISION

Topic Chair: Valtiner, Markus, Vienna
University of Technology, Austria
Topic Co-Chair: Jarvis, Karyn, Swinburne
Univ. of Technology, Australia
Fears, Kenan, U.S. Naval Research Lab
Goacher, Robyn E., Niagara University
Graham, Dan, University of Washington
Hanley, Luke, University of Illinois at Chicago
Howell, Caitlin, University of Maine
Lerach, Jordan, ImaBiotech Corp.
Parekh, Sapun, University of Texas at Austin

BIOMATERIALS PLENARY SESSION

Topic Chair: Valtiner, Markus, Vienna
University of Technology, Austria

CHEMICAL ANALYSIS AND IMAGING INTERFACES FOCUS TOPIC

Topic Co-Chair: Kolmakov, Andrei,
National Institute of Standards and
Technology (NIST)
Topic Co-Chair: Yu, Xiao-Ying, Pacific
Northwest National Laboratory

ELECTRONIC MATERIALS AND PHOTONICS DIVISION

Topic Chair: Douglas, Erica, Sandia National Laboratories
Cleveland, Dr. Erin, Univ. of Maryland
Henry, Dr. Michael David, Sandia National Laboratories
Kawasaki, Prof. Jason, University of Wisconsin - Madison
King, Dr. Sean W., Intel Corporation
McDonnell, Stephen, Univ. of Virginia
Myers-Ward, Dr. Rachael L., U.S. Naval Research Laboratory
Paquette, Prof. Michelle M., University of Missouri-Kansas City
Rockett, Prof. Angus, Colorado School of Mines
Wiggins, Bryan, Intel Corporation

FUNDAMENTAL DISCOVERIES IN HETEROGENEOUS CATALYSIS FOCUS TOPIC

Topic Co-Chair: Arnadottir, Liney, Oregon State University
Topic Co-Chair: Baber, Ashleigh, James Madison University
Topic Co-Chair: Killelea, Dan, Loyola University Chicago
Parkinson, Gareth S., TU Wien, Austria
Schauer mann, Svetlana, Christian-Albrechts University Kiel, Germany
Utz, Arthur, Tufts University
Weaver, Jason, University of Florida

MAGNETIC INTERFACES AND NANOSTRUCTURES DIVISION

Topic Chair: Lauter, Valeria, Oak Ridge National Laboratory
Donath, Markus, Westfälische Wilhelms-Universität Münster, Germany
Enders, Axel, University of Bayreuth, Germany
Gai, Zheng, Oak Ridge National Lab
Holcomb, Mikel B., West Virginia Univ.
Kaspar, Tiffany, Pacific Northwest National Laboratory
Kelber, Jeffrey, Univ. of North Texas
Mankey, Gary, University of Alabama
Ohldag, Hendrik, Lawrence Berkeley National Laboratory
Szulczewski, Greg, The Univ. of Alabama

MANUFACTURING SCIENCE AND TECHNOLOGY GROUP

Topic Co-Chair: Diebold, Alain C., SUNY College of Nanoscale Science and Engineering
Topic Co-Chair: Kaarsberg, Tina, Department of Energy
Joseph, Eric A., IBM Research Division, T.J. Watson Research Center

Rogers, Bridget, Vanderbilt University
Rubloff, Gary, University of Maryland, College Park
Svedberg, Erik, National Academies of Sciences, Engineering, and Medicine

MEMS and NEMS TECHNICAL GROUP

Topic Co-Chair: Qian, Zhenyun, Northeastern University
Topic Co-Chair: Wang, Max Zenghui, University of Electronic Science and Technology of China
Topic Co-Chair: Zheng, Xuqian, University of Florida

MINI SYMPOSIUM ON 2D MATERIALS SYNTHESIS

Topic Co-Chair: Batzill, Matthias, University of South Florida
Topic Co-Chair: Czaplewski, David, Argonne National Laboratory
Topic Co-Chair: Douglas, Erica, Sandia National Laboratories
Ebrahimi, Maryam, Lakehead University, Canada
Gunlycke, Daniel, Naval Research Lab
Katoch, Jyoti, Carnegie Mellon Univ.
Kawasaki, Jason, University of Wisconsin - Madison
McCreary, Kathleen, Naval Research Lab
McDonnell, Stephen, Univ. of Virginia
Myers-Ward, Rachael L., U.S. Naval Research Laboratory

NANOSCALE SCIENCE AND TECHNOLOGY DIVISION

Topic Chair: Czaplewski, David, Argonne National Laboratory
Burnham, Nancy, Worcester Polytechnic Institute
Ebrahimi, Maryam, Lakehead University, Canada
Fantner, Georg Ernest, École Polytech. Fédéral de Lausanne, Switzerland
Hanbicki, Aubrey, Laboratory for Physical Sciences
Jariwala, Deep, Univ. of Pennsylvania
Klimov, Nikolai, National Institute of Standards and Technology
Ko, Wonhee, Oak Ridge National Lab
Liu, Xiaolong, Northwestern University
Luican-Mayer, Adina, University of Ottawa, Canada
McCreary, Kathleen, Naval Research Lab
Tu, Qing, Texas A&M University

NANOSCALE SCIENCE AND TECHNOLOGY PLENARY

Topic Chair: Czaplewski, David, Argonne National Laboratory

NEW TRENDS ON STRUCTURAL AND ELECTRONIC CHARACTERIZATION OF MATERIALS, INTERFACES, AND SURFACES USING SYNCHROTRON AND FEL-BASED RADIATION SOURCES FOCUS TOPIC

Topic Co-Chair: Castro, Germán Rafael, Spanish CRG BM25-SpLine Beamline at the ESRF, France
Topic Co-Chair: McChesney, Jessica, Argonne National Laboratory
Topic Co-Chair: Nemsak, Slavomir, Advanced Light Source, Lawrence Berkeley National Laboratory

PLASMA SCIENCE AND TECHNOLOGY DIVISION

Topic Chair: Engelmann, Sebastian, IBM T.J. Watson Research Center
Topic Co-Chair: Wang, Mingmei, TEL Technology Center, America, LLC
Agarwal, Sumit, Colorado School of Mines
Arnold, John, IBM Research Division, Albany, NY
Bezard, Philippe, IMEC, Belgium
Darnon, Maxime, CNRS/Université de Sherbrooke, Canada
Gordon, Michael, University of California at Santa Barbara
Hayashi, Hisataka, Kioxia, Japan
Ishikawa, Kenji, Nagoya Univ., Japan
Kessels, W.M.M. (Erwin), Eindhoven Univ. of Technology, Netherlands
Lishan, David, Plasma-Therm LLC
Luan, Pingshan, TEL Technology Center, America, LLC
Maeda, Kenji, Hitachi High Technologies, Japan
Mededovic Thagard, Selma, Clarkson Univ.
Odunuga, Samson, Intel Corporation
Pargon, Erwine, CNRS-LTM, Université Grenoble Alpes, France
Raley, Angelique, TEL US
Reniers, Francois, Université libre de Bruxelles, Belgium
Sankaran, Mohan, University of Illinois at Urbana-Champaign
Tatsumi, Tetsuya, Sony Semiconductor Solutions Corporation, Japan
Tian, Wei, Consultant
van de Sanden, Richard M.C.M., Eindhoven University of Technology, Netherlands
Vitale, Steven, MIT Lincoln Lab
Walton, Scott, Naval Research Lab

QUANTUM INFORMATION SCIENCE FOCUS TOPIC

Topic Co-Chair: Adiga, Vivekananda, IBM, T.J. Watson Research Center
Topic Co-Chair: Pappas, David, Rigetti Computing

Bal, Mustafa, Fermi Lab
Bouyer, Philippe, CNRS, France
Bylander, Jonas, Chalmers University of
Technology, Sweden
Chen, Yong P., Purdue University
Kok, Pieter, University of Sheffield, UK
Lake, Russell, Bluefors
Rae, Corey, University of Colorado
Boulder/National Institute for Science
and Technology (NIST)
Richardson, Christopher, Laboratory for
Physical Sciences
Rubinsztein-Dunlop, Halina, University
of Queensland, Australia
Silver, Richard, National Institute of
Standards and Technology (NIST)
Yoder, Jonilyn, MIT Lincoln Lab

RADIATION EFFECTS ON MATERIALS

FOCUS TOPIC

Topic Co-Chair: Dubowsky, Scott, Univ.
of Illinois at Urbana-Champaign
Topic Co-Chair: Jaramillo, Camilo, Penn
State University

SMART MULTIFUNCTIONAL MATERIALS FOR NANOMEDICINE

FOCUS TOPIC

Topic Co-Chair: Reniers, Francois,
Université libre de Bruxelles, Belgium
Topic Co-Chair: Satriano, Cristina,
University of Catania, Italy

SPECTROSCOPIC ELLIPSOMETRY

FOCUS TOPIC

Topic Chair: Hofmann, Tino, Univ. of
North Carolina at Charlotte
Topic Co-Chair: Darakchieva, Vanya,
Linköping University, Sweden
Topic Co-Chair: Diebold, Alain C., SUNY
College of Nanoscale Science and
Engineering

SURFACE SCIENCE DIVISION

Topic Chair: Altman, Eric, Yale Univ.
Anderson, Scott, University of Utah
Bluhm, Dr. Hendrik, Fritz Haber
Institute of the Max Planck Society,
Germany
Calaza, Florencia, UNL-Conicet,
Argentina
Chen, Dr. Donna, University of South
Carolina
Dohnalek, Dr. Zdenek, Pacific Northwest
National Laboratory
Groot, Dr. Irene, Leiden University,
Netherlands
Iski, Prof. Erin, University of Tulsa
Schauermann, Prof. Dr. Svetlana,
Christian-Albrechts-University Kiel,
Germany
Utz, Prof. Arthur, Tufts University
Zhang, Zhenrong, Baylor University

THIN FILMS DIVISION

Topic Chair: Vallee, Christophe, SUNY
POLY, Albany
Akyildiz, Halil, Uludag Univ., Turkey
Banerjee, Parag, Univ. of Central Florida
Becker, Joe, Kurt J. Lesker Company
Conley, Jr., John, Oregon State University
Creatore, Adriana, Eindhoven University
of Technology, Netherlands
Fitz-Gerald, James, University of Virginia
Grubbs, Robert, Micron Technology
Guisinger, Nathan, Argonne National
Laboratory
Gupta, Subhadra, University of Alabama
Jewell, April, Jet Propulsion Laboratory
(NASA/JPL)
Jur, Jesse, North Carolina State Univ.
Kachian, Jessica, Intel Corporation
Li, Dawen, University of Alabama
Losego, Mark, Georgia Institute of
Technology
Mackus, Adrie, Eindhoven University,
Netherlands
Nejati, Siamak, University of Nebraska-
Lincoln
Park, Jin-Seong, Hanyang Univ., Korea
Peng, Qing, University of Alabama
Poedt, Paul, Holst Centre / TNO,
Netherlands
Stiff-Roberts, Adrienne, Duke University
Vanfleet, Richard, Brigham Young Univ.
Wang, Xinwei, Shenzhen Graduate
School, Peking University, China
Wheeler, Virginia, U.S. Naval Research
Laboratory
Yanguas-Gil, Angel, Argonne National
Laboratory
Yu, Cunjiang, University of Houston
Zhao, Junjie, Zhejiang Univ., China

UNDERGRADUATE POSTER SESSION

Topic Co-Chair: Arnadottir, Liney,
Oregon State University
Topic Co-Chair: Baber, Ashleigh, James
Madison University
Topic Co-Chair: Iski, Erin, Univ. of Tulsa

VACUUM TECHNOLOGY DIVISION

Topic Chair: Carter, Jason, Argonne
National Laboratory
Topic Co-Chair: Lushtak, Yevgeniy,
Lawrence Berkeley Lab
Alfrey, Jason, Vacuum Technology, Inc.
Bagge-Hansen, Michael, Lawrence
Livermore National Laboratory
Brucker, Gerardo, MKS Instruments,
Inc., Pressure and Vacuum
Measurement Group
Fedchak, James A., National Institute of
Standards and Technology (NIST)
Heinbuch, Scott, MKS Instruments, Inc.

Hendricks, Jay, National Institute of
Science and Technology
Lanza, Giulia, SLAC National Accelerator
Laboratory
Li, Yulin, Cornell University
Molkenboer, Freek, TNO Science and
Industry, Netherlands
Omolayo, Sol, Lawrence Berkeley Lab,
University of California, Berkeley
Ricker, Jacob, NIST
Romel, Chandra, California Institute of
Technology
Scherschligt, Julia, National Institute of
Standards and Technology
Stutzman, Marcy, Jefferson Lab
Van Drie, Alan, TAE Technologies
Wüest, Martin, INFICON Ltd.,
Liechtenstein

2D MATERIALS TECHNICAL GROUP (2D)

The 2D Materials Technical Group will review the world-wide effort exploring 2D materials covering their synthesis, characterization, processing, properties, and applications. Papers are solicited in growth and fabrication; properties including electronic, magnetic, optical, mechanical properties; characterization including microscopy and spectroscopy; surface chemistry, functionalization, bio and sensor applications; dopants, defects, and interfaces; nanostructures including heterostructures; device physics and applications; novel 2D materials; and novel quantum and symmetry-protected phenomena in 2D materials.

2D1+AS+EM: Electron Microscopy and Photoemission Spectroscopy

Robert Hovden, University of Michigan

Ute Kaiser, University of Ulm, Germany

2D2+AS+NS+SS: Scanning Probe Microscopy and Spectroscopy

An-Ping Li, Oak Ridge National Laboratory

Wei Ruan, Fudan University, China, "Imaging Quantum Spin Liquid Behavior in Single-layer 1T-TaSe₂"

Ali Yazdani, Princeton University

2D3+EM: Electronic, Mechanical, and Optical Properties

Martin Kroner, ETH Zurich, Switzerland

Chih-Kang (Ken) Shih, University of Texas at Austin

Young Woo Son, Korea Institute for Advanced Study, Korea (Republic of), "Interplay between Electronic, Magnetic and Mechanical Properties in 2D Crystals"

2D4+EM+MI: Charge Density Waves, Magnetism, and Superconductivity

Yi-Ting Hsu, Notre Dame University, "Novel Materials for Quantum Computing Devices: Monolayer Topological Superconductors"

Thomas Michely, University of Cologne, Germany, "Tunable Electronic Structure and Correlations in Quasi-Freestanding Monolayer Transition Metal Dichalcogenides"

Hyejin Ryu, Korean Institute of Science, Korea (Republic of)

2D5+AS+SS: Defects, Dopants, Edges, Functionalization, and Intercalation

Ralph Claessen, University of Wuerzburg, Germany

Sarah Haigh, University of Manchester, UK

2D6+MI: Heterostructures, Twistronics, and Proximity Effects

Allen Macdonald, University of Texas at Austin

Frances Ross, MIT, "Strategies for Controlling Structure and Magnetic Texture in 2D Magnets"

2D7+AS+BI+HC+SS: Biological, Electronic, Energy, and Other Applications

Deji Akinwande, University of Texas Austin

Aida Ebrahimi, Penn State University

2D8+EM+MI: Electron and Spin Transport

2D9+NS+QS: Symmetry-Protected and Quantum Properties

Iuliana Radu, IMEC, Belgium

Christoph Stampfer, RWTH Aachen, Germany

2D10: Novel Materials

Keun Su Kim, Yonsei University, Korea (Republic of), "Bandstructure Engineering in Two-Dimensional Semiconductors"

Francesca Tavazza, NIST, "Semi-High Throughput Investigation of 2D Materials: Anomalous Quantum Confinement Effect and Spectral Properties"

2D11: 2D Materials Poster Session

ACTINIDES AND RARE EARTHS FOCUS TOPIC (AC)

Actinides and rare earths exhibit many unique and diverse physical, chemical, and magnetic properties resulting in large part from the complexity of their 5f and 4f electronic structure. The Actinide and Rare Earth Sessions focus on the chemistry, physics and materials science of f-electron materials. Emphasis will be placed upon the 4f/5f electronic and magnetic structure, surface science, thin film properties, and applications to energy-related issues. The role of fundamental f-electron science in resolving technical challenges posed by actinide materials will be stressed, particularly with regard to energy applications, including energy generation, novel nuclear fuels, and structural materials. Both basic and applied experimental approaches, including synchrotron-radiation-based and neutron-based investigations, as well as theoretical modeling computational simulations, will be featured, with the aim of explaining the observed behavior in these complex materials. Of particular importance are the issues important to nuclear energy and security, including fuel synthesis, oxidation, corrosion, intermixing, stability in extreme environments, prediction of properties via bench-marked simulations, separation science, and forensics. Specific sessions will be devoted to a continued, focused emphasis on the advances in the theory and measurements of core-level spectroscopies for the study of actinides and rare earths. This Focus Topic will also address advances in chemistry/materials sciences for environmental management and will promote the participation of early career scientists.

AC1+LS+MI: Magnetism, Electron Correlation, and Superconductivity in the Actinides/Rare Earths

Daniel Gnida, PAN-Wroclaw, Poland

AC2+LS+MI: Chemistry and Physics of the Actinides/Rare Earths

Santa Jasone-Popova, ORNL, "Novel Preorganized Ligands for Selective and Efficient Separation of f-Elements"

Karah Knope, Georgetown University, "Impact of Noncovalent Interactions on Actinide Structural Chemistry"

AC3+AS+LS: Emerging Topics and Methods in Actinide/Rare Earth Science

Miles Beaux, LANL, "The Non-Integer Occupancy Ground State Hypothesis"

Jennifer Matzel, LLNL

AC4+LS+MI: Actinide/Rare Earth Theory

David Dixon, University of Alabama, "Extending Our Understanding of f-Element Oxidation States Using Computational Chemistry"

Filipp Furche, UC Irvine

AC5: Actinides and Rare Earths Poster Session

ADVANCED ION MICROSCOPY AND ION BEAM NANO-ENGINEERING FOCUS TOPIC (HI)

The Advanced Ion Microscopy & Ion Beam Nano-Engineering Focus Topic targets advancement in focused ion beam technologies and applications. The renaissance of novel ion beam technologies in the recent years brought unique opportunities in microscopy, nano-fabrication, metrology, material engineering, and novel analytical techniques. With origins in Gas Field Ion Source Helium Ion Microscopy (GFIS-HIM), this session has expanded to include the full spectrum of charged particle beams and sources including Liquid Metal Ion Source (LMIS), a breadth of solid state and alloy sources, plasma-cusp ion sources, cold beams, and neutral beams, for a broad range of research and applications.

HI1+AS: Advanced Ion Microscopy & Surface Analysis

Frances Allen, University of California, Berkeley, "Defect Engineering on the Atomic Scale with the Helium Ion Microscope"

Florian Vollnhals, Institute for Nanotechnology and Correlative Microscopy INAM, Germany, "Correlative Microscopy using HIM and HIM/SIMS"

HI2: Novel Beam Induced Material Engineering and Nano Patterning

Rantej Bali, HZDR-Helmholtz-Zentrum Dresden-Rossendorf, Germany, "Anisotropic Effects in Embedded Magnetic Nanostructures Achieved Using Focused Ion Beams"

Rosa Cardoba, U. De Valencia, Spain

HI3: Emerging Ion Sources and Optics

Edward Bielejec, Sandia National Lab, "Novel Source Development for Focused Ion Beam Implantation and Irradiation"

HI4: Advanced Ion Microscopy Poster Session

ADVANCED SURFACE ENGINEERING DIVISION (SE)

The Advanced Surface Engineering Division (SE) welcomes presentations for diverse areas in surface engineering focusing on coating deposition technologies, advanced coating materials, characterization of coating microstructure and properties, and utilizing surface engineering for industrial applications. The program offers four oral sessions and a poster session, which are co-sponsored by other AVS Divisions and focus topics. The four technical sessions will be led by high profile invited speakers who will highlight recent advances in fundamental and cutting-edge research in surface engineering. The session "Vapor Deposition Technologies and New Trends in Surface Engineering" highlights the latest progresses in synthesizing thin films and coatings and surface modification on all kinds of materials. The session "Nanostructured and Multifunctional Thin Films and Coatings" welcomes presentations on the design and development of advanced nanostructured coatings for achieving multifunctionality to be used in various environment, e.g. wear, erosion, corrosion, high temperature, etc. Studies focusing on the deep understanding of the relationship between process, structure and properties of advanced coatings and modified surfaces are of interest. The session "Mechanical and Tribological Properties of Thin Films and Coatings" will highlight contributions on fundamental understanding and applied research aspects for thin film and coating mechanical and tribological properties. The contribution includes new and advanced surface characterization techniques, analysis and characterization of modified surfaces, and the interaction of the surface with environment. A new session of "Advanced Coatings for hypersonics and other harsh aerospace environments" focus on cutting-edge research on coating technologies for hypersonics, e.g. high-entropy alloys (HEA), thermal barrier coatings (TBCs), and ultra-high temperature ceramic coatings (UHTC), etc. In addition, SE will continue to offer the Young Investigator Award to young investigators for recognizing their outstanding participation and research based on presentations in SE program sessions.

SE1+MN+PS+TF: Vapor Deposition Technologies and New Trends in Surface Engineering

Robert Franz, Montanuniversität Leoben, Austria, "Plasma and Erosion of Multi-Element Arc Cathodes"

Nina Schalk, University of Leoben, Austria, "Combinatorial Application of Advanced Characterization Methods to Illuminate the Role of Interfaces in Multilayer Coatings"

SE2+AS+BI+SS+TF: Nanostructured and Multifunctional Thin Films and Coatings

Bill Baloukas, Polytechnique Montreal, Canada, "Nanostructured Optical Thin Films for Energy Applications and More"

Johanna Rosen, Linköping University, Sweden

SE3+AS+MN+SS: Mechanical and Tribological Properties of Thin Films and Coatings

Julien Fontaine, Ecole Centrale de Lyon, France, "Investigating Solid And Boundary Lubrication Processes With An Environment Controlled Tribometer Based On A Unique 6 Axes Sensor"

SE4+MN+PS: Advanced Coatings for Hypersonics and Other Harsh Aerospace Environments

Thomas Stinnett, Lockheed Martin, USA, "Advanced Coatings for Hypersonic Applications: Thermal Barrier Coatings for Titanium Alloys"

SE5: Advanced Surface Engineering Poster Session

APPLIED SURFACE SCIENCE DIVISION (AS)

The Applied Surface Science Division (ASSD) provides a forum for research in surface preparation, modification, and utilization for practical applications with a focus on Characterization of Surfaces, Interfaces, and Nanomaterials. The Division has long been the premier gathering place for the global community of surface analysts with historic emphasis on techniques such as XPS, SIMS, and Auger spectroscopies. We have long-standing analytical interests with traditional sessions such as quantitative surface analysis, industrial problem solving, and advances in technique development. Our contributors present a blend of fundamental research in measurement science along with cutting-edge applied studies in nanoscience, materials for energy conversion, semiconductor processing, polymers, biotechnology, and more. We strive to grow in new areas for future development in applied surface analysis and analytical data processing. For AVS 68 we are also encouraging contributions focusing on the detection and characterization of defects at surfaces and interfaces. Novel surface analytical methods for providing insight into surfaces, such as Atom Probe Tomography, Ellipsometry, and in operando techniques are welcome. Abstracts describing novel research are solicited in areas below. In addition, there are three Memorial Sessions in Memory of Charles Fadley, David Shirley, and Martin Seah. We accept abstracts for both oral sessions and poster sessions, which provide an excellent opportunity for one-on-one discussions of new results with colleagues. Special consideration will be given to papers that highlight cross-disciplinary issues of the research. The authors are also encouraged to submit their original results to the accompanying AVS journals.

AS1+CA+EL+EM+LS+SE+SS: Quantitative Surface Analysis

David Cant, National Physical Laboratory, UK, "Hard Targets : Developing Tools for Quantitative HAXPES"

Peter Licence, University of Nottingham, UK, "Chemistry in-Vacuo: Suck It and See!"

AS2+BI+CA+HC+LS+PS+SE+SS: Analysis of Surfaces and Interfaces Related to Energy and the Environment

Svitlana Pylypenko, Colorado School of Mines, "Analysis of Surfaces and Interfaces in Polymer Electrolyte Membrane Fuel Cell and Electrolyzer Devices"

AS3+2D+EM+MS+NS+SS+TF: Probing Defects at Surfaces and Interfaces

Nayon Park, University of Washington, "Controlling the Surface Defects of InP Quantum Dots Using ALD-inspired Surface Chemistry and Phosphorus K α and K β X-ray Emission Spectroscopy"

AS4+AC+BI+CA+HI: Unraveling the Composition of Complex Systems with SIMS

Birgit Hagenhoff, Tascon, GmbH, Germany, "Towards Organic 3D Characterization: SIMS Analysis Using Ar Cluster Ions"

Christopher Szakal, National Institute of Standards and Technology (NIST), "Innovations in Nuclear Materials Analysis with SIMS"

AS5+AP+EM+SE: Surface Analysis Using Complementary Techniques

Brian Gorman, Colorado School of Mines, "Hardware and Data Analysis Methods for Integrating TEM and Atom Probe Tomography"

Alexander Gray, Temple University, "Combining Multiple X-Ray Spectroscopic and Scattering Techniques to Probe Emergent Electronic Phenomena at Oxide Interfaces"

AS6+LS+RE+SS: Probing Surface and Interface Structure with X-ray Photoelectron Spectroscopy: in Memory of Charles Fadley

Martina Müller, Universität Konstanz, Germany, "Electronic Structure of Tunable Ferrocenic Oxides Determined by Photoemission Spectroscopy"

Bongjin Simon Mun, Gwangju Institute of Science and Technology, Korea (Republic of), "Study of Surface Oxides on Pt₃Ni(111) and Pt₃Co(111) using Ambient Pressure XPS"

AS7+LS+RE+SS: Synchrotron-Based Photoelectron Spectroscopy Studies of Technologically Important Materials: in Memory of David Shirley

Günter Kaindl, Freie Universität Berlin, Germany, "David A. Shirley - Pioneer of Synchrotron-Radiation Science and International Cooperation"

Eric Shirley, National Institute of Standards and Technology (NIST), "On Photoelectron Spectroscopy and the Shirley Background"

AS8+CA+HC+LS: Shining a Light on Surface Chemical Metrology: In Memory of Martin Seah

Don Baer, Pacific Northwest National Laboratory, "Complementary Perspectives on the Impacts of Martin Seah on Surface Analysis"

Ian Gilmore, National Physical Laboratory, UK, "Metrology Lights the Way for Advances in Metabolic Imaging at the Single-cell Scale"

AS9: Applied Surface Science Poster Session

ATOMIC SCALE PROCESSING FOCUS TOPIC (AP)

The Atomic Scale Processing Focus Topic is aimed at providing a unique forum to expand the scope of atomic layer deposition (ALD) and atomic layer etching (ALE) processes towards understanding the fundamentals needed to achieve true atomic scale precision and the application of such processing on various areas of interest to the broader

AVS community. The emphasis will be on synergistic efforts, across multiple AVS divisions and groups, to generate area selective processes as well as novel characterization methods to advance the field of processing at the atomic scale. We are excited to offer several sessions in collaboration with the PSTD, the TFD, as well as the EMPD, focusing on area selective deposition, atomic layer process chemistry, and surface reactions and atomic layer etching.

AP1+AS: Area Selective Processing and Patterning

James Ekerdt, University of Texas at Austin, "Low Temperature Area -selective ALD and ALE of Pd"

Woo-hee Kim, Hanyang University, Korea

Alex Martinson, Argonne National Laboratory, "Site-selective Atomic Layer Deposition: Targeting Electronic Defects"

Christophe Vallee, SUNY College of Nanoscale Science and Engineering

AP2+AS+EL+MS+SS: Advancing Metrology and Characterization to Enable Atomic Scale Processing

Thomas Grehl, IONTOF GmbH, Germany

Harm Knoops, Oxford Instruments Plasma Technology, Netherlands, "Atomic Scale Processing for Quantum Computing"

Sung Park, Molecular Vista

AP3+2D+PS+TF: Atomic Layer Processing: Integration of Deposition and Etching for Advanced Material Processing

Sashi Vyas, Intel Corp.

AP4+AS+HI+PS+SS: Beam Studies / Surface Reaction Analysis and Emerging Applications of Atomic Scale Processing

Howard Fairbrother, Johns Hopkins University, "Rationalizing and Controlling the Composition and Properties of Ion Beam Deposited Materials"

Ivo Utke, Empa, Swiss Federal Laboratories for Materials Science and Technology, Switzerland

AP5+TF: Thermal Atomic Layer Etching

Andreas Fischer, LAM Research, "Thermal Atomic Layer Etching: The Right Etch Technology at the Right Time"

Gert Leusik, TEL Technology Center, America, LLC, USA, "Thermal Atomic Layer Etch Processes in Semiconductor Manufacturing, Challenges and Opportunities"

AP6: Atomic Scale Processing Poster Session

BIOMATERIAL INTERFACES DIVISION (BI)

The Biomaterial Interfaces Division (BI) program provides an interdisciplinary forum for the presentation and discussion of fundamental aspects of bio-interface science and engineering. The BI program brings together recent advances made in materials science and molecular biology with sophisticated surface and interface analysis methods, and theoretical and modeling approaches for biological systems. Areas of interest are: microbes and fouling at surfaces, including, control of microbes and fouling, including biofilms, biofouling, attachment and adhesion of microbes, assessment of antifouling and fouling release function, antifouling coatings, motility at interfaces, colonization analysis, biofilms and EPS, biomolecules and biophysics at interfaces, including proteins at surfaces, nucleic acids, polysaccharides, adsorption, blood-contacting materials, bio adhesion, and infection and immunity; characterization of biological and biomaterials surfaces, including: spectroscopy, 2D and 3D imaging, microscopy, optical and mechanical methods of biomaterials and thin film analysis, characterization in biological media, quantification, chemometrics, microfluidics, time- and spatial resolution, scanning probe techniques; bioanalytics, biosensors and diagnostics, including: 3D analysis, biological membranes, vesicles, membrane processes, forces, recognition, signaling, biosensors, microfluidics, point-of-care devices, paper based sensors, electrochemistry, 3D chemical analysis, 3D tomographic analysis, microscopy, 3D tracking; biomaterials and nanomaterials fabrication, including organic thin films, polymer coatings, hybrid coatings, biologically inspired materials, plasma produced biomaterials, patterning, nanofabrication; including rapid prototyping, additive manufacturing; 3D structures including artificial organs, 3D biofilm structures; Bioenergy for our energy future including biomaterials for fuels, biomass conversion, and heterogeneous catalysis of biomaterials. Perfectly imperfect biology, including reproducibility related topics, the role of defects in biologic structures, and statistical significance for discovery of patterns and rare processes. The BI program begins with the traditional Sunday afternoon Plenary Session on programmable biologic materials. We also invite submissions of Flash poster presentations, to be made in a dedicated session with an accompanying networking session involving associated poster presentations. Joint BID/Biointerphases prizes will be awarded for the best student Flash/Poster presentations.

BI1+AS+PS: Microbes and Fouling at Surfaces

Jessica Schiffman, University of Massachusetts - Amherst

BI2+AS+PS: Biomolecules and Biophysics at Interfaces

Jing Yu, Nanyang Technological University, Singapore

BI3+AS: Characterization of Biological and Biomaterials Surfaces

Shin Muramoto, NIST

BI4+AS+EM+NS+SE+TF: Bioanalytics, Biosensors and Diagnostics

Melanie McGregor, University of South Australia

BI5+SE: Biomaterials and Nanomaterials Fabrication

BI6+AS+HC+SS: Biology for Our Energy Future

Ghim Wei Ho, National University of Singapore

Tak-Sing Wong, Penn State University, "Nature-inspired Materials for Energy and Environmental Sustainability"
BI7+AS: Perfectly Imperfect Biology: Reproducibility in Biological Surface Science

Lisbeth Grøndahl, University of Queensland, Australia

BI8: Biomaterial Interfaces Flash Poster Session

CHEMICAL ANALYSIS AND IMAGING INTERFACES FOCUS TOPIC (CA)

Chemical and physical processes occurring at surfaces and gas-liquid, solid-liquid, and gas-solid interfaces are crucial for many applications and yet their analysis often represents grand scientific and engineering challenges. The Chemical Analysis and Imaging at Interfaces Focus Topic symposium is designed as a cross-disciplinary "melting pot" and aims to disseminate the latest developments in experimental methods and understanding of the interfacial physical and chemical processes relevant (but not limited) to materials synthesis, microfabrication, energy/catalysis research, biomedical applications, environmental sciences, and surface modifications, to name a few. In particular, in (ex-) situ/in vivo/operando chemical imaging, microscopy, and spectroscopy studies using electron, X-ray, ion, neutron beams as well as optical methods and synchrotron radiation/free-electron lasers facilities are strongly encouraged. Attention will also be paid to correlative spectroscopy and microscopy methods, modern image/spectra processing, and AI techniques. Contributions are invited including but not limited to experimental, fundamental research, industrial R&D, novel analytical techniques/approaches, and metrology of realistic surfaces and interfaces.

CA1+AS+LS+NS+SS+VT: Environmental Interfaces

Mark Schollossman, University of Illinois at Chicago

Ahmet Uysal, Argonne National Laboratory

CA2+2D+AS+BI+HC+LS+NS: In Situ Microscopy, Spectroscopy and Processing at Liquid-Solid-Gas Interfaces

Si Chen, Argonne National Lab

Milos Troth, University of Technology Sydney, Australia

CA3+HC+LS+VT: Multiphase Interfacial Analysis and Imaging

Keshav Dani, Okinawa Inst. Of Sci. & Tech, Japan

Qiang Fu, Dalian Inst. Phys. Chem., China

CA4+AS+BI: Modeling and Multi-Dimensional Data Processing of Interfacial Processes

Zbigniew Postawa, Jagiellonian University, Poland, "Atomic-scale Modeling of Cluster Projectile Interactions with Liquid Interfaces"

Alexander Tselev, University of Aveiro, Portugal

CA5+AS+SE+SS: Progress and Challenges in Industrial Applications

Hugo Perez, DENSSolutions, Netherlands Antilles, "Advanced In-situ Transmission Electron Microscopy: A Powerful Tool for Material Science, Energy Storage & Life Science Applications"

Anna Zaniewski, Advent Diamond, Inc.

CA6+2D+AS+SE+SS: Novel Developments and Applications of Interfacial Analysis

Baptiste Gault, MPI, Germany

Takahide Yamaguchi, National Institute for Materials Science, Japan

CA7: Chemical Analysis and Imaging Interfaces Poster Session

ELECTRONIC MATERIALS AND PHOTONICS DIVISION (EM)

The Electronic Materials and Photonics Division (EMPD) encompasses presentations in any aspect of the science and engineering of materials, interfaces, and processing that advance electronic, photonic, and optoelectronic device technologies. Sessions planned for AVS 66 include materials, processes, and devices for advanced logic, memory, and interconnect applications. Methods to enable new device topologies and simplify process flows such as selective area patterning, deposition, and etching will also be highlighted. In honor of our late colleague Prof. Nikolaus Dietz, a long-time EMPD committee member and AVS contributor, we have organized a special session covering the materials growth, characterization, and fabrication of wide and ultra-wide band gap devices. Consistent with the energy theme of AVS 66, we have devoted a session to the electronics and photonics needed to enable renewable energy generation, storage, and transmission. Topics include low-power electronics, power electronics, photovoltaics, and thermoelectrics. We are also holding a session covering the latest advances in electronic and photonic nanostructure synthesis, assembly, and properties, as well as the techniques required for their characterization on the nanoscale. As in past years, we will offer multiple graduate student poster awards as well as post-doc travel awards to help create a forum in which younger scientists can present their work and develop relationships for the future.

EM1+PS+TF: New Devices and Materials for Electronic and Photonic Applications

Mikael Rechtsman, Pennsylvania State University

EM2+MS: Artificial Intelligence and Machine Learning to Accelerate Development of Electronic and Photonic Materials and Devices

Kristin Persson, Lawrence Berkeley Lab

EM3+MN+TF: Wide and Ultra Wide Band Gap Materials and Devices

Man Hoi Wong, University of Massachusetts Lowell, "What Can We Do With Ga₂O₃?"

EM4+AS+NS+SS: Defect Engineering in Electronic & Photonic Materials & Devices

Elizabeth Dickey, Carnegie Mellon University, "Design and Control of Defect-Mediated Properties in Electronic Ceramics"

EM5+MN+NS: Piezoelectric, Ferroelectric, and Multiferroic Devices & Microelectronics

Susan Trolrier-McKinstry, Pennsylvania State University

EM6: Devices & Materials for Logic, Memory, and Interconnects**EM7+EL+NS: Computational Origins of Electronic & Photonic Defects**

John Robertson, Cambridge University, UK, "Moire Defect Interfaces for Transition Metal Dichalcogenide Semiconductor Channels and Low Contact Resistances"

EM8+AS: Hybrid Perovskite Materials, Processing, Characterization, and Devices

Joseph Berry, National Renewable Energy Laboratory

EM9: Electronic Materials and Photonics Poster Session**FUNDAMENTAL DISCOVERIES IN HETEROGENEOUS CATALYSIS FOCUS TOPIC (HC)**

The Fundamental Discoveries in Heterogeneous Catalysis (HC) Focus Topic highlights recent advances in the understanding of the atomic and molecular basis for heterogeneously-catalyzed reactions on solid surfaces. This will be the fifth time HC has been organized. Emphasis will be on facilitating dialogue between surface science-based and applied communities studying heterogeneously-catalyzed systems. In addition to previous session topics including theoretical models, nanoscale structures, gas-surface dynamics, and other novel studies of active surfaces, several new areas will be explored. New sessions will focus on machine learning and artificial intelligence, electrocatalysis and photocatalysis over surfaces, exotic surfaces, and as well as single-atom catalysis and new materials in line with the Symposium theme of "Imperfectly Perfect Materials". HC will highlight connections among theoretical and experimental approaches with the goal of revealing key details of the fundamental chemistry and physics underlying heterogeneous catalysis. Of particular interest are developments in chemical understanding, atomic-level details, and predictive models of reactions catalyzed by metal surfaces.

HC1+AS+SS: Mechanisms and Reaction Pathways in Heterogeneously-Catalyzed Reactions

Aravind Asthagiri, Ohio State University

Tim Schäfer, University of Göttingen, Germany

HC2+AS+NS+SS: Making Imperfections Count: Design and Characterization of Catalytic Surfaces

Ping Liu, Brookhaven National Laboratory

Karina Morgenstern, Ruhr-University of Bochum, Germany, "A Local View on the Influence of Solvent and Product on the Reactivity of Surface-Catalyzed Reactions"

HC3+AS+SS: Bridging Gaps in Heterogeneous Catalysis

Leslie Abdul-Aziz, University of California – Riverside

Ethan Crumlin, Advanced Light Source, Lawrence Berkeley National Laboratory

HC4+AS+SS: Ambient Pressure Studies of Heterogeneous Catalysis

Maya Kiskinova, Elettra Sincrotrone Trieste, Italy, "Shedding Light on Properties of Catalysts Under Reaction Conditions Using Synchrotron-Based Microscopy"

Jose Rodriguez, Brookhaven National Laboratory

HC5+AS+SS: Advances in Heterogeneous Electrocatalysis

Feng Lin, Virginia Tech

Kelsey Stoerzinger, Oregon State University, "Electrocatalytic Nitrate Reduction: Controlling Adsorbate Affinity to Tailor Reaction Products"

HC6+AS+SS: Single Atom Catalysis

Tao Zhang, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, China, "Ten Years of Single-Atom Catalysis: What We Have Learned and Where We Will Go?"

HC7+AS+SS: Development and Characterization of New Materials for Catalysis

Ashley Head, Brookhaven National Laboratory

Matthias Meier, TU Wien, Austria, "How the Support Dictates the Reactivity of FeO_x-Based Single-Atom Catalysts"

Eranda Nikolla, Wayne State University

HC8+AS+SS: Photocatalysis

Greg Kimmel, Pacific Northwest National Laboratory, "Azimuth-Resolved Adsorbate Structure and Reactivity on Anatase and Rutile TiO₂ Surfaces"

Jennifer Strunk, Leibniz-Institut für Katalyse, Germany

HC9: Heterogeneous Catalysis Poster Session**MAGNETIC INTERFACES AND NANOSTRUCTURES DIVISION (MI)**

This year's Magnetic Interfaces and Nanostructures Division (MIND) program features groundbreaking, exploratory, debated, and emerging results in topical areas related to magnetic interfaces and nanostructures. Particular attention will be given to research areas in magnetism that are of strong interest to the AVS community so that maximum overlap with other divisions and focus topics can be achieved. The program will cover a wide area of topics including chiral magnetism, spin orbit effects, magnetism in topological insulator and other quantum materials, as well as on interfaces in various complex heterostructures. The focus of the program is to cover areas of magnetism

that are fascinating from a fundamental point of view and are also significant for future applications. We especially emphasize the synergies between the research areas covered by MIND and their role in understanding and harnessing defects to enable new materials and devices. The program will feature a special session on “Emerging Researchers attracted by Magnetism.” We will select the best graduate student presentation from finalists for the Leo Falicov Award and will also offer an award for postdoctoral fellows who will be presenting papers at the MIND sessions. The winners of both awards will be announced towards the end of the meeting.

MI1: Topological Insulator Heterostructures

Badih Assaf, University of Notre Dame, "Infrared Magnetospectroscopy of Magnetic Topological Insulator Heterostructures"

Leonid Rokhinson, Purdue University, "Evidence of Antiferromagnetic Exchange at the EuSe/Bi₂Se₃ Interface"

MI2: Spin Landscape I (Magnetic Structures in Real and Momentum Space)

Sinead Griffin, Lawrence Berkeley National Laboratory (LBNL), "Theoretical Design of Frustrated Topological Phases in Magnetic Thin Films"

Christian Binek, University of Nebraska – Lincoln, "Voltage Controlled Néel Vector Rotation in Zero Magnetic Field"

MI3: Spin Landscape II (Magnetic Structures in Real and Momentum Space)

Olav Hellwig, Helmholtz-Zentrum Dresden - Rossendorf, Germany, "Tunable Spin Landscapes in Synthetic Antiferromagnets (SAFs) with Perpendicular Magnetic Anisotropy (PMA)"

Daniel Wegner, Radboud University, Netherlands, "From Glassiness to Order - The Strange Magnetism of Elemental Neodymium"

MI4+2D+TF: Quantum Materials (2D)

Sergey Frolov, University of Pittsburgh, "Hybrid Superconductor-Semiconductor Devices for Quantum Computing"

Alexander Demkov, University of Texas Austin, "Interfacial Magnetism in Oxide Heterostructures"

Roland Kawakami, Ohio State University, "Epitaxial 2D Magnetic Materials"

MI5: Special Session “Emerging Researchers Attracted by Magnetism”

Steven Bennett, Naval Research Laboratory, "Irradiative Control of FeRh's Metamagnetic Phase Change under Three-dimensional Spatial Confinement Interrogated by Polarized Neutron Scattering"

Hendrik Bentmann, Wuerzburg University, Germany, "Topological States in the van der Waals Magnet MnBi₂Te₄: from 3D to 2D"

Michelle Jamer, Naval Research Academy, "Discovering Magnetic Mechanisms in Room-temperature Metallic Antiferromagnet Fe₃Ga₄"

Anika Schlenhoff, University of Hamburg, Germany, "Spin-polarized Resonant Tunneling - A New Tool for Sensing and Manipulating Magnetism on the Atomic Scale"

MI6: Magnetic Interfaces and Nanostructures Poster Session

MANUFACTURING SCIENCE AND TECHNOLOGY GROUP (MS)

The Manufacturing Science and Technology Group (MSTG) sessions bring together invited speakers to highlight the challenges and opportunities for successful manufacturing of next generation materials, devices and technologies. Our sessions are meant to generate synergy among scientists and engineers working across the spectrum of these technologies, including basic research, discovery, metrology, characterization, processing, and development, and deployment. We seek to encourage everyone to keep these manufacturing challenges in mind as they move technologies forward. This year we are highlighting the areas of machine learning for process control and for materials discovery, as well as characterization, and contributions to the Symposium theme of “Imperfectly Perfect Materials.

MS1+HI: Machine Learning for Microelectronics Manufacturing Process Control

Peter Barar, Synopsys

Adnan Chowdhury, NXP Semiconductors

Jeff David, PDF Solutions, "Progressing Process Control with Data-Centric AI"

Jun Shinagawa, Tokyo Electron America, "Paths Toward Autonomous Plasma Process Tool Operation by Pairing of Plasma and Machine Learning Technologies"

Tom Sonderman, Skywater Technology

MS2+AP+AS+TF: Advanced Characterization and Metrology for 3D

Bryan Barnes, NIST, "Semiconductor Metrology for Dimensional and Materials Scaling"

Cornel Bozdog, Nearfield Instruments, "New in-Line Metrology for Advanced Semiconductor Nodes"

Taeyong Jo, Samsung

Sergei Kalinin, Oak Ridge National Laboratory, "Automated Experiment in Electron Microscopy: From Physics Discovery Towards Creating Structures with Designed Properties"

Subra Sankaranarayanan, Argonne National Laboratory, "Towards a Digital Twin for Spatiotemporal Experiments"

MS3+HI: Machine Learning for Materials' Discovery

Preeti Kamakoti, Exxon Mobil, "Accelerating Materials R&D with Data and Model-driven Approaches-An Industrial Perspective"

Aarti Singh, Carnegie Mellon University, "Deep Optimization for Material Discovery"

Brian Valentine, DOE, "Recent Advances in Semiconductor Material Design and Discovery"

MS4: Manufacturing Science and Technology Poster Session

MEMS AND NEMS TECHNICAL GROUP (MN)

The MEMS and NEMS Technical Group (MN) program will highlight recent advances in the broad areas of micro/nanoelectromechanical systems (MEMS/NEMS), especially latest fundamental studies of novel materials, processes, devices, and emerging functions and applications of MEMS/NEMS, in various areas. Our program will include resonant low-dimensional materials and parametric and nonlinear MEMS/NEMS resonators which create intriguing possibilities of integrating these devices with existing fluidic, electronic and optical on-chip networks. The program continues to embrace latest progresses in optical MEMS/ NEMS, micro/nanophotonics, optomechanics, quantum MEMS/NEMS, resonant systems, CMOS-MEMS, mesoscopic dynamics and dissipation processes, inertial sensors, harsh-environment transducers, and MEMS/NEMS-enabled energy technologies, etc. It also aims to capture some of the latest advances in soft materials, flexible and implantable MEMS/NEMS for biosensing, bio-inspired microsystems, wearable and wireless healthcare.

MN1: MEMS Technology for Sensing and Frequency Control

Cristian Cassella, Northeastern University, "AlScN Piezoelectric Metamaterials for Next Generation RF Systems"

Ruo Chen Lu, The University of Texas at Austin, "Scaling Acoustics into mm-Wave: Higher-Order Lamb Mode Devices in Piezoelectric Thin Films"

MN2+2D: Emerging Materials for MEMS/NEMS Devices

Yanan (Laura) Wang, University of Nebraska - Lincoln, "Phononic Crystals based on Two-Dimensional Materials"

Rui Yang, Shanghai Jiao Tong University, China, "Atomically-Thin MoS₂ Nanoelectromechanical Resonators"

MN3+AS+NS+SE: Scanning Probe Study in MEMS/NEMS

Jürgen Brugger, École Polytechnique Fédérale de Lausanne, Switzerland

Huan Hu, Zhejiang University, China, "Nanodevice Fabrication and Nanostructure Fine-Tuning using Helium Ion Microscope"

MN4+QS: Dynamics and Nonlinearity in MEMS

Xueyong Wei, Xi'an Jiaotong University, China, "Synchronization Phenomena in Micromechanical Resonators: Fundamental and Application"

Eva Weig, Technical University of Munich, Germany, "Can a Single Nanomechanical Mode Generate a Frequency Comb?"

MN5+SE: MEMS and BioMEMS Processes, Materials, and Devices

Azadeh Ansari, The Georgia Institute of Technology, "Fabrication, Actuation and Control of 3D-printed Microscale Bristle Robots"

Xia Liu, École Polytechnique Fédérale de Lausanne, Switzerland, "Thermomechanical Nanostraining in Two-Dimensional Materials and Devices"

MN6: Hybrid M/NEMS and M/NEMS Heterogeneous Integration

Roozbeh Tabrizian, University of Florida

MN7: MEMS and NEMS Poster Session

MINI SYMPOSIUM ON 2D MATERIALS SYNTHESIS (MS-2DMS)

Controlled synthesis of single layer van der Waals materials is the foundation that enables the applications of these materials in a various fields from electronic materials to chemical functions and beyond. This mini-symposium focuses on the progress made in making high quality extended 2D materials, the integration of 2D materials with dissimilar materials, the use of 2D materials to enable novel thin film growth, and the controlled synthesis of nanostructures 2D materials, whose structures add functionalities to the 2D sheets. Central to this symposium are novel or improved approaches for synthesizing materials with desired properties and functionalities. All kinds of 2D materials and synthesis methods are considered in this symposium, including but not limited to graphene, single element 2D sheets, and transition metal (di)chalcogenides.

MS-2DMS1+2D+EM+NS: Direct Growth of 2D Materials, Including CVD and MBE

Joan Redwing, Penn State University, "Epitaxial Growth of Wafer-Scale Transition Metal Dichalcogenide Films for Large Area Device Applications"

Rodney Ruoff, Ulsan National Institute of Science and Technology, Korea (Republic of), "Single Crystal (hkl) Metal Foils With a Variety of Surface Orientations and Growth of Thin Films on Them, and Growth of Graphene on Insulating Substrates by New Methods"

MS-2DMS2+2D+EM+NS: Integration of 2D Materials With Dissimilar Materials

Harold Hwang, Stanford

Jeewan Kim, MIT, "Challenges, Opportunities, and Applications of Remote Epitaxy"

MS-2DMS3+2D+EM+NS: Synthesis and Characterization of Nanostructured Materials: Nanoribbons, 2D Polymers and Van Der Waals Materials

NANOSCALE SCIENCE AND TECHNOLOGY DIVISION (NS)

The Division (NSTD) explores the science and technology that emerges when material is shrunk to the nanoscale. Researchers from around the globe will present their work on topics such as nanoscale devices and quantum systems exploiting nanoscale design and characterization. The role of nanomaterials in novel devices and constructs is

highlighted, particularly their surface chemistry, energetics, mechanics, and imagery. Specific emphasis will be made on the the key connections between nanoscale physical and chemical phenomena induced in confined volumes as probed and manipulated by scanning probe tips, electromagnetic radiation, electrons and ions, as well as approaches to harness these phenomena for nanoscale and atom-by-atom fabrication. The NSTD program particularly promotes novel physical phenomena emerging in these nanosystems, and their applications for quantum information systems, sensing, and other applications.

NS1+AP+BI: Fabrication and Operation of Nano-Systems

Marko Loncar, Harvard University

NS2+BI: Nanopore Sensing and Fabrication, Operation and Metrology of Biodevices

Aleksandra Radenovic, EPFL, Switzerland

NS3+QS: Fabrication, Testing and Metrology of Quantum Devices and Systems

Michelle Simmons, University of New South Wales, Australia, "Precision Engineering of Quantum States in Silicon at the Atomic Scale"

NS4+EM+TF: Nanophotonics, Metasurfaces and Plasmonic Systems Including Inverse Design Methods

Jelena Vuckovic, Stanford University

NS5+AP+BI+SS: Frontiers in Scanning Probe Microscopy Including Machine Learning

Eun-ah Kim, Cornell University

NS6+AS+EM: Scanning Probe Metrology of 1D and 2D Materials

Michael Crommie, UC Berkeley

NS7+AS+EM: Correlative Microscopy for Nanoscale Characterization

Harald Hess, Howard Hughes Medical Institute, "Large Volume 3D Biological Imaging With Electron and Cryo-Super-Resolution Microscopy"

NS8+AS+EM+SS: Quantum Based Sensors and Metrology

Peter Maurer, University of Chicago

NS9+QS: Open Science Discussion Session (Open Data (SS Spectra), Open Teaching Materials, Sharing)

NS10: Nanoscale Science and Technology Poster session

NEW TRENDS ON STRUCTURAL AND ELECTRONIC CHARACTERIZATION OF MATERIALS, INTERFACES, AND SURFACES (LS)

Knowledge-based design and implementation of smart functional materials requires a full understanding of the mechanisms which control the properties and behavior of these very complex systems. Generally, in these materials the defects, discontinuities and interfaces define many of their properties. This understanding can be achieved only by exploring simultaneously structure, dynamics and function at multiple spatial, temporal and energy scales. In this respect, the continuously developing state-of-the-art of experimental techniques at synchrotron and free electron laser facilities are the key to a full understanding of the properties of a broad range of complex static and dynamic systems, paving the way to further technological advancements. Today scientists are working hard to obtain systems that have varied, controlled and, if possible, predictable properties. In this context, the development of new methods of solid synthesis and their subsequent textural, morphological and structural characterization, as well as the description of their properties (catalytic, optical, magnetic, electronic, etc.), becomes increasingly important. There is a tendency towards the rational design of multifunctional solids, based on the accumulated knowledge in solid state, surfaces, crystallochemistry, thermodynamics and reactivity. The LS Focus Topic at AVS68 will be dedicated to structural and electronic investigations using hard and soft X-ray scattering and to recent achievements using techniques that have gained significantly from the use of the Synchrotron and FEL based radiation sources.

LS1+2D+AS+EM+MI+QS+TF: Information and Technology

Vincent Cros, Unité Mixte de Physique CNRS/Thales, France

LS2+2D+AS+EM+QS+SS: Operando Catalysis and Energy Systems

Takuya Masuda, National Institute for Materials Science, Japan

LS3+CA+SE+SS: Extreme Conditions: High Pressure, Temperature, High Magnetic Fields

Paul Loubeyre, Atomique Energie Commission CEA, France

LS4+2D+AS+TF: Role of Defects in Materials

Jyoti Katoch, Carnegie Mellon University

LS5: New Trends on Structural and Electronic Characterization of Materials, Interfaces, and Surfaces Using Synchrotron and FEL-Based Radiation Sources Poster Session

PLASMA SCIENCE AND TECHNOLOGY DIVISION (PS)

The Plasma Science & Technology Division (PSTD) program highlights state-of-the-art advances in plasma science, ranging from fundamental studies of plasma physics and chemistry to plasma-matter interactions and new applications for plasma processing. Our diverse international community includes researchers from academia, national laboratories, and industry covering topics extending from the latest advancements in plasma research for established fields such as semiconductor fabrication to newer areas of study such as energy research, novel materials synthesis, catalysis, and biomedical applications, where plasma is either the focus or the enabling tool. Abstracts

describing novel research are solicited in areas concerning the topics listed below. We accept abstracts for both oral sessions and poster sessions, which provide an excellent opportunity for one-on-one discussions of new results with colleagues. Special consideration will be given to papers that highlight cross-disciplinary issues of the research. The authors are also encouraged to submit their original results to the one of the appropriate AVS journals.

PS1: Advanced BEOL: Interconnect Materials and Etching

Theo Standaert, IBM Research

PS2+AP: Advanced FEOL: Plasma Processing for Logic Devices

Yun Han, TEL Technology Center, America, LLC, "Plasma Etch Challenges in Logic Device Evolution from 2D to 3D"

PS3+NS: Advanced Plasma Patterning: EUV-Based, Multipatterning and Alternative Patterning Approaches (Imprint, DSA, Etc.)

Katie Lutker-Lee, TEL

PS4+TF: Plasma Processing for Advanced Emerging Memory Technologies, Advanced Packaging and Heterogeneous Integration

Shreya Kundu, IMEC, Belgium, "An Overview of Complex Metal Alloy Patterning in Sync With Semiconductor Integration"

PS5+TF: Plasma Processes of Non-Silicon Related Semiconductors for Energy-Efficient Devices in Power, Photovoltaics and Optoelectronics Applications

Taketomo Sato, Hokkaido University, Japan, "Low-damage Etching of Nitride Semiconductors utilizing Photo-electrochemical Reactions"

PS6+AP: Plasma Assisted Atomic Layer Etching

Dominik Metzler, IBM Research, "Use of Atomic Layer Etching Techniques in Today's and Tomorrow's Industry"

PS7+AP+TF: Plasma Deposition and ALD Processes for Coatings and Thin Films

Silvia Armini, IMEC, Belgium

PS8+SE: Plasma Sources, Diagnostics, Sensors and Control

Gilles Cunge, CNRS-LTM, France

PS9: PSTD Award Lectures (ALL INVITED SESSION)

Jean-Paul Booth, Ecole Polytechnique, France, "What We Still Don't Know About Plasmas in Simple Diatomic Gases- or How to Use a DC Plasma in Pure O₂ as Ideal Test-Bed for Experimental Validation of Simulations"

Ellen Fisher, University of New Mexico, "Merging the Fundamental and Applied: Understanding Plasma Kinetics and Energetics to Build Better Mousetraps"

Yohei Ishii, Hitachi High Technologies America Inc., "Dry Etch Solution to a Challenge in Si/SiGe Dual Channel Process Integration"

Lawrence Overzet, University of Texas at Dallas, "Plasma ON then OFF, ON - OFF, ON - OFF, ON - OFF: Who Knew Being Indecisive Could Work So Well!"

Floran Peeters, DIFFER, Netherlands, "Next generation "Birkeland-Eyde": from NH₃ to NO"

David Ruzic, University of Illinois, "Time-Resolved Energy and Ion Energy Distributions during Bi-Polar High Powered Impulse Magnetron Sputtering (HIPIMS)"

PS10+MS: Modelling of Plasmas and Plasma Driven Processes, and Machine Learning

Yu-Hao Tsai, TEL Technology Center, America, LLC, "Fundamental Study on the Selective Etching of SiGe and Si in CIF₃ Gas for Nanosheet GAA Transistor Manufacturing: A First Principle Study"

PS11+AS+SS: Plasma-Surface Interactions

Miyako Matsui, Hitachi High Technologies, Japan, "Selective Mask-Deposition for Highly Selective Etching Process"

PS12: Plasmas for the Environment and Sustainability: Plasmas-Liquid Interactions, Water, Air, Soil Treatment

Patrick Cullen, University of Sydney, Australia, "Plasma Bubbles: A Route to Sustainable Chemistry"

PS13+AS: Plasma Chemistry and Catalysis

Nicolas Gosset, Air Liquide, Japan, "New Etchants for Advanced Semiconductor Plasma Processes"

PS14+BI+SM: Plasma for Antimicrobial Treatment, Medicine, and Biointerfaces

Eun Ha Choi, Kangwon University, Korea (Republic of), "Nonthermal Atmospheric Pressure Plasma (NAP) Sources for Plasma Bioscience, Medicine and Inactivation of Human Corona Virus 229E"

PS15+SE: Atmospheric Pressure Plasmas and their Applications

Davide Mariotti, University of Ulster, UK, "Synthesis and Applications of Metal Oxides NPs"

PS16: Plasma Science and Technology Poster Session

QUANTUM INFORMATION SCIENCE FOCUS TOPIC (QS)

The Quantum Information Science Focus Topic will cover innovative quantum technologies that enable us to create, control and manipulate quantum systems. Topics will cover superconducting qubits, color centers, ion traps, quantum metrology as well as supporting technology of single photon amplifiers, multiplexers and advances in cryogenic systems, vacuum technology, microwave to optical conversion schemes etc. Challenges in achieving high performance quantum devices and making precision measurements using quantum systems will be addressed.

QS1+EM+MN+NS: Systems and Devices for Quantum Information

Megan Ivory, Sandia National Laboratories

Kathy-Anne Soderberg, Air Force Research Laboratory, "Toward Heterogeneous Quantum Networks: Interfacing Trapped Ion, Superconducting, and Integrated Photonic Qubits"

QS2+EM+MN+NS+SS: Systems and Devices for Quantum Computing

Chris Palmstrom, University of California Santa Barbara

Meenakshi Singh, Colorado School of Mines, USA, "Investigating Quantum Speed Limits With Superconducting Qubits"

QS3+EM+MN+NS+SS: High Coherence Qubits for Quantum Computing

Laura Cardani, INFN, Italy

Cameron Kopas, Rigetti Computing, "Optimizing Material Interfaces for Coherence in Superconducting Qubits"

QS4+2D+EM+MN+NS: SiGe, SiC and Related Materials for Quantum Information Sciences

Serena Eley, Colorado School of Mines

Gregory Fuchs, Cornell University

QS5+EM+MN+NS: The Quantum Metrology Revolution

Fedor Jelezko, Universitat Ulm, Germany

Ella Lachman, Rigetti Computing, "Magnetic Textures in Quantum Materials: from Topology to Magnonics"

Uwe Siegner, PTB, Germany

QS6+EM+NS+VT: Color Centers: from Materials to Quantum Technologies

Lee Bassett, University of Pennsylvania, "Materials and Devices for Efficient Quantum Memories and Sensors"

Milos Toth, University of Technology Sydney, Australia

QS7+EM+MN+NS+SS: Quantum Information Science Poster Session

RADIATION EFFECTS ON MATERIALS (RE)

The Radiation Effects on Materials Focus Topic is organized by young investigators within AVS to highlight cutting edge research related to the interaction of various types of radiation with materials and surfaces. The umbrella term "radiation" is used broadly; contributions are welcome from any place on the electromagnetic spectrum. There will be three sessions that focus on: using radiation to functionalize and/or decontaminate materials/surfaces with biological applications, effects of radiation on materials in space environments and returning to Earth, and using radiation as a tool to gain insight into the properties of materials and materials processing. Poster submissions are also encouraged within this focus topic.

RE1+AS+SS: Radiation and Bioactive Materials, Surfaces, and Interfaces

Katja Fricke, Leibniz Institute for Plasma Science and Technology, Germany

Endzhe Matykina, Universidad Complutense de Madrid, Spain

Krasimir Vasilev, University of South Australia

RE2: Radiation in Space/Natural Radiation

Sven Bilen, Penn State University

George R. Rossman, Caltech

Michelle Thompson, Purdue University, "Exploring the Effects of Radiation on Planetary Surfaces through the Analysis of Returned Samples from the Moon and Asteroids"

RE3+AS: Materials Analysis and Characterization with Radiation

Cedric Pardanaud, Aix-Marseille University, France

Nicola Perry, University of Illinois at Urbana-Champaign, "In Situ Optical Characterization of High Temperature Defect Kinetics in Mixed-Conducting Oxide Films"

Zachary Robinson, SUNY Brockport

RE4: Radiation Effects on Materials Poster Session

SMART MULTIFUNCTIONAL MATERIALS FOR NANOMEDICINE (SM)

The Smart Multifunctional Materials for Nanomedicine (SM) Focus Topic brings together the most applicative aspects of hybrid bio-interface science and plasma surface engineering, in close connection with BI and PS Divisions, respectively. Covered topics include nanomaterials for theranostics (i.e., a combination of diagnostics and therapy), nanomedicine for precision drug delivery and cancer therapy; multi-component nanostructures for collective properties (such as optical, self propellant and electrocatalysis activity); plasma-based processing of biomaterials surfaces and nanofabrication; medicinal plasma; self-cleaning and photothermal active surfaces; wound healing and tissue repair; advanced point-of-care (PoC) nanobiosensors; smart (nano)materials (e.g., multifunctional and dynamic structures, able to respond to changes in their environment for self-regulating thermal and lighting systems; physical-, chemical-, and biological-responsive nanomedicine), but also nanomaterials connected to the areas of environment (e.g., biosafety and ecotoxicological challenges) and energy (e.g., energy-converting issues in photo-, radiation-, ultrasound-, magnetic field-, microwave-, electric field-, and radiofrequency-based nanomedicine).

SM1: Theranostics and Nanomedicine

Hatice Altug, Ecole Polytechnique de Lausanne (EPFL), Switzerland

SM2: Plasma Chemistry (and Their Appropriate Plasma Reactors) for Multifunctional (Nano)Biomaterials

Uroš Cvelbar, Jožef Stefan Institute, Ljubljana, Slovenia

SM3: Wound Healing and Tissue Repair

Yujian James Kang, Tennessee Institute of Regenerative Medicine, UTHSC College of Graduate Health Sciences, "Biosynsphere - A Hydrogel Particle Enveloping Stem Cells for Wound Tissue Regeneration"

SM4: Smart Multifunctional Materials for Nanomedicine Poster Session

SPECTROSCOPIC ELLIPSOMETRY FOCUS TOPIC (EL)

The Spectroscopic Ellipsometry (EL) Focus Topic integrates themes ranging from classical material science and thin film characterization to nanometer scale science and novel optical sensing concepts. We will host three oral sessions dedicated to traditional applications of spectroscopic ellipsometry in optical materials and thin film characterization as well as new and emerging topics. The first session will focus on classical research topics of ellipsometry as for instance optical coatings and inorganic thin films characterization. Furthermore, presentations on the ellipsometric investigation of novel optical and electronic materials and materials with subwavelength structures will be included. The second oral session is dedicated to emerging technological advances and breakthroughs of spectroscopic ellipsometry. In the third oral session of EL, we will host presentations on novel applications and theoretical approaches for ellipsometry. The best student paper, which is selected based on the quality of the research, a presentation, and discussion during the symposium, will be awarded with the EL student award. EL will host a poster session.

EL1+AS+EM: Optical Characterization of Thin Films and Nanostructures

Rüdiger Schmidt-Grund, TU Ilmenau, Germany

EL2+AS+EM: Emerging Technological Advances and Breakthroughs of Spectroscopic Ellipsometry

Mathias Schubert, University of Nebraska - Lincoln

EL3+EM: Spectroscopic Ellipsometry: Novel Applications and Theoretical Approaches

Maria Losurdo, National Research Council Institute CNR-NANOTEC, Italy

EL4: Spectroscopic Ellipsometry Poster Session

SURFACE SCIENCE DIVISION (SS)

The Surface Science Division (SSD) provides a forum for cutting edge and foundational research that involves solid surfaces and interfaces including gas-solid and liquid-solid interactions. We aim to understand the wide range of processes, which play out on surfaces and at interfaces. This knowledge is critical to improve catalysts, find ways to limit corrosion, and even peek into the chemical processes at planetary surfaces. Surface science has close ties with other divisions such as heterogeneous catalysis, and the focus topics on quantum information and science, and 2D materials. These close relations are seen in the program and encourage participants to explore science outside of their immediate sphere of interest. This year's sessions extend from surface chemistries ranging from liquid to astronomical environments, materials ranging from dilute metal alloys to oxides, and structures ranging from zero dimensional nanoparticles to two-dimensional layered materials, and understanding surfaces in complex environments which promote understanding under "real life conditions," which are now feasible owing to advances in measurement techniques. We will host the Morton M. Traum Award to honor research presented by students in the SSD.

SS1+AS+TF: Dynamics and Mechanisms at Surfaces and Interfaces

Cristina Diaz, Univ. Complutense Madrid, Spain

SS2+2D+AS: Structure, Adsorption and Reaction at 2D Material Surfaces

Matthias Batzill, University of South Florida, "Introducing Defects and Compositional Phase Changes in 2D Transition Metal Chalcogenides by Reaction with Transition Metals"

SS3+AS: Environmental, Atmospheric and Astronomical Surfaces

Heather Allen, Ohio State University

SS4: Liquid/Solid Interfaces and Electrochemistry

Julia Kunze-Liebhauser, University of Innsbruck, Austria, "Dynamic Structure Changes of Bare and Modified Cu(111) during CO and Water Activation"

SS5+AS+HC: Oxide and Chalcogenide Surface Reactivity

Dario Stacchiola, Brookhaven National Laboratory, "Stabilization of Active Cu Sites on Oxide Surfaces"

SS6+AS+TF: Oxide and Chalcogenide Surfaces and Interfaces

Jeppe Lauritsen, University of Aarhus, Denmark

SS7+AS+SE: ALD Surface Chemistry

Jeffrey Elam, Argonne National Laboratory

SS8+AS: Molecular Organization at Surfaces

Ursula Mazur, Washington State University, "Cooperativity at the Solution/Solid Interface: Formation and Reactivity of Self-Assembled Monolayers"

SS9+HC: Dilute Alloys, Doped Materials, Multi-component Clustering

Andrew Gellman, Carnegie Mellon University

SS10+AS+HC: Nanoparticle Surfaces

Michelle Personick, Wesleyan University, "Precision Engineering of Metal Nanoparticle Surfaces for Fundamental Studies of Catalytic Reactivity"

SS11+AS: Memorial Session in Honor of Patricia Thiel I (ALL-INVITED SESSION)

Jürgen Behm, University of Ulm, Germany

James Evans, Iowa State University, "Assembly and Stability of Metal Nanoclusters at Surfaces: Modeling Inspired by Thiel Group STM Studies"

Cynthia Jenks, Oak Ridge National Laboratory

Dajiang Liu, Ames Laboratory

Jeong Young Park, Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea, "Atomic Scale Investigation of Friction Properties of Quasicrystals and Beyond"

Miquel Salmeron, Lawrence Berkeley National Laboratory (LBNL)

Michael Tringides, Iowa State University

SS12+AS: Memorial Session in Honor of Patricia Thiel II (ALL-INVITED SESSION)

Alex Belianinov, Sandia National Laboratories, "Focused Ion Beam Applications for Nanotechnology"

Vincent Fournie, University of Lorraine, France

Dapeng Jing, Ames Laboratory, "Unusual Flat and Extended Morphology of Encapsulated Cu Under MoS₂"

Thomas Michely, University of Cologne, Germany, "Cluster Superlattice Membranes"

Karina Morgenstern, Ruhr University Bochum, Germany

SS13: Surface Science Poster Session

THIN FILMS DIVISION (TF)

The Thin Films Division offers several core oral sessions and one poster session. A broad range of outstanding invited speakers will cover the breadth of thin film science, thin film deposition, thin film interfaces, technology, and applications. We have several sessions dedicated to ALD and CVD, encompassing from surface reactions and growth mechanisms to novel processes, precursors, scale up, and emerging applications, and sessions dedicated to novel materials by a wide range of deposition processes, including epitaxial films and interfaces, PVD and solution-based methods, and the application of simulation and machine learning to thin film growth. The division also features a session on interfacial phenomena on thin film growth. Additionally, the division has a strong focus on the application of thin films, including microelectronics, battery and spintronics applications, interfaces and contacts, flexible electronics, plasmonic, photonic, and metamaterials, energy, and catalysis. It has also a session dedicated to low dimensional materials. Specifically, to address this year's symposium theme the division is introducing two new sessions on perfectly imperfect materials with focus on imperfectly oxides by ALD and imperfect Heusler Alloys for spintronics. Finally, the division continues its focus on organic and hybrid materials, including the modification of polymers using vapor infiltration methods and the vapor deposition of functional polymer films. Again, this year, TFD will host a student-focused session to highlight the Harper Award candidates in which the student finalists will present their work in an interactive "TED Talk" type of forum.

TF1+AP: Manufacturing and Scale-Up of CVD and (Spatial) ALD

Zheng Guo, Qingdao Sifang SRI Intellectual Co., Ltd, China

TF2+AP+SE+SS: ALD and CVD: Surface Reactions, Mechanisms and Kinetics

Laura Nyns, IMEC, Belgium, "ALD of Chalcogenide and III-V Materials for Memory Applications"

TF3+PS: Hipims for Emerging and Advanced Materials

TF4: Solution Based Thin Film Deposition Techniques

Daniel Gamelin, University of Washington

TF5+AP: Novel ALD CVD Precursors, Processes, Deposited Morphologies and Substrate Architectures

Mikko Ritala, University of Helsinki, Finland, "New Precursors and Approaches to ALD and AS-ALD of Metals"
TF6: Perfectly Imperfect Oxides: Imperfect Stoichiometry, Perfect Performance

Mari Napari, University of Southampton, UK, "The Electrical and Magnetic Properties of Nonstoichiometric Nickel Oxide Thin Films"

TF7+EM: Microelectronics Application

Ivona Z. Mitrovic, University of Liverpool, UK, "Rare Earth Thin Oxide Films for Sustainable Energy"

TF8+2D: Low Dimension Material Application

Stephan Hofmann, University of Cambridge, UK, "Exploration of Fundamental Mechanisms to Advance Integrated Process Technology for Atomically Thin 2D Films"

TF9: Energy Generation Application

Jinsong Huang, University of North Carolina

TF10: ALD for Batteries

Xueliang Sun, University of Western Ontario, Canada

TF11+EM: Thin Film for Spintronics

Vince Sokalski, Carnegie-Mellon University, "Magnetic Multi-Layer Thin Films for Future Skyrmion-Based Memory"

TF12: Perfectly Imperfect Heusler Alloys for Spintronics

Avik Ghosh, University of Virginia, "Designer Heusler Half-Metals for Ultra-Fast Spintronic"

TF13+SE+SS: Nucleation and Interface Phenomena in Thin Films

Mariona Coll, Institut de Ciència de Materials de Barcelona, Spain, "Opportunities of Complex Oxides Prepared by Atomic Layer Depositions"

TF14+MS: Simulations and Machine Learning Applications for Thin Films

Rafael Jaramillo, MIT

TF15+AS: In-Situ Characterization of Thin Films and Interfaces

Matthew Highland, Argonne National Laboratory

TF16: Growth in 3D, High Aspect Ratio and Nanostructured Materials

Neil Dasgupta, University of Michigan, "Tailoring Nanomaterial Interfaces Using Atomic Layer Deposition: Bridging Scales from Atoms to Bulk"

TF17+EM: Wide and Ultra-Wide Bandgap Thin Films: Advances in Deposition and Novel Materials

Zlako Sitar, North Carolina State University, "AlGaN, an Enabling Ultra-Wide Bandgap Semiconductor"

TF18+SE: Vapor Deposition and Vapor Infiltration of Organic, Polymeric, and/or Hybrid Materials

Trisha L. Andrew, University of Massachusetts - Amherst, "Chemical Vapor Deposition of Soft Materials for Wearable Health Monitoring"

TF19+EM: Thin Films for Optics, Photonics, and Metamaterials

Michelle Povinelli, University of Southern California

TF20+EM: Thin Films for Soft Electronics

Suresh Sitaraman, Georgia Institute of Technology

TF21: Thin Film Poster Session**VACUUM TECHNOLOGY DIVISION (VT)**

The Vacuum Technology Division (VTD) spans a broad range of topics and provides a forum for research in achieving, maintaining, measuring, and/or analyzing vacuum or vacuum processes across a wide range of pressures, gas compositions and applications. The 2022 VTD program topics include: vacuum measurement; vacuum pumping; large vacuum systems; accelerator; vacuum quality control. New topics for 2022 include vacuum technology for quantum applications, vacuum technology and fusion research, and imperfectly perfect materials. The VTD Poster session features a student poster competition, where students of any discipline are invited to share their innovative solutions to vacuum equipment challenges. Student presenter awards will also be given for the best oral presentations.

VT1: Vacuum Measurement, Partial Pressure, and Gas Analysis

Nenad Bundaleski, Universidade Nova de Lisboa, Spain

VT2: Vacuum Pumping and Extreme High Vacuum

Ewa Ronnebro, Pacific Northwest National Laboratory, "Ultra-High Vacuum Test System With Sensitive Detection for Quantitative Determination of Hydrogen Gettering and Permeation of Various Materials"

VT3: Gas Dynamics, Modeling, and Simulation**VT4: Leaks, Flows, and Material Outgassing**

Brad Shaw, Leak Testing Specialists

Ivo Wevers, CERN, France

VT5: Aerospace and Large Vacuum System**VT6: Accelerators**

Marek Grabski, MAX IV Laboratory, Sweden, "Vacuum System of the MAX IV 3 GeV Storage Ring"

Charles Hetzel, Brookhaven National Laboratory, "Developments of the Vacuum Systems Required for the Electron Ion Collider"

Marc Ross, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory

VT7: Particle Control, Quality Control, Ultraclean Systems**VT8: Vacuum Technology for Quantum Applications**

Adhikari Rana, California Institute of Technology

Alex Tingle, Cold Quanta

VT9: Vacuum Technology for Fusion Research

Charles Smith, Oak Ridge National Laboratory, "Design of the ITER Roughing Pump System"

VT10: Imperfectly Perfect Materials

Jonaaron Jones, Volunteer Aerospace

VT11: Vacuum Technology Poster Session

SPECIAL SESSIONS & EVENTS

AVS 68 PLENARY LECTURE: Professor Evelyn Hu, Harvard University, Monday, November 7, 2022, 5:30-6:30 p.m.

BIOMATERIALS PLENARY SESSION (BP)

The Biomaterials Interfaces program kicks off with the now traditional Biomaterials Plenary Session. This year we are pleased to have presentations from two prominent scientists who will present their cutting edge research on Materials and Biology for Energy Applications.

BP1: Biomaterials Plenary Session: Programmable Biologic Materials (ALL-INVITED SESSION)

Maartje Bastings, EPFL, Switzerland

Adrienne M. Rosales, The University of Texas at Austin

Matt Tirrell, University of Chicago, "New Biomaterials and Bio-inspired Materials from Polyelectrolyte Complexation"

NANOSCALE SCIENCE AND TECHNOLOGY PLENARY SESSION (NSP)

The Nanoscale Science and Technology Division starts the week with a plenary session featuring a talk from the Nanotechnology Recognition Award winner. Following this talk, we will have our Early Career and Graduate Student competitions. Please join us for these engaging talks on nanoscale science and technology and for lively discussion during a reception, immediately after the competitions.

NSP1: Nanoscale Science the Technology Plenary Session (ALL-INVITED SESSION)

J. Alexander Liddle, National Institute of Standards and Technology (NIST), "Adventures in Nanofabrication and Manufacturing, from Electron-Beam Lithography to DNA: Science, Technology, and Lessons Learned"

NSTD Competition Finalists

EXHIBITOR TECHNOLOGY SPOTLIGHT WORKSHOPS (EW)

The Exhibitor Technology Spotlight Sessions will take place in the stage area of the exhibit hall during the technical session breaks on Tuesday and Wednesday. These sessions are free and open to all registered AVS 68 attendees. This is your opportunity to learn about new products, research techniques and services offered by AVS exhibitors. Each session is followed by a brief Q&A session making it a truly interactive learning experience. After the sessions, you may visit the presenting exhibitors at their booths to further discuss any points that you would like to receive more details on. Come learn how new technology can benefit your research efforts!

EW1: Exhibitor Technology Spotlight Session

UNDERGRADUATE POSTER SESSION (UN)

AVS 68 will host the second annual undergraduate poster session, open to any undergraduate researcher. This special session provides undergraduate researchers the opportunity to present and network with students, professors, and industry leaders! We welcome the newest members of AVS to share their important work with all Society members and greatly encourage participation! Registration is discounted for undergraduate students and limited travel assistance may be available.

UN1: Undergraduate Poster Session

AVS VENDOR EXHIBIT: The Exhibit comprises an extensive display of tools, equipment and services for Surface Science; Biomaterial Interfaces; Electronic Materials & Photonics; Magnetic Interfaces; Manufacturing Science; MEMS/NEMS; Nanoscience; Thin Film; Plasma Science; Vacuum Technology, educational material, career services and professional literature, journals and publications. Each year, the technical symposium expands into new and exciting technical disciplines which bring new exhibitors showing new technology and research methods. The continuously expanding technical program consistently keeps our Symposium fresh and exciting for exhibitors and attendees alike. The exhibits will be open from Tuesday morning until Thursday afternoon (November 8-10, 2022). Please contact exhibits@avs.org for additional information. You may also review our website www.avs.org

AVS LATE BREAKING ABSTRACT SUBMISSIONS: There will be opportunities for presentation of post-deadline discoveries in all fields relevant to the AVS membership. Submissions that address topics in surfaces, interfaces, films, nanometer-scale phenomena, emerging technologies, or new innovations. Abstracts will be solicited starting in mid-July for either (1) an individual 20 minute oral presentation, or (2) a poster presentation. Late Breaking Abstracts will be used to fill holes in the program and they must be submitted via the AVS website by Wednesday, August 24, 2022. Notification of acceptance/rejection will be made soon thereafter. Please check the AVS 68 (www.avs.org) website for details and submission guidelines in mid-July.

AVS SPONSORSHIP PROGRAM: AVS is a not-for-profit Society that offers a myriad of services, programs and events related to science and technology in the fields of vacuum, materials, interfaces and processing to scientists and engineers from around the world. An extensive recognition and exposure program, which is active before and during the Symposium, is available to our Symposium Sponsors. As a Symposium Sponsor, your logo will appear on the AVS website, in the Technical/Exhibitor Program, on signage and slide shows at the Symposium. The earlier you commit to AVS Symposium Sponsorship, the greater exposure you will receive. To learn more about Sponsorship opportunities, please contact Jeannette DeGennaro at 212-248-0200 ext. 229 or jeannette@avs.org or Yvonne Towse at 212-248-0200 ext. 222 or yvonne@avs.org.

ONLINE ABSTRACT SUBMISSION ONLY: www.avsymposium.org

Deadline: 11:59 p.m. ET, Monday, May 2, 2022

Supplemental data (1-2 pages, 1MB) will also be accepted via the submission site.

Instructions may be found at the web site above.

***** A presenter may present ONE ORAL AND ONE POSTER at the Symposium *****

ORAL Sessions: Rooms will be set up with projectors, screens, microphones, and laptops (PCs).

POSTER Sessions: Each poster presenter will be allotted space that is 4 feet wide by 4 feet high. Please make your poster no larger than 46 inches wide by 46 inches high to ensure it fits nicely into the allotted space.

AVS recognizes that the global COVID-19 pandemic continues to impact face-to-face meetings. We anticipate seeing you in Pittsburgh, PA, and we will continue to comply with COVID-19 guidelines (local, state, and federal). As a result, all meeting plans are subject to change to stay in compliance with these COVID-19 guidelines. Additional details will be made available as the event draws closer.

AVS AWARDS & TRAVEL GRANTS

All award applications for AVS National and Division/Group awards may be found at the following link:

(<http://www.avsymposium.org/awards>). Please contact Angela Klink, Member Services Administrator, (angela@avs.org, 212-248-0200 ext. 221) for any additional information.

AVS PROFESSIONAL AWARDS

Each year, the AVS solicits nominations for major national awards. These include the Medard W. Welch Award, the Gaede-Langmuir Award, the John A. Thornton Memorial Award and Lecture, the Peter Mark Award, Fellow of the Society and the George T. Hanyo Award. Nominations are due March 31, 2022 and should be submitted through the AVS online award submission site. Nomination information is available on www.avsymposium.org or through Angela Klink (212-248-0200, ext. 221 or angela@avs.org).

NATIONAL STUDENT AWARDS

Students may apply for one National Student Award and one Division/Group Award in a given year.

Each year, the AVS solicits nominations for eight graduate student awards. These are the Russell and Sigurd Varian Award, the Nellie Yeoh Whetten Award, the Dorothy M. and Earl S. Hoffman Award, two Dorothy M. and Earl S. Hoffman Scholarships (N.B. the Hoffman Award and Scholarships are distinct from the Hoffman Travel Grants described below) and three Graduate Research Awards. The nomination procedures are on www.avsymposium.org or through Angela Klink (212-248-0200, ext. 221 or angela@avs.org) Applicants should use the AVS online award submission site. **The deadline is May 2, 2022.**

DOROTHY M. AND EARL S. HOFFMAN TRAVEL GRANTS

The Hoffman Travel Grants have been created in an effort to promote student involvement in AVS and encourage their participation in the annual AVS International Symposium. These travel grants will be given to any applying graduate students who meet the following criteria: 1) you must be the presenter of an accepted Symposium abstract, 2) you must be a full-time graduate student, 3) the grant is not transferable, 4) you must attend the Symposium to receive the grant and, 5) you are not eligible to receive the grant if you are receiving any other travel support from AVS. An invitation e-mail will be sent to eligible students (early July 2022) and the student should apply for the grant by return e-mail to the AVS National Office. The application deadline is Monday, August 22, 2022. Should your application be approved, you will receive an e-mail notification by Monday, September 19, 2022. Grants will be given on a random basis until the 2022 funds are depleted. Funds for the grant recipients will be available at the Symposium Registration Manager's desk, and you will also be asked to present a student I.D. Please note that all travel grants must be collected at the meeting.

DIVISION/GROUP STUDENT AWARDS

Students may apply for one National Student Award and one Division/Group Award in a given year.

The **Applied Surface Science Division** is once again offering the opportunity for students to participate in its annual student award competition – where three finalists will present their research to their ASSD peers and compete for cash awards! Students who are interested in competing are required to **submit** an abstract for a poster or talk to one of the ASSD or ASSD co-sponsored sessions to be eligible. **Presentation during an AVS International Symposium session is required for eligibility.** Three finalists will be selected by the ASSD Student Awards Committee from the overall applicant pool. The finalists will present a “capsule” (3 -slide, 5-minute) presentation to the judges during the Tuesday night ASSD Business Meeting. The finalists will be ranked based upon their presentation skills, scientific merit and originality of their work. First, second, and third place prizes are \$750, \$450 and \$300 respectively. In addition to the grand monetary prize, the student that wins the best presentation award will be reimbursed for the 2022 AVS International Symposium registration at the student rate. Students who win more than one award in a given year at the International Symposium will receive an award amount that is capped at \$2250. The winner will also be asked to submit an abstract to an ASSD or ASSD co-sponsored session in 2022. Students wishing to participate in the competition should complete the application on the awards submission site and **submit an abstract by May 2, 2022.**

Biomaterial Interfaces Division is offering student awards (\$250, \$150 and \$100) for the best combined Flash and Poster Presentation based on their PhD research. These awards are sponsored by our AVS Biointerphases journal. All PhD students presenting at both the flash poster presentation and the poster session will be considered for the prizes automatically. They will be judged on the scientific merit and originality of their research, as well as the quality of presentation. Individuals more than one year past the date when their PhD degree was awarded are not eligible to compete for the student prize. Inquiries may be addressed to Dr. Caitlin Howell, caitlin.howell@maine.edu.

The **Electronic Materials & Photonics Division (EMPD) Student Poster/Presentation Award** is given at the annual AVS International Symposium and Exhibition. All abstracts, both poster and oral, submitted to an EMPD session will be automatically considered. The presenting author must be a graduate or undergraduate student at the time of submission. Awards will be judged on the scientific merit and originality of their research, their contribution to it, as well as the quality of their presentation. Poster award candidates must be present during the EMPD poster session for judging. The Award consists of a certificate and a \$500 cash prize. Multiple awards are anticipated.

The **Electronic Materials & Photonics Division (EMPD) Student Travel Award** given annually to graduate and undergraduate students who have an accepted abstract AND will be presenting in an EMPD session at the International Symposium. All accepted abstracts with a student as presenting author are automatically considered. Multiple awards are anticipated.

Magnetic Interfaces & Nanostructures Division: Leo M. Falicov Student Award has been established in memory of Professor Leo M. Falicov to recognize outstanding research performed by a graduate student in areas of interest to MIND. Finalists will be selected on the basis of abstract submission, and will receive a cash award upon attending the AVS International Symposium and presenting their paper in an oral MIND session. The winner will be selected on the basis of the oral presentation, considering quality of research and clarity of presentation, and will receive a cash prize and a certificate. Interested applicants (except for former winners) should complete the application on the awards submission site and submit a copy of the submitted AVS abstract and a letter of recommendation before the **abstract deadline of May 2, 2022.**

Manufacturing Science and Technology Group is pleased to announce and solicit applications to be competitively awarded to up to 2 graduate students who present papers in MSTG sponsored sessions. The purpose of the MSTG award is to both encourage participation of students in the MSTG program and to acknowledge the valuable contributions they make in advancing state-of-the-art in manufacturing science and technology. Full-time university graduate students with primary appointments at universities are eligible to apply. Preference will be given to those who give oral presentations of their papers. Students awarded the MSTG Award will receive a grant. Submission materials consist of: 1) Letter of application describing the student's research (1 pg. max.); 2) Letter of endorsement by the student's research advisor (1 pg. max.); 3) Copy of submitted abstract; 4) CV (2 pg. max) 5) completed application materials should be submitted through the awards submission site by the **deadline of May 2, 2022.**

MEMS and NEMS Technical Group is pleased to announce two types of student awards. One is "**Outstanding Paper Award**" competition at the AVS Symposium and Exhibition. The number of student awardee(s) will be determined at the discretion of MN Awards Committee. The award includes a cash prize (\$200) and a certificate to the well

deserving student presenting his/her research in an MN-sponsored session. The MN group reserves the right to adjust the award amount (including, but not limited to, making it non-monetary for a particular year or for a specific awardee, especially if the symposium is held virtually online or an awardee selected attends virtually). Both graduate and undergraduate students are eligible. All students presenting at our sessions will be considered for the prizes automatically. They will be judged on the scientific merit and originality of their research as well as the quality of presentation. In addition, the MN group will consider a "**Best Research Work Award**" by offering a registration waiver to the well-deserving graduate/undergraduate student(s) submitting an abstract to the MN session. The MN group reserves the right to adjust the award amount (including, but not limited to, making it non-monetary for a particular year or for a specific awardee, especially if the symposium is held virtually online or an awardee selected attends virtually). The number of student awardee(s) will be determined at the discretion of MN Awards Committee. This award will be solely based on the quality of work described in the abstract. All students will automatically be considered for this award as well. MEMS and NEMS students are also encouraged to apply for the National Student Awards which should be submitted through the awards submission site by the **deadline of May 2, 2022**.

The Nanoscale Science and Technology Division Graduate Competition As nanoscience has continued to expand its impact in diverse fields including quantum science, biology, mechanics, and energy, the Nanoscale Science and Technology Division (NSTD) has been a hub of research broadly related to instrumentation, lithography, manipulation, imaging, and translation to industry. The NSTD holds a Graduate Competition at the annual AVS International Symposium to highlight and celebrate exceptional researchers working on the frontiers of nanoscience. All graduate students presenting a poster or oral presentation in an NSTD sponsored or co-sponsored session are encouraged to apply. To apply submit a cover letter, resume, advisor support letter, and AVS abstract to the awards submission site by the **deadline date of May 2, 2022**. For eligibility, the applicant must not have received a doctoral degree at the time of abstract submission. All finalists will receive a student registration waiver for the conference!!! All finalists will be selected by the NSTD Awards Committee, and they will be informed in September 2022. All finalists must present a five-minute talk (with additional time for questions) at the NSTD Sunday plenary session for the awards competition. The winner will be selected based on the quality of the talk, the responses to subsequent questions, and the level of the research. The graduate award winner will receive a certificate and a cash award of \$500. This award is made possible by financial support from NSTD's sponsors, who in 2021 were Qnami, Bruker, Heidelberg Instruments, Nanoscribe, Nanosurf, RHK Technology, and SPECS.

John Coburn and Harold Winters Student Award in Plasma Science and Technology Student Merit Awards recognize meritorious achievements by students in an area fostered and encouraged by the Plasma Science and Technology Division, while also encouraging student participation in the Division. The John Coburn and Harold Winters Award is given in recognition of outstanding research achievements *and* an oral presentation given by a Student Merit Award winner at the AVS International Symposium. The following materials are required to apply for the Award: 1) A curriculum vitae of the nominee, 2) A one-page letter of recommendation from the student's research advisor/mentor, 3) A copy of the nominee's submitted abstract for the AVS International Symposium. An eligible nominee must have their abstract accepted to the AVS International Symposium for the year they are nominated and be a registered student at the time of the earliest deadline for abstract submission. Only one student from a given research group may be nominated in each year and previous winners of the Coburn and Winters Award are not eligible. A maximum of six (6) Student Merit Award winners will be selected by the PSTD Awards Committee on the basis of technical/scientific merit and originality of research. Each Merit Award winner will receive a cash award and an official certificate and must present their research in a private session of the PSTD Awards Committee. This private presentation will be *in addition* to the regularly scheduled PSTD oral session at the AVS Symposium. The Coburn and Winters Award winner will be selected from the Student Merit Awardees based on the quality of both the research and oral presentation. The overall winner will receive an additional cash prize and certificate. All materials should be submitted on the awards application link below and **must be received on or before May 2, 2022**.

The **Surface Science Division** solicits nominations for the Morton M. Traum Surface Science Student Award to be given to the best student presenter at the AVS International Symposium. **Who can apply?** Candidates for the award must be registered to give an oral or poster presentation at the AVS International Symposium and be either a current graduate student or have received their Ph.D. degree in the year of the Symposium. Up to five finalists will be selected to compete with posters during the Surface Science poster session; these poster presentations are in addition to any presentation they are registered for at the Symposium but presents the same scientific content. **What are the prizes?** All finalists and the winner will receive cash prizes starting at \$1000 for the winner, and certificates. The winner's name will be added to the list of previous winners in the Symposium technical program, the AVS website, and on a plaque on display at the Symposium. **How do I participate?** Traum award applicants should submit on the

AVS website 1) a copy of the abstract submitted to the AVS that includes the abstract submission number; 2) an extended abstract that does not exceed two pages (including tables, figures, and references); 3) their expected graduation date, 4) two letters of recommendation, and 5) an AVS application form for student awards. Please use the online award submission site to complete your application. **Deadline: May 2, 2022.**

Thin Film Division James Harper Award Graduate Student Award: The ThinFilm Division's premier, competitive graduate student award is in honor of James M.E. Harper, who was a pioneer in the thin film areas of interconnects and silicides, and was active in the AVS as a Trustee, Director, vice-program chair, Thin Film chair, and many other roles. Finalists for the award will be chosen based on the application packages below. The finalist will then compete for the final Harper Award by presenting their work along the lines of a short, 15 minute TED-talk at the AVS symposium, where they will be judged in real time for both content as well as presentation quality and originality. The Harper Award consists of a plaque and cash prize of \$800. Other finalists will receive Thin Film Graduate Student Awards of \$400. To be eligible for the Harper Award, the student must be the presenter of an oral presentation in the Thin Film Division sessions at the AVS meeting and must be a currently registered graduate student on the date of the abstract submission deadline. Interested applicants should send 1) their CV; 2) a copy of their submitted AVS abstract; and 3) a letter of recommendation from their research advisor. Application materials should be submitted through the awards submission site. **Deadline: May 2, 2022.**

Vacuum Technology Division Student Poster Competition: Vacuum Technology Division Student Poster Competition – Known as the “Student-Built Vacuum System Competition (alias - Junkyard Wars of Vacuum Technology),” for student posters that describe the design, development, and/or use of “student-built vacuum systems.” Although these types of vacuum systems may not represent state-of-the-art technology, they often reflect ingenious designs that are guided by unique functionality, and/or are constrained by limited resources. Competitive submissions are expected to reveal inspired and/or cost-effective solutions to real-world issues encountered in typical vacuum system designs. The competition is open to any student who has built a vacuum system for any research purpose. The resulting research project, whether complete or not, should be presented along with the vacuum challenges that have been undertaken. The posters will be judged during the poster session and cash prizes of up to \$500 will be awarded to the winners of the competition. The application deadline for entering the competition is the same as the abstract deadline which is **May 2, 2022**. Students desiring to enter the competition should submit the poster abstract and application directly in the awards submission site and submit the abstract to the VTD poster abstracts call. Inquiry may be directed to the VTD Student Award Coordinator, Julia Scherschligt (julia.s@nist.gov).

Vacuum Technology Division Student Presenter: This Award is given at the annual AVS International Symposium to encourage students to present their research work in the VTD sessions during the Symposium. To qualify for the award, the applicants must be a full-time student (graduate or undergraduate) at an accredited educational or/and research institute. Candidate students shall submit an abstract to the annual AVS International Symposium & Exhibition for an oral presentation which meets requirements and deadlines and must be the presenter (16-minute talk + 4-minute Q&A) at the AVS Symposium. A panel will judge the student presenters, and the awardee will be selected based on the quality of the presented works (with emphasis on his/her contribution to the presented works) and on the presentation, itself. The VTD Student Presenter award consists of a certificate and a cash prize up to \$500. The application may be done by going to awards submission site. Inquiry may be directed to the VTD Student Award Coordinator, Julia Scherschligt (julia.s@nist.gov). **Deadline is May 2, 2022.**

SOCIETY/DIVISION/GROUP PROFESSIONAL AWARDS (NOT FOR STUDENTS)

The **AVS Applied Surface Science Division (ASSD) Peter M. A. Sherwood Mid-Career Professional Award** recognizes achievements leading to exceptional progress in research and development made by professionals in their mid-career in an area of interest to the ASSD. The award consists of a cash award plus a plaque. **The nomination deadline is April 15, 2022.** The nomination package must contain the nomination form, nominating letter, biographical materials and three supporting letters. The Awardee will give a featured talk at the AVS International Symposium where the award will be presented. Travel support is available to attend the Symposium. The Award will be made only if an appropriate candidate is identified. Packages must be submitted to Alex Shard (alex.shard@npl.co.uk). See the [AVS Awards website](#) for the nomination form and full submission guidelines.

The **AVS Advanced Surface Engineering Division (ASED)** establishes the *ASED Young Investigator Award* to recognize outstanding participation and research based on presentations in SE program at the AVS International Symposium. PhD students or engineers/researchers from industry or academia up to 5 years after PhD graduation, who will be members of the ASED of AVS, are eligible. Members of the ASED AVS Program Committee and a member of the ASED award committee will judge all nominations and make the selection of the winner, based on the submitted documents. The committee may conduct on-line interviews with the nominees in the selection process.

The winner will be announced at least two months prior to the symposium. The winner will receive a certificate, \$500 prize after presenting his/her work at the symposium and up to \$300 travel expenses. **Nomination Procedures:** The Nominator, who is either the supervisor of the young researcher or a senior colleague in the case of a junior academic, shall submit the following items to the current Chair of the ASED Awards Committee by the abstract submission deadline for AVS International Symposium. Late or incomplete applications will not be evaluated. 1) Recommendation letter from the Nominator; 2) Abstract submitted to the ASED program of the AVS International Symposium; both oral and poster presentations are eligible; 3) Two-page description of the research of the young investigator, including a clear and concise description of the aim of the research and its relationship to the status of the field, a summary of the applicant's specific contributions, exceptional ability, and future promise; (3) Resume, which shall include education and employment history with dates, awards and honors received, current professional/technical affiliations (including AVS) and related activities, and complete publication list with full citations. **Nomination Submission and Deadline:** The same as the Abstract Submission Deadline (the year of the AVS Symposium) May 2, 2022. All nomination materials must be compiled by the Nominator and submitted as a package. The complete nomination package is to be sent electronically to the current Chair of the ASED Awards Committee (asedawards@avs.org) such that it is received by the Abstract Submission **Deadline of May 2, 2022**. Late or incomplete application packages will not be evaluated.

The **AVS Biomaterial Interfaces Division (BID)** invites applications for the **Early Career Researcher (ECR) Award**. Open to all authors submitting an abstract to a BID session at the Annual International Symposium, the prize consists of symposium registration and \$500 towards travel costs as well as an honorary presentation in a relevant BI session. The nominee's Ph.D. or equivalent degree must have been earned less than 15 years prior to January 1 of the award year. Required application materials: 1) a nominating letter and two supporting letters, 2) a biography and CV of the nominee, and 3) a copy of the nominee's abstract submitted to the AVS symposium. Application materials will be reviewed and the award winner chosen by the BID Executive Committee. Application materials should be sent by email to: Dr. Caitlin Howell, caitlin.howell@maine.edu. **Deadline May 2, 2022**.

Electronic Materials & Photonics Division Postdoctoral Travel Award is given annually to postdoctoral fellows who have an accepted abstract AND will be presenting an EMPD presentation at the International Symposium. The application consists of (i) a copy of the accepted abstract with Program Number, (ii) a recommendation letter from the advisor, and (iii) CV, plus (iv) a cover letter of request. Multiple awards are anticipated. **Deadline: annually on August 2**. Submissions and inquiries should be directed to empd.awards@avs.org.

Magnetic Interfaces and Nanostructures Division: The MIND Postdoctoral Award recognizes outstanding contributions to the areas of interest to MIND. The award comes with a certificate and a cash prize for the winner. Postdoctoral fellows (except for former winners) up to five years after PhD graduation who do not hold a permanent position at the time of the application, are eligible. Candidates who will be presenting their papers at this year's International Symposium in an oral MIND session are welcome to apply. The application consisting of (i) copy of the accepted abstract, (ii) a recommendation letter from her/his advisor, (iii) her/his CV, plus (iv) cover letters should be sent to Markus Donath (markus.donath@uni-muenster.de) by the **deadline October 1** of the Symposium year.

Nanoscale Science and Technology Division Early Career Competition: As nanoscience has continued to expand its impact in diverse fields including quantum science, biology, mechanics, and energy, the Nanoscale Science and Technology Division (NSTD) has been a hub of research broadly related to instrumentation, lithography, manipulation, imaging, and technology translation. The NSTD holds an Early Career Competition at the annual AVS International Symposium to highlight and celebrate exceptional researchers working on the frontiers of nanoscience. Post-doctoral researchers as well as beginning independent researchers presenting a poster or oral presentation in an NSTD sponsored or co-sponsored session are encouraged to apply.

To apply, send a cover letter, resume, and AVS abstract to the NSTD Awards Coordinator: Adina Luican-Mayer (luican-mayer@uottawa.ca) as a single PDF file. For consideration, **the application must be sent by 11:59 PM CDT, July 20, 2022**. For eligibility, the applicant must hold a doctoral degree for no more than five years at the time of abstract submission. Note that this award is meant to highlight work performed after the Ph.D. and thus research performed towards a doctorate will not be considered. Applications from industry, national laboratories, and academic institutions are encouraged. All Early Career award finalists will be selected by the NSTD Awards Committee, and they will be informed in September 2022. All finalists must present a five-minute talk (with additional time for questions) at the NSTD Sunday plenary session for the awards competition. The winner will be selected based on the quality of the talk, the responses to subsequent questions, and the level of the research. The NSTD Early Career award winner will receive a certificate and a cash award of \$500. Depending on the needs of the following year's AVS Symposium, the winner will be considered for an invited talk. This award is made possible by

financial support from NSTD's sponsors, who in 2021 were Qnami, Bruker, Heidelberg Instruments, Nanoscribe, Nanosurf, RHK Technology, and SPECS.

The Nanotechnology Recognition Award The Nanotechnology Recognition Award recognizes members of NSTD for outstanding scientific and technical contributions in the science of fabrication, characterization, and fundamental research employing nanometer-scale structures, scanning probe microscopy, technology transfer involving nanometer-scale structures, and/or the promotion and dissemination of knowledge and development in these areas. The award comprises a cash award plus a certificate. The nomination is for 2023, and the **deadline is July 20, 2022**. The nomination material should include a nominating letter, biographical material, and 3 supporting letters, which should be emailed as a single pdf file to Adina Luican-Mayer (luican-mayer@uottawa.ca). The Award will be presented at the AVS International Symposium and conference registration will be waived for the award winner. This award is made possible by financial support from NSTD's sponsors, who in 2021 were Qnami, Bruker, Heidelberg Instruments, Nanoscribe, Nanosurf, RHK Technology, and SPECS.

The Plasma Science & Technology Division is pleased to solicit nominations for the Plasma Prize, which is awarded annually for outstanding scientific and technical contributions to the fields of plasma science and technology that are fostered and encouraged by PSTD. These areas are those represented in the programs of the AVS International Symposia, as well as in topical conferences sponsored by PSTD, and those areas defined in the PSTD's By-laws. The contribution may be in the nature of sustained or single (e.g., outstanding achievement or publication), significant contributions to theory or experiment, discovery, understanding, inventions, measurements, technique development, or management. The nominee must have published work in JVST or presented work in the PSTD sessions of the AVS International Symposia and be a current AVS Platinum member. Please submit **ONLY** the following required application materials: (1) A nominating letter citing the contributions and any involvement in the AVS community by the nominee; (2) A biography and Curriculum Vitae of the nominee. The nomination should be made by colleagues or others who are well acquainted with the nominee. Application materials will be reviewed and the award winner chosen by the PSTD Fellowship-Awards Committee. The award consists of an honorary lecture at one of the PSTD oral sessions at the International Symposium, a certificate citing the accomplishments of the recipient, and a cash prize. Nominations must be submitted as a single pdf file by email to: Scott Walton (scott.walton@nrl.navy.mil). **Nomination deadline: May 2, 2022.**

The Plasma Science and Technology Division is committed to promoting the advancement of young scientists and engineers along with future leaders in plasma science and technology. In support of this mission, the Plasma Science and Technology Division is pleased to solicit nominations for the *PSTD Young Investigator Award*. The nominee must be a young scientist or engineer, who has made outstanding basic and/or applied science and engineering contributions in an area of importance to the Plasma Science and Technology Division. The submissions are reviewed based on the merit of the nominee's contributions to the field of plasma science and technology. To be eligible, the nominee must have no more than 7 years of full-time employment after their highest degree was earned, prior to January 1 of the award year, and be a current AVS Platinum member. Required application materials include: 1) A nominating letter that includes a description citing the reason for nomination; 2) Two letters that support the nomination; 3) A biography and CV of the nominee. The applicant must also submit an abstract to the International Symposium in PSTD sponsored session in the year of the nomination. Application materials will be reviewed and the award winner chosen by the PSTD Fellowship-Awards Committee. The award consists of an honorary lecture at one of the PSTD oral sessions at the International Symposium, a certificate citing the accomplishments of the recipient, and a cash prize. Application materials should be sent to Scott Walton (scott.walton@nrl.navy.mil). **Nomination deadline: May 2, 2022.**

The Thin Film Division is pleased to solicit nominations for a prestigious award, the **Paul H. Holloway Young Investigator Award**. This award is named after Professor Paul H. Holloway, who has a distinguished history of scholarship and services to AVS. The nominee must be a young scientist or engineer who has contributed outstanding theoretical and experimental work in an area important to the AVS Thin Film Division and be a current AVS member. The nominee's Ph.D. or equivalent degree must have been earned less than 7 years prior to January 1 of the award year. Required application materials: 1) a description citing the reason for nomination; 2) a nominating letter and two supporting letters; 3) a biography and CV of the nominee. It is expected that an applicant will also submit an abstract to the Annual Symposium in Thin Film sponsored or co-sponsored session. Application materials will be reviewed and the award winner chosen by the TFD Awards Committee. The award consists of a cash prize, a certificate citing the accomplishments of the recipient, and an honorary lecture at one of the TFD oral sessions at the International Symposium. Application materials should be sent to Robert Grubbs rkswest@yahoo.com. **Deadline: May 2, 2022.**

Thin Film Division Distinguished Technologist Award: The Award serves to recognize individuals who have provided exceptional technical support of thin film research or related development activities. We are all indebted

to the support provided at some point in our careers by outstanding technologists or technicians, and this award is meant to recognize the importance of that role in thin film research and development. There is no requirement that a nominee be an AVS member, however membership and/or an active role in the society at the national or local level is advantageous. The nominee must have provided outstanding technical support to a laboratory research or development program in an area of interest to the Thin Film Division, as evidenced by a nomination letter, and a letter of support. It is expected that the nomination come from an active AVS member. The award includes a plaque, a \$500 cash award, and up to \$500 in travel expenses to the AVS International Symposium. These will be presented to the awardee at the annual AVS Symposium & Exhibition by the Thin Film Division. The winner does not have to be present to receive the award but is encouraged to attend. The Distinguished Technologist Award will be granted to a maximum of one person per year. The award was created in 2015 by the New Mexico Chapter of AVS to honor its founders and their many contributions. The New Mexico Chapter of AVS provided the endowment for this Award. Required application materials include 1) a nominating letter and one letter of support, and 2) a brief biography and CV of the nominee. Application materials will be reviewed and the award winner chosen by the TFD Awards Committee. Application materials should be sent by email to Robert Grubbs rkswest@yahoo.com by **July 23, 2022**.

The **VTD Early Career Award** strives to recognize outstanding experimental and/or theoretical work related to vacuum science and technology by a scientist or engineer early in their career. The contributions can be directly in the field of vacuum science such as vacuum metrology and measurement, gas dynamics, or designing vacuum equipment, or to related fields such as gas analysis or surface science for accelerator applications. The nominee does not have to be a current member of the AVS. To be eligible, the nominee must meet AT LEAST ONE of the following three criteria: The nominee is not older than thirty-eight (38) years of age during of the year in which the award is made; the nominee is within 10 years of their undergraduate degree or 5 years of their graduate degree during the year which the award is made; or the nominee holds an early career membership in the AVS. Final eligibility will be subject to the judgment of the VTD Early-Career sub-committee. The award consists of an \$800 cash award and a certificate setting forth the reasons for the award. The awardee is expected to give an invited talk in one of the VTD sessions at the AVS National Symposium during the year in which the award is given. To be considered for this award please submit: 1) A nomination letter, not more than 2 pages long, that cites at least one major contribution or significant accomplishment, which should be summarized in three sentences or less and supported by publications, presentations, patents, or other evidence included in the nomination package; 2) A curriculum vitae including a short (one paragraph) biography; 3) at least (1) one letter of recommendation. A phone or web interview with candidates may also be requested. Self-nominations are acceptable. Application materials or questions should be sent by email to the VTD Student Award Coordinator, Julia Scherschligt (julia.s@nist.gov). **Deadline: May 2, 2022.**

Theodore E. Madey Award: AVS, in cooperation with the Polish Vacuum Society (PVS), is pleased to solicit nominations for the 2023 Theodore E. Madey Award. In the spirit of its namesake, the Award fosters collaboration between Polish and North American scientists. The Awardee is sponsored to visit Poland, present a seminar at a university, and engage in scientific discussions. The Awardee will be selected on the bases of: (1) outstanding theoretical and/or experimental research in areas of interest to the AVS and PVS, including surface science; (2) demonstrated leadership in international collaborative research; and (3) the potential to develop fruitful new international collaborations within the span of his/her career. Required nomination materials include: 1) a letter from the nominator that describes the ways in which the applicant fits the criteria for this award; 2) two supporting recommendation letters; 3) CV (5 pages maximum) which should include education, employment history, professional recognitions (invited, appointed or elected positions), and awards; and 4) complete list of publications, patents, and invited talks. Nomination documents must all be in PDF format. Nomination materials will be reviewed, and the award winner will be selected, by a special committee consisting of both AVS and PVS members. The AVS and PVS contingents will alternate in taking the leadership in award selection, e.g. AVS in 2022 and PVS in 2024. Nominations are due in even-numbered years, and awards are given in odd-numbered years. Nominations are viable for two consecutive award cycles. **Nomination materials for the 2023 award should be sent by email to: Angela Klink, AVS Member Services Administrator, angela@avs.org by March 31, 2022.**