



# AVS 69<sup>TH</sup> International Symposium & Exhibition

November 5-10, 2023 | Oregon Convention Center | Portland, OR



## AVS 69<sup>TH</sup> INTERNATIONAL SYMPOSIUM & EXHIBITION CALL FOR ABSTRACTS

On behalf of the AVS, we invite you to submit an abstract to the AVS 69<sup>th</sup> International Symposium and Exhibition, which will be held November 5-10, 2023 in Portland, OR. 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 **"Two is Better than One: Breaking Barriers with Coupled Phenomena"** and we encourage you to review the program and submit your abstract so you can be part of this exciting event!

In addition to a vibrant technical program with over 130 oral and poster sessions, 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 **Wednesday, May 10, 2023**. Also, please note that we are also 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 69 in Portland!

Virginia Wheeler  
2023 Program Chair

Mark Engelhard  
2023 Program Vice-Chair

### **PROGRAM COMMITTEE**

#### **PROGRAM CHAIR**

Virginia Wheeler  
U.S. Naval Research Laboratory  
virginia\_wheeler@avs.org

#### **PROGRAM VICE-CHAIR**

Mark Engelhard  
Pacific Northwest National Laboratory  
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#### **2D MATERIALS TECHNICAL GROUP**

Topic Chair: Batzill, Matthias, University of South Florida  
Topic Co-Chair: Gunlycke, Daniel, Naval Research Laboratory  
Topic Co-Chair: Katoch, Jyoti, Carnegie Mellon University  
Ebrahimi, Aida, Penn State Univ.  
Li, Huamin, Univ. at Buffalo-SUNY  
Michely, Thomas, University of Cologne, Germany  
Ross, Frances, MIT  
Satriano, Cristina, University of Catania, Italy

Shih, Chih-Kang, Univ. of Texas at Austin

Singh, Simranjeet, Carnegie Mellon University

Son, Young-Woo, Korea Institute for Advanced Study, Republic of Korea

Xiao, Kai, Oak Ridge National 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  
Buck, Edgar, Pacific Northwest National Laboratory

Durakiewicz, Tomasz, National Science Foundation

Gofryk, Krzysztof, Idaho National Laboratory

Havela, Ladislav, Charles University, Prague, Czech Republic

Pugmire, Alison, LANL

Roussel, Paul, AWE, UK

Svanidze, Eteri, Max Planck Institute for Chemical Physics of Solids, Germany

Tereshina-Chitrova, Evgeniya, Charles Univ., Prague, Czech Republic

Zwicknagl, Gertrud, Technische Universität Braunschweig, Germany

#### **ADVANCED FOCUSED ION BEAMS (IB)**

Topic Co-Chair: Ajantiwalay, Tanvi, Pacific Northwest National Laboratory

Topic Co-Chair: Tan, Shida, Intel Corporation

Topic Co-Chair: Thevuthasan, Theva, Pacific Northwest National Laboratory

Topic Co-Chair: Wolff, Lena, Caltech

#### **ADVANCED SURFACE ENGINEERING DIVISION**

Topic Chair: Kodambaka, Suneel Kumar, Virginia Tech

Topic Co-Chair: Mangolini, Filippo, The University of Texas at Austin

Topic Co-Chair: Matjaz, Panjan, Jožef Stefan Institute, Slovenia

### **APPLIED SURFACE SCIENCE DIVISION**

Topic Co-Chair: Fisher, Gregory L.,  
Physical Electronics  
Topic Co-Chair: Scurr, David, University  
of Nottingham, UK  
Topic Co-Chair: Shard, Alexander,  
National Physical Laboratory, UK  
Consiglio, Steve, Tokyo Electron  
Counsell, Jonathan, Kratos Analytical  
Limited, UK  
Engelhard, Mark, Pacific Northwest  
National Laboratory  
Francis, Andrew, Medtronic, Inc.  
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  
Sherwood, P.M.A., Kansas State  
University  
Spila, Timothy, University of Illinois  
Terlier, Tanguy, Rice University  
Thevuthasan, Theva, Pacific Northwest  
National Laboratory  
Zakel, Julia, IONTOF GmbH, Germany

### **ATOMIC SCALE PROCESSING FOCUS TOPIC**

Topic Co-Chair: Bruce, Bobby, IBM TJ  
Watson Research Center  
Topic Co-Chair: Joseph, Eric A., IBM  
Research Division, T.J. Watson  
Research Center  
Agarwal, Sumit, Colorado School of  
Mines  
Armini, Silvia, IMEC Belgium  
Chang, Jane, University of California  
Los Angeles  
Clendenning, Scott B., Intel Corp.  
deMarneffe, Jean-Francois, IMEC, Belgium  
Detavernier, Christophe, Ghent  
University, Belgium  
Engelmann, Sebastian, IBM T.J. Watson  
Research Center  
Gordon, Peter, Carleton Univ., Canada  
Groot, Irene, Leiden Univ., The Netherlands  
Hamaguchi, Satoshi, Osaka Univ., Japan  
Hofmann, Tino, University of North  
Carolina at Charlotte  
Huffman, Craig, Micron  
Jewell, April, Jet Propulsion Laboratory  
(NASA/JPL)  
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

Paquette, Michelle M., University of  
Missouri-Kansas City  
Parsons, Gregory N., North Carolina  
State University  
Reinke, Petra, Univ. of Virginia  
Rogers, Bridget, Vanderbilt Univ.  
Wang, Mingmei, Lam Research Corp.  
Wheeler, Virginia, U.S. Naval Research Lab

### **BIOMATERIAL INTERFACES DIVISION**

Topic Chair: Valtiner, Markus, Vienna  
Univ. of Technology, Austria  
Topic Co-Chair: Fears, Kenan, U.S. Naval  
Research Laboratory  
Bilotto, Pierluigi, CEST GmbH, Austria  
Goacher, Robyn E., Niagara University  
Graham, Dan, University of Washington  
Hanley, Luke, Univ. of Illinois at Chicago  
Jarvis, Karyn, Swinburne University of  
Technology, Australia  
Parekh, Sapun, Univ. of Texas at Austin  
So, Christopher, Naval Research Lab  
Weidner, Tobias, Aarhus University,  
Denmark

### **BIOMATERIALS PLENARY SESSION (ALL-INVITED)**

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

### **CHEMICAL ANALYSIS AND IMAGING OF INTERFACES FOCUS TOPIC**

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

### **ELECTRONIC MATERIALS AND PHOTONICS DIVISION**

Topic Chair: McDonnell, Stephen,  
University of Virginia  
Topic Co-Chair: Banerjee, Parag,  
University of Central Florida  
Cleveland, Erin, Univ. of Maryland  
Douglas, Erica, Sandia National Labs  
Gong, Cheng, Univ. of Maryland  
Henry, Michael David, Sandia National  
Laboratories  
Kawasaki, Jason, University of  
Wisconsin - Madison  
King, Seth, Univ. of Wisconsin - La Crosse  
Krishnamoorthy, Sriram, UC Santa  
Barbara  
Paquette, Michelle M., University of  
Missouri-Kansas City  
Pennachio, Daniel, NRL  
Rockett, Angus, Colorado School of  
Mines  
Roy, Tania, Duke University

### **EXHIBITOR TECHNOLOGY SPOTLIGHT WORKSHOPS**

Topic Chair: DeGennaro, Jeannette, AVS

### **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  
Farber, Rachael, The Univ. of Kansas  
Parkinson, Gareth S., TU Wien, Austria  
Roy, Sharani, University of Tennessee  
Knoxville  
Schauermaun, Svetlana, Christian-  
Albrechts-Univ. Kiel, Germany  
Senanayake, Sanjaya, Brookhaven  
National Laboratory  
Utz, Arthur, Tufts University  
Weaver, Jason, Univ. of Florida

### **LABORATORY-BASED AMBIENT- PRESSURE X-RAY PHOTOELECTRON SPECTROSCOPY**

Topic Chair: Herman, Gregory, Oregon  
State University  
Topic Co-Chair: Bluhm, Hendrik, Fritz  
Haber Institute of the Max Planck  
Society, Germany  
Topic Co-Chair: Ptasinska, Sylwia,  
University of Notre Dame

### **MAGNETIC INTERFACES AND NANOSTRUCTURES DIVISION**

Topic Chair: Ohldag, Hendrik, Lawrence  
Berkeley National Lab.  
Topic Co-Chair: Lauter, Valeria, Oak  
Ridge National Laboratory  
Barsukov, Igor, UC Riverside  
Donath, Markus, Westfälische  
Wilhelms-Univ. Münster, Germany  
Enders, Axel, Univ. of Bayreuth, Germany  
Gai, Zheng, Oak Ridge National Lab  
Holcomb, Mikel B., West Virginia  
University  
Kaspar, Tiffany, Pacific Northwest  
National Laboratory  
Kelber, Jeffrey, Univ. of North Texas

### **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  
Antonelli, G. Andrew, Onto Innovation  
Joseph, Eric A., IBM Research Division,  
T.J. Watson Research Center  
Mehta, Jeremy, DOE-EERE

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

#### **MEMS AND NEMS TECHNICAL GROUP**

Topic Co-Chair: Lee, Jaesung, University  
of Texas at El Paso  
Topic Co-Chair: Zheng, Xu-Qian, Nanjing  
University of Posts & Telecomm, China  
Ansari, Azadeh, Georgia Institute of  
Technology  
Burkett, Susan L., Univ. of Alabama  
Davis, Robert, Brigham Young University  
Diao, Zhu, Halmstad University/Stockholm  
University, Sweden  
Esteves, Giovanni, Sandia National  
Laboratories  
Feng, Philip, University of Florida  
Ghodssi, Reza, Univ. of Maryland  
Gousev, Evgeni, Qualcomm MEMS  
Technologies, Inc.  
Hanay, Selim, Bilkent University, Turkey  
Hentz, Sébastien, CEA/LETI-University  
Grenoble Alpes, France  
Hiebert, W.K., University of Alberta and  
The National Institute for  
Nanotechnology, Canada  
Ilic, B. Robert, National Institute for  
Science and Technology (NIST)  
Jordan, Matthew, Sandia National  
Laboratories  
Kotru, Sushma, Univ. of Alabama  
Krylov, Slava, Tel Aviv Univ., Israel  
Maboudian, Roya, University of  
California at Berkeley  
Metzler, Meredith, NIST  
Naik, Akshay, Indian Institute of  
Science, India  
Ng, Tse Nga (Tina), University of  
California at San Diego  
Qian, Zhenyun, Northeastern University  
Smith, Connor, United States Naval  
Academy  
Sumant, Anirudha, Argonne National Lab  
Thundat, Thomas, University of Alberta  
and The National Institute for  
Nanotechnology, Canada  
Tian, Wei-Cheng, National Taiwan  
University, Taiwan  
Wang, Max Zenghui, University of  
Electronic Science and Tech. of China  
Wang, Yanan, University of Nebraska-  
Lincoln  
Weig, Eva, Technical University of  
Munich, Germany  
Zorman, Christian, Case Western  
Reserve University

#### **NANOSCALE SCIENCE AND TECHNOLOGY DIVISION**

Topic Chair: Fantner, Georg Ernest,  
École Polytechnique Fédéral de  
Lausanne, Switzerland  
Topic Co-Chair: Klimov, Nikolai, National  
Institute of Standards and Tech.  
Topic Co-Chair: Luican-Mayer, Adina,  
University of Ottawa, Canada  
Ebrahimi, Maryam, Lakehead  
University, Canada  
Engel, Leeya, Technion, Israel  
Jariwala, Deep, Univ. of Pennsylvania  
Ko, Wonhee, Univ. of Tennessee Knoxville  
Kolmer, Marek, Ames Laboratory  
Orgiu, Emanuele, Univ. du Québec  
Stavis, Samuel, NIST

#### **NANOSCALE SCIENCE AND TECHNOLOGY PLENARY SESSION (ALL-INVITED)**

Topic Chair: Fantner, Georg Ernest,  
École Polytechnique Fédéral de  
Lausanne, Switzerland

#### **PLASMA SCIENCE AND TECHNOLOGY DIVISION**

Topic Chair: Wang, Mingmei, Lam  
Research Corp.  
Topic Co-Chair: Gordon, Michael, Univ.  
of California at Santa Barbara  
Agarwal, Sumit, Colorado School of  
Mines  
Arnold, John, IBM Research Division,  
Albany, NY  
Bezard, Philippe, IMEC, Belgium  
Boris, David, Naval Research Lab  
Bruce, Bobby, IBM TJ Watson Research  
Center  
Buzi, Luxherta, IBM Research Division,  
T.J. Watson Research Center  
Darnon, Maxime, CNRS/Université de  
Sherbrooke, Canada  
Despiau-Pujo, Emilie, CNRS-LTM,  
Université Grenoble Alpes, France  
Engelmann, Sebastian, IBM T.J. Watson  
Research Center  
Ganta, Sathya, Applied Materials, USA  
Go, David, Notre Dame University  
Hayashi, Hisataka, DAIKIN INDUSTRIES,  
LTD., Japan  
Ishii, Yohei, Hitachi High Technologies  
America Inc.  
Ishikawa, Kenji, Nagoya University,  
Japan  
Kessels, W.M.M. (Erwin), Eindhoven  
University of Technology, The  
Netherlands  
Lishan, David, Plasma-Therm LLC  
Liu, Lei, Lam Research Corp.  
Luan, Pingshan, TEL Technology Center,  
America, LLC

Maeda, Kenji, Hitachi High  
Technologies, Japan  
Marcha, Nathan, IBM T. J. Watson  
Research Center  
Miller, Eric, IBM Research Division,  
Albany, NY  
Odunuga, Samson, Intel Corporation  
Pargon, Erwine, CNRS-LTM, Université  
Grenoble Alpes, France  
Peeters, Floran, LeydenJar Technologies  
Raley, Ms. Angelique, TEL US  
Reniers, Francois, Université libre de  
Bruxelles, Belgium  
Sankaran, Mohan, University of Illinois  
at Urbana-Champaign  
Shearer, Jeffrey, TEL Technology  
Center, America, LLC  
Tatsumi, Tetsuya, Sony Semiconductor  
Solutions Corp., Japan  
Tsai, Yu-Hao, TEL Technology Center,  
America, LLC  
Uner, Necip, Middle East Technical  
University, Turkey  
van de Sanden, Richard M.C.M.,  
Eindhoven University of Technology,  
The Netherlands  
Vitale, Steven, MIT Lincoln Lab  
Wang, Jerry, Applied Materials, USA

#### **QUANTUM SCIENCE AND TECHNOLOGY FOCUS TOPIC**

Topic Co-Chair: Engelmann, Sebastian,  
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  
McRae, Corey Rae, 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.

#### **SPECTROSCOPIC ELLIPSOMETRY TECHNICAL GROUP**

Topic Co-Chair: Hofmann, Tino, Univ. of  
North Carolina at Charlotte  
Topic Co-Chair: Mock, Alyssa, Weber  
State University  
Antonelli, G. Andrew, ONTO  
Innovations

Aspnes, David, North Carolina State University  
Diebold, Alain C., SUNY College of Nanoscale Science and Engineering  
Mathias, Schubert, University of Nebraska-Lincoln  
Urban, F.K., Florida International University

#### **SURFACE SCIENCE DIVISION**

Topic Chair: Groot, Irene, Leiden University, The Netherlands  
Altman, Eric, Yale University  
Anderson, Scott, University of Utah  
Baber, Ashleigh, James Madison Univ  
Calaza, Florencia, UNL-Conicet, Argentina  
Jiang, Nan, University of Illinois - Chicago  
Maier, Sabine, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany  
McEwen, Jean-Sabin, Washington State University  
Stacchiola, Dario, Brookhaven National Laboratory  
Utz, Arthur, Tufts University  
Zhang, Zhenrong, Baylor University

#### **THEORY FOR SURFACE PROCESSES AND SPECTROSCOPIES FOCUS TOPIC**

Topic Chair: Bagus, Paul, University of North Texas  
Pacchioni, Gianfranco, University of Milan, Italy

#### **THIN FILM DIVISION**

Topic Chair: Jewell, April, Jet Propulsion Laboratory (NASA/JPL)  
Banerjee, Parag, University of Central Florida  
Becker, Joe, Kurt J. Lesker Company  
Choudhury, Devika, Argonne National Laboratory  
Conley, Jr., John F., Oregon State University  
Creatore, Adriana, Eindhoven University of Technology, Netherlands  
George, Steven M., University of Colorado at Boulder  
Grubbs, Robert, IMEC, Belgium  
Jalan, Bharat, University of Minnesota  
Kachian, Jessica, Intel Corporation  
Losego, Mark, Georgia Institute of Tech.  
Mackus, Adrie, Eindhoven University, Netherlands  
Nejati, Siamak, University of Nebraska-Lincoln  
Park, Jin-Seong, Hanyang University, Korea  
Parsons, Gregory N., North Carolina State University  
Poedt, Paul, Spark Nano, Netherlands  
Vallee, Christophe, SUNY POLY, Albany

Vanfleet, Richard, Brigham Young Univ.  
Wang, Xinwei, Shenzhen Graduate School, Peking University, China  
Yanguas-Gil, Angel, Argonne National Lab  
Young, Matthias, University of Missouri  
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: Lushtak, Yev, Lawrence Berkeley Lab  
Topic Co-Chair: Lanza, Giulia, SLAC National Accelerator Laboratory  
Alfrey, Jason, Vacuum Technology, Inc.  
Bagge-Hansen, Michael, Lawrence Livermore National Laboratory  
Carter, Jason, Argonne National Lab.  
Fedchak, James A., National Institute of Standards and Technology (NIST)  
Heinbuch, Scott, MKS Instruments, Inc.  
Hendricks, Jay, NIST  
Li, Yulin, Cornell University  
Molkenboer, Freek, TNO Science and Industry, the Netherlands  
Omolayo, Sol, Lawrence Berkeley Lab, University of California, Berkeley  
Ricker, Jacob, NIST  
Romel, Chandra, Consultant  
Scherschligt, Julia, National Institute of Standards and Technology  
Stutzman, Marcy, Jefferson Lab  
Tingle, Ms. Alex, Cold Quanta  
Van Drie, Alan, TAE Technologies  
Wüest, Martin, INFICON Ltd., Liechtenstein  
Wulfsberg, Steven, SAES Group

## **2D MATERIALS TECHNICAL GROUP (2D)**

The 2D Materials Technical Group will review the world-wide effort exploring van der Waals 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 topological and quantum phenomena in layered materials.

### **2D1+TF: 2D Materials: Synthesis and Processing**

*Xiangfeng Duan*, UCLA, "2D Hybrid Superlattices and Artificial Quantum Solids"

*David Johnson*, University of Oregon

### **2D2: 2D Materials: Electron Microscopy**

*Miaofang Chi*, Oak Ridge National Laboratory

*Jani Kotakoski*, University of Vienna, Austria, "In and Ex Situ (S)TEM Manipulation of 2D Materials"

### **2D3: 2D Materials: Scanning Probe Microscopy and Photoemission Spectroscopy**

*Peter Liljeroth*, Aalto University, Finland, "Designer Quantum Materials Using van der Waals Heterostructures"

*Eli Rotenberg*, Lawrence Berkeley Lab, "2D Materials Explored Using nanoARPES at the MAESTRO Beamline in the Advanced Light Source"

### **2D4: 2D Materials: Electronic, Mechanical, and Optical Properties**

*Saptarshi Das*, Penn State University, "Stochastic Computing Enabled by 2D Memtransistors"

*Xuedan Ma*, Argonne National Lab, "Creating Quantum Photon Sources in 2D Semiconductors"

### **2D5: 2D Materials: Charge Density Waves, Magnetism, and Superconductivity**

*Victor Brar*, University of Wisconsin - Madison

*Stuart Parkin*, Max Planck Institute for Microstructure Physics, Germany, "Josephson Diode Effect via Proximity Induced Superconductivity in 2D Materials"

### **2D6: 2D Materials: Defects, Dopants, Edges, Functionalization, and Intercalation**

*Bilu Liu*, Tsinghua-Berkeley University, China

*Jamie Warner*, University of Texas Austin

### **2D7: 2D Materials: Heterostructures, Twistronics, and Proximity Effects**

*David Cobden*, University of Washington

*Nitin Samarth*, Penn State University

### **2D8: 2D Materials: Catalysis, Energy, and Environment**

*Fabino Di Fonzo*, Italian Institute of Technology, Milan, Italy

### **2D9: 2D Materials: Biological Interfaces**

*Lucia Gemma Delogu*, University of Padova, Italy

*Sung Woo Nam*, University of California Irvine

### **2D10: Quantum Effects in 2D Materials: Ferroelectricity and Quantum Spin Liquid**

*Kenneth Burch*, Boston College, "Modulation Doping with a 2D Magnet"

*Sanfeng Wu*, Princeton University, "Topology, Correlations and Unconventional Quantum Criticality in Monolayer  $\text{WTe}_2$ "

### **2D11: 2D Materials: Sensors and Devices**

*Tongcang Li*, Purdue University, "Quantum Sensing with Spin Defects in Hexagonal Boron Nitride"

*Eric Pop*, Stanford University

### **2D12: 2D Materials Poster Session**

## **ACTINIDES AND RARE EARTHS FOCUS TOPIC (AC)**

Actinides and Rare Earths exhibit unique and diverse physical, chemical and magnetic properties resulting from the complexity of the 5f and 4f electronic structure. The Actinide and Rare Earth Focus Topic Session concentrates on the fundamental chemistry, physics, materials, and interface science of f-electron materials with an emphasis on all aspects of nuclear technology while facilitating the involvement of early career scientists. The Focus Topic examines the role of the 4f/5f electrons in the electronic and magnetic structure, interfacial science, and issues related to f-electron materials and nuclear technologies. The role of fundamental f-electron science in resolving challenges posed by actinide chemistry and materials will be central, particularly with regard to topics such as separation science, nuclear fuels, structural materials, nuclear energy processes, nuclear safeguards/forensics, and stewardship. Contemporary experimental approaches, including synchrotron radiation-based investigations and emerging techniques, all coupled to theory, will be featured to understand these complex materials. Specific sessions will be

devoted to advances in experimental and theoretical approaches along with new sessions recognizing the resurgence of several targeted aspects of actinide science. There will be a particular emphasis on the inclusion of early career participants. Shared sessions will be with Applied Surface Science, Magnetic Interfaces/Nanostructures, Theory for Surface Processes and Spectroscopies Topic Area, and special Light Source Science Sessions.

**X-ray light sources** have evolved from their traditional role as unique and powerful sources of energy-tunable and time-resolved electromagnetic radiation into nucleation sites for novel science. Currently, light sources provide singular and indispensable capabilities for advancing science and technology in many scientific fields. These special sessions will bring together facility principals and scientific leaders, as well as early career scientists, to showcase the most recent and powerful developments at these facilities, as well as plans for facility upgrades and future directions in experimentation. Specifically, the sessions will examine in detail the new possibilities for science that can be done in the tender X-ray with existing and future beamlines. The overall coherence characteristics of the upgraded light sources offer new and substantial opportunities for unique experimental design and time-resolving measurements. These sessions will showcase the best and most impactful recent experiments built upon the unique characteristics of light sources, such as high energy resolution fluorescence detection, spectromicroscopy, ambient-pressure photoelectron spectroscopy, hard X-ray photoelectron spectroscopy and their key roles in contributing innovation to societally important science issues such as clean energy production, economic competitiveness, and general national security. Shared sessions will be with Applied Surface Science, Magnetic Interfaces/Nanostructures, and with several Topic Areas – Theory for Surface Processes and Spectroscopies, Laboratory-Based Ambient-Pressure X-ray Photoelectron Spectroscopy; and Actinide and Rare Earth.

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

*Dai Aoki, Tohoku University, Japan*

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

*Alyssa Gaiser, Michigan State University, "Promethium: the missing piece in the Americium and Curium Separation"*

*Tsuyoshi Yaitai, JAEA, Japan, "Structures and Electronic States of Actinide and Lanthanide Complexes with Phenanthroline Derivatives"*

**AC3+AS+MI+TH: Emerging Topics and Methods in Actinide/Rare Earth Sciences**

*Andrea Severing, University of Koeln, Germany*

*Samuel Webb, SLAC National Accelerator Laboratory*

**AC4+AS+TH: Nuclear Safeguards, Forensics, Environmental Science, and Stewardship**

*Claire Corkhill, University of Sheffield, UK*

*Scott Donald, Lawrence Livermore National Laboratory, "Changes in Oxidation Mechanism with Relative Humidity: Application to Uranium Dioxide Powders"*

**AC5+MI+TH: Actinide/Rare Earth Theory**

*Xiaosong Li, University of Washington, "Electronic Structure Methods for f-Block Elements: Are We There Yet"*

**AC6+LX+MI+TH: Tender X-ray Science**

*Dimosthenis Sokaras, SLAC National Accelerator Laboratory, "SSRL Advances in X-Ray Spectroscopy for Actinides Research"*

**AC7+TH: Time-resolved Studies**

*Robert Schoenlein, SLAC National Accelerator Laboratory*

*Linda Young, University of Chicago, "Attosecond Studies of Radiolysis at XFELs"*

**AC8+AS+LX+MI+TH: Facility Upgrades**

*Jonathan Lang, Argonne National Laboratory*

*Andreas Scholl, Lawrence Berkeley National Laboratory, "The Impact of Upgraded High-Brightness Synchrotron Lightsources on the Chemical Speciation of Nanoscale Heterogeneous Aggregates and Transformations"*

**AC9+AS+LX+MI+TH: Recent Capability Development**

*Lynne Ecker, Brookhaven National Laboratory*

*Tonya Vitova, Karlsruhe Institute of Technology (KIT), Germany*

**AC10: Actinides and Rare Earths Poster Session**

**ADVANCED FOCUSED ION BEAMS (IB) (IB)**

Advanced Focused Ion Beams 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. This session includes the full spectrum of charged particle beams and sources including Gas Field Ion Sources (GFIS) 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. The applications include advanced in-situ focused ion beam material modifications and patterning, sophisticated capabilities for electron microscopy and atom probe tomography sample preparation capabilities, and advanced ion microscopy and imaging.

**IB1: Advances in FIB instrumentation, Ion Sources and Optics**

*Nico Klingner, Helmholtz Zentrum Dresden-Rossendorf, Germany*

**IB2: Beam Induced Material Engineering and Nano Patterning**

*Philip Rack, University of Tennessee, "Modeling and Experimental Demonstrations of Ion-Solid-Gas and Photon Beam Interactions During Nanoscale Synthesis"*

**IB3: In Situ FIB Applications**

*Peter Hosemann, University of California Berkeley*

**IB4: Advanced Ion Microscopy and Surface Analysis**

*Antje Biesemeier, Luxembourg Institute of Science and Technology (LIST), Luxembourg, "Multimodal Characterisation of Biological Samples on FIB Instruments Combining Nano-Scale SIMS, SE and STIM Imaging Under Ambient and Cryogenic Conditions"*

**IB5: Advances in TEM and APT Specimen Preparation**

*Bharat Gwalani, North Carolina State University*

**IB6: Ion Beam Imaging, Cross-sectioning and Tomography**

*Valerie Brogden, Oregon State University*

**IB7: Advanced Focused Ion Beams Poster Session**

**ADVANCED SURFACE ENGINEERING DIVISION (SE)**

The program of Advanced Surface Engineering Division (SE) will cover a variety of topics focusing on design, deposition, and engineering of surfaces for industrial applications. The program includes a poster session and three oral sessions, led by invited speakers who will highlight recent advances in fundamental and cutting-edge research in surface engineering. The session "*Advanced Multi-Functional Thin Film Materials*" will aim at encouraging presentations on 'new' materials (e.g., high-entropy alloys, MXenes, etc.) of interest to the surface engineering community. The revised session "*Surface Engineering by Deposition of Protective Coatings*" will facilitate discussions on conventional (e.g., vapor phase) and non-conventional (e.g., liquid or solution phase) methods for the growth of thin films, coatings, and modification of surfaces. It will also feature presentations on the design and development of advanced nanostructured coatings for achieving multifunctionality to be used in various environments, 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 appreciated. The session "*Mechanics and Tribology 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 surfaces with environment. The program invites contributors from academia and industrial world that focus on current and future trends in surface engineering.

**SE1+TF: Advanced Multi-Functional Thin Film Materials**

*Erik Lewin, Uppsala University, Angstrom Laboratory, Sweden, "Order and Disorder – Novel Possibilities with Multi-Component Materials?"*

**SE2+TF: Surface Engineering by Deposition of Protective Coatings**

*Jianliang Lin, Southwest Research Institute, San Antonio Texas*

*Jochen Schneider, RWTH Aachen University, Germany*

**SE3+TF: Mechanics and Tribology of Thin Films and Coatings**

*Wenjun (Rebecca) Cai, Virginia Tech*

**SE: Advanced Surface Engineering Poster Session**

**APPLIED SURFACE SCIENCE DIVISION (AS)**

The Applied Surface Science Division (ASSD) is dedicated to the advancement of surface analysis in a practical context including surface preparation, modification, and utilization of tools for 2D and 3D characterization of surfaces, interfaces and nanomaterials. The ASSD has long been at the heart of the global community of surface analysts with a historic emphasis on techniques such as XPS, SIMS, and Auger spectroscopies. We have long-standing analytical interests with sessions including quantitative surface analysis, industrial problem solving, multi-modal and multi-dimensional characterization for research and problem solving. For AVS 69 we are also encouraging contributions in the area of power storage and green energy as well as modelling for data interpretation as applied to surface analysis. Our contributors represent a blend of fundamental research in measurement science, cutting-

edge applied studies, industrial problem solving and industrial innovation. This year's theme is "Two is Better than One: Breaking Barriers with Coupled Phenomena." 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 the utilization of coupled phenomena in their research.

**AS1+CA+EL+EM+SE+SS+TF: Quantitative Surface Analysis**

*Kelsey Stoerzinger, Oregon State University*

**AS2+2D+CA+EM+MS+NS+SE+SS+TF: Multi-Modal & Multi-Dimensional Analysis**

*Glenn Jernigan, US Naval Research Laboratory, "Growth and Characterization of Large-Area 2D Materials"*

**AS3+2D+CA+EM+MS+NS+SE+SS+TF: Power Storage & Green Energy**

*Cecile Courreges, University of Pau / iPREM, France. "In-situ Surface Analysis Techniques for the Investigation of All-Solid-State Lithium-Ion Batteries Cycling"*

**AS4+2D+CA+EM+NS+SE+SS+TF: Modelling in Applied Surface Analysis**

*Marko Sturm, University of Twente, Netherlands, "Probing Thin Film Interfaces at the Nanoscale by Low Energy Ion Scattering"*

**AS5+2D+CA+EM+MS+NS+SE+SS+TF: Industrial Applications**

*Jean-Paul Barnes, CEA-LETI, France, "Correlating TOF-SIMS with Other Surface Analysis and Microscopy Techniques for Microelectronics and Energy Applications"*

**AS6+CA+EL+EM+SE+SS+TF: Quantitative Surface Analysis**

**AS7+2D+CA+EM+MS+NS+SE+SS+TF: Multi-Modal & Multi-Dimensional Analysis**

**AS8+2D+CA+EM+MS+NS+SE+SS+TF: Power Storage & Green Energy**

**AS9+2D+CA+EM+MS+NS+SE+SS+TF: Modelling in Applied Surface Analysis**

**AS10+2D+CA+EM+MS+NS+SE+SS+TF: Industrial Applications**

**AS11: Applied Surface Science Poster Session**

**ATOMIC SCALE PROCESSING FOCUS TOPIC (AP)**

The Atomic Scale Processing Focus Topic is aimed to provide 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 Plasma Science & Technology Division, the Thin Film Division as well as the Electronic Materials and Photonics Division focusing on area selective deposition, atomic layer process chemistry and surface reactions and atomic layer etching.

**AP1+EM+PS+TF: Area Selective Processing and Patterning**

*Yukio Kaneda, Sony Semiconductor Solutions Corporation, Japan, "A Study of Elucidation and Improvement of TiO<sub>2</sub> Selectivity by First-Principles Based Thermodynamic Simulation"*

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

*Alain Diebold, College of Nanoscale Science and Engineering, "Optical and X-Ray Characterization and Metrology of Si/Si(1-x)Ge(x) Nanoscale Superlattice Film Stacks and Structures"*

**AP3+EM+TF: Beam Studies / Surface Reaction Analysis and Emerging Applications of Atomic Scale Processing**

**AP4+PS+TF: Thermal Atomic Layer Etching**

*John Hennessy, Jet Propulsion Laboratory (NASA/JPL)*

**AP5+2D+EM+PS+TF: Atomic Layer Processing: Integration of Deposition and Etching**

*Annelies Delabie, IMEC, Belgium, "Mechanisms of Area-Selective Deposition in Nanoscale Patterns"*

**AP6+PS: Plasma Enhanced Atomic Layer Etching**

*Remi Dussart, Orleans University, France, "Mechanisms And Benefits of Cryogenic Atomic Layer Etching of Silicon Compounds"*

**AP7+TF: Novel ALD/CVD Precursors and Processes for High Aspect Ratio Architectures**

*Riikka Puurunen, Aalto University, Finland*

**AP8+EM+PS+TF: Atomic Scale Processing Poster Session**

**BIOMATERIAL INTERFACES DIVISION (BI)**

The Biomaterial Interfaces Division (BID) 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. Complexity of biologic systems, 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 'Coupled phenomena in biomaterial systems'**. 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+PS: Microbes and Fouling at Surfaces**

*Axel Rosenhahn*, Ruhr Universität Bochum, DE, Germany, "Amphiphilic Marine Fouling Release Coatings"

*Rong Yang*, Cornell University, "Bio-Informed Interface Design and Synthesis to Manipulate Microbial Behavior"

**BI2+AS+PS: Biomolecules and Biophysics at Interfaces**

*James De Yoreo*, Pacific Northwest National Laboratory, "an *in Situ* Look at the Controls of Surface Charge and Solution Structure on Biomolecular Assembly at Solid-Liquid Interfaces"

**BI3: Characterization of Biological and Biomaterials Surfaces**

*Morgan Alexander*, Nottingham Trent University, UK, "Cell Instructive Polymer Biomaterials"

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

*Philipp Fruhmann*, Center for Electrochemical Surface Technology, CEST GmbH, Austria, "Molecularly Imprinted Polymers (MIPs): Rising and Versatile Key Elements In Bioanalytics"

**BI5: Biomaterials and Nanomaterials Fabrication**

*Morgan Hawker*, California State University, Fresno, "Plasma and Beyond: Expanding the Horizons of Naturally-Derived Polymers as Biomaterials *Through Surface Modification*"

*Heather Sheardown*, McMaster University, Canada, "Changing Ophthalmic Treatment Paradigms Using Biomaterials"

**BI6+AS+HC+SS: Energy Harvesting in Biologic Systems**

**BI7: Simulation of Biointerfaces and Biomaterials**

**BI8: Emerging Topics in Biointerface Sciences (by invitation only in collaboration with Biointerphases)**

**BI9: Biomaterial Interfaces Flash Poster Session**

**CHEMICAL ANALYSIS AND IMAGING OF INTERFACES FOCUS TOPIC (CA)**

Chemical and physical processes occurring at surfaces and solid-solid, solid-liquid, gas-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 of interfacial physical and chemical processes relevant (but not limited) to materials synthesis, microfabrication, energy/catalysis research, biomedical applications, environmental sciences, 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: Environmental Interfaces**

*Musa Ahmed*, LBNL

*Feng Wang*, Argonne National Laboratory, USA

**CA2: In Situ Microscopy, Spectroscopy, and Processing at Liquid-Solid-Gas Interfaces**

*Manh-Thuong Nguyen*, PNNL, "Solid-Liquid Interfaces for Energy-efficient Chemical Separation of Critical Minerals and CO<sub>2</sub> Conversion"

*Dimitry Verkhoturov*, TAMU, "Hypervelocity Nanoparticle Impacts on Extracellular Vesicles: Prospects for Application in Cancer Detection"

**CA3: CHIPS Act: Interfaces and Defects**

*Yamaguchi Takahide*, NIMS (National Institute for Materials Science), Japan, "Diamond/h-BN Heterostructures for High-performance Electronics"

*Luke Yates*, Sandia National Laboratories, USA, "Future Needs and Current Trends in Interfacial Metrology for the Development of Reliable Ultra-Wide Bandgap Electronics"

**CA4: Modeling of Multi-Dimensional Data of Interfacial Processes**

*Aurora Clark*, University of Utah

*Ichiro Takeuchi*, University of Maryland, "Autonomous Combinatorial Experimentation"

**CA5: Progress and Challenges in Industrial Applications**

*Paul Dietrich*, SPECS Surface Nano Analysis GmbH, Germany, "Operando Electrochemical Studies with Near Ambient Pressure XPS"

*Olga Ovchinnikova*, Thermofisher

**CA6: Novel Developments and Applications of Interfacial Analysis**

*Radislav Potyrailo*, General Electric, "Reporting Interfaces: Unconventional Excitation of Interfaces Enables Exquisite Sensing Toward Our Sustainable Future"

*Tanguy Terlier*, Rice University, "Novel Strategies for the Characterization of the Next-Generation Energy Storage Materials by ToF-SIMS: From an in-Situ Exploration to an Operando Measurement"

**CA7: Chemical Analysis and Imaging of Interfaces Poster Session**

**ELECTRONIC MATERIALS AND PHOTONICS DIVISION (EM)**

The Electronic Materials and Photonics Division encompasses all aspects of advanced electronic and photonic materials including material synthesis, surface and interface engineering, computational materials science, machine learning, materials characterization, and materials integration into device applications. The division welcomes abstracts on these topics and those focused on enabling such materials advances such as selective area patterning, novel deposition and etching, and machine learning materials discovery. In addition to general abstracts that fit the aforementioned scope, we are soliciting for several sessions that align with the AVS 69 theme. With respect to transparent conductors, we are particularly interested in p-type TCO's and organic conductors. We welcome submissions on the discovery and manipulation of electronic, magnetic, and topological properties materials using strain and strain gradients, and their application in devices. We invited abstracts on materials challenges related to all aspects of quantum materials enabling quantum computing, communications, and sensing; wide and ultra-wide band gap materials for power, IoT, 6G, electric vehicles and improved grid resiliency; CMOS+X; Multiferroics; AI and machine learning for materials discovery; latest advances and future challenges in the development materials for active and passive components for the mid-IR; materials, processes, and technologies for advanced top-down and bottom-up patterning to meet next-generation device integration requirements; and neuromorphic computing. For the first time, we will be holding a focused session on early career speakers coordinated with the March 2023 JVST special issue. As in past years, we will offer multiple awards including a graduate student poster and presentation awards as well as post-doc and graduate student travel awards to help create a forum in which younger scientists can present their work and develop relationships for the future.

EMPD is also hosting the inaugural Early Career Professionals (ECP) Session highlighting the work accomplished by ECPs relating to electronic and photonic materials and devices. In addition to being open for contributed abstract submissions, the ECP Session will feature invited talks from the recipients of the 2022 JVST A Young Author Award.

**EM1: Advanced Materials for Electronic and Photonic Applications**

*Paul Lane*, National Science Foundation, "Minding the Gap: Advancing Electronics and Photonics through Materials Research"

**EM2: Theme: Advanced Materials for Straintronics**

*Harold Hwang*, Stanford University, "Strain Manipulation of Ferroelectricity and Flexoelectricity"

**EM3: Theme: CMOS+X: Piezoelectrics, Ferroelectrics and Multiferroics**

*Jon Ihlefeld*, University of Virginia, "Factors that Stabilize the Ferroelectric Phase of Hafnia"

**EM4: CMOS+X: Emerging Memory Technologies**

*Suman Datta*, Georgia Institute of Technology

**EM5: Theme: Recent Advancement in Transparent Conductors**

*Andriy Zakutayez*, National Renewable Energy Laboratory

**EM6: Materials for Quantum Computation and Quantum Information**

*Stephanie Law*, Penn State University, "Collective Excitations in Topological Materials"

**EM7+TF: Wide- and Ultra-Wide Band Gap Materials and Devices**

*Grace Xing*, Cornell University, "Ga<sub>2</sub>O<sub>3</sub> and AlN for Power and RF Electronics"

**EM8: Emergent Photonic Materials and Devices for Mid-IR Applications**

*Kathleen Richardson*, University of Central Florida

**EM9+TF: Advanced Patterning and Fabrication for Device Scaling**

*Luciana Meli*, IBM

**EM10: Materials and Device Advances for Neuromorphic Computing**

*Mario Lanza*, King Abdullah University of Science and Technology, Saudi Arabia, "Hexagonal Boron Nitride Based Memristors for Neuromorphic Computing"

**EM11: Materials and Devices to Advance AI, and AI to Advance Materials and Devices**

*Matthew Marinella*, Arizona State University, "Devices for Energy Efficient Analog In-Memory AI Computing at the Edge"

**EM12: Advancements in Microelectronics and Nanotechnology by Early Career Professionals**

*Nicholas Glavin*, Air Force Research Lab

*Deep Jariwala*, University of Pennsylvania, "Heterostructures for Low-Power Logic and Memory Devices"

**EM13: 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 sixth time HC has been organized. Emphasis will be on facilitating dialogue between surface science-based and applied communities studying heterogeneously-catalyzed systems. Session topics include theoretical models, nanoscale structures, gas-surface dynamics, and other novel studies of active surfaces. In addition, emerging areas will be explored, for example electrocatalysis and photocatalysis over surfaces and single-atom catalysis, flipping the script on the Symposium theme of "Two is Better Than One". 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. On symposium Thursday afternoon, HC will host a reception for the community.

**HC1: Origin of Single Atom Catalysis**

*Gianfranco Pacchioni*, University of Milano, Italy, "A Few Questions About Single Atom Catalysts: When Theory Helps"

*Tao Zhang*, Chinese Academy of Sciences, China

**HC2: Advances in Size Controlled Catalysts****HC3: Electro Catalysis**

*Marcel Schreier*, UW-Madison

**HC4: Closing in on Reality**

*Helena Hagelin Weaver*, University of Florida

**HC5: Dynamics and Mechanisms in Heterogeneously Catalyzed Reactions**

*Ulrike Diebold*, TU Wien, Austria, "Silicate Surfaces and Water: An Atomic-Scale View"

*Sheima Khatib*, Virginia Tech

**HC6: Heterogeneous Catalysis in Energy Applications**

*Theo Kitsopoulos*, Max Planck Institute, Germany

**HC7: Advances of Theory in Heterogeneous Catalysis**

*Sascha Kandrassenka*, Max Planck Institute, Germany, "Understanding the Catalytic Reaction of Oxygen and Hydrogen on Pt: Interplay of Theory and Experiment"

*J.R. Schmidt*, University of Wisconsin – Madison, "Advances in Theory of Heterogeneously Catalyzed Reactions"

## **HC8: Model Catalysis and Materials Characterization**

*Abner de Siervo*, State University of Campinas, Brazil, "On-Surface Synthesis of Porous Planar-Carbon-Lattices: Fundamental Properties and Applications"

## **HC9: Fundamental Discoveries in Heterogeneous Catalysis Poster Session**

### **LABORATORY-BASED AMBIENT-PRESSURE X-RAY PHOTOELECTRON SPECTROSCOPY (LX)**

This focus topic will address research using laboratory-based ambient-pressure X-ray photoelectron spectroscopy (AP-XPS). Considerable advances have been made in AP-XPS, where much of the prior research has been performed at synchrotron radiation sources. New capabilities have been developed which allows AP-XPS to be performed in standard laboratory settings. New ambient pressure cell design, differential pumping, and high-brightness laboratory X-ray sources allow laboratory-based AP-XPS research to help further science and technology. Abstracts addressing the development, novel applications, integration with other techniques, and future directions for laboratory-based AP-XPS are solicited. Topics are expected to include catalytic reactions, electrochemical systems, corrosion, biomaterials, and semiconductor processing.

#### **LX1+AS+SS: Laboratory-Based AP-XPS: Instrumentation Development**

*Andrei Kolmakov*, National Institute for Science and Technology (NIST), "Recent Developments in Multi-Channel Graphene Liquid Cells"

*Andreas Thissen*, SPECS Surface Nano Analysis GmbH, Germany

#### **LX2+AS+HC+SS: Laboratory-Based AP-XPS: Applications towards Catalysis**

*Barbara Lechner*, Ludwig Maximilian University of Munich, Germany

*Carlos Ostos Ortiz*, Universidad de Antioquia, Colombia

#### **LX3+AS+HC+SS+TH: Laboratory-Based AP-XPS: Combination of Experiment with Theory**

*Liney Arnadottir*, Oregon State University, "Combined AP-XPS and DFT Study of Acetic Acid Decomposition on Pd(111)"

*Brandon Wood*, Lawrence Livermore National Laboratory

#### **LX4+AS+BI+SS: Laboratory-Based AP-XPS: Characterization of Porous Materials and Liquids**

*J. Anibal Boscoboinik*, Brookhaven National Laboratory, "Evolution of Metal-Organic Frameworks in the Presence of a Plasma by AP-XPS and IRRAS"

*Wendy Flavell*, University of Manchester, UK, "Surface Degradation and Passivation in Perovskite Solar Cells"

#### **LX5+AS+BI+BP+SS: Laboratory-Based AP-XPS: Understanding Biological and Pharmaceutical Interfaces**

*Marc Benjamin Hahn*, Freie Universität Berlin, Germany, "The Change of DNA and Protein Radiation Damage Upon Hydration: In-Situ Studies by Near-Ambient-Pressure XPS"

*Sven Schroeder*, University of Leeds, UK, "Applications of NAP XPS in Pharmaceutical Manufacturing: Surface Analysis, Hydrogen Bonds, and Solute-Solvent Interactions"

#### **LX6+AS+BI+SS: Laboratory-Based AP-XPS: Poster Session**

### **MAGNETIC INTERFACES AND NANOSTRUCTURES DIVISION (MI)**

The theme of AVS 69 is "Two is better than one: breaking barriers with coupled phenomena". Coupled phenomena are the foundation of the field of magnetism, which is the combination and interplay of fundamental atomic and many-body interactions. For this reason one entire session of the MIND program will be dedicated to demonstrate how the interplay of exchange interaction and spin-orbit coupling can be used to control and manipulate spin and magnetism on the nanoscale. With the recent emergence of 2D magnetism also comes increased interest of how to couple magnetism with superconductivity. This field has become very active and for this reason will be featured with two sessions on this subject. Finally, a special symposium will address the interaction of light and spin, i.e., the ability to control spin phenomena using light.

#### **MI1+2D+TF: Interplay of Exchange and Spin-Orbit Interaction for Spin Manipulation**

*Jingsheng Chen*, National University of Singapore, "Symmetry Breaking by Materials Engineering for Spin-Orbit-Torque Technology"

#### **MI2+2D+TF: 2D Magnetism and Superconductivity I**

*Benjamin Hunt*, Carnegie Mellon University

*Inna Vishik*, University of California at Davis, "Spatially-Resolved Photoemission Studies of Magnetic Weyl Semimetals"

#### **MI3+2D+TF: 2D Magnetism and Superconductivity II**

*Paolo Sessi*, Max Planck Institute for Microstructure Physics, Germany, "Interfacing Magnetism And Superconductivity: Visualizing Interactions From 0D To 2D"

*Mina Yoon*, Oakridge National Laboratory

#### **MI4+2D+TF: Special Symposium on "Light and Spin"**

*Daniel Gamelin*, University of Washington, "Developing Nanostructures to Exploit Spin-Photonic Interactions"

*Thierry Grosjean*, CNRS, France, "Magnetization Switching Using Polarized Light"

*Bin Hu*, University of Tennessee, "Spin-Switchable Circularly-Polarized Orbital Order in 2D-Superlattice Perovskite Films"

*Sophie Morley*, Lawrence Berkeley Lab, University of California, Berkeley, "Generating X-ray Orbital Angular Momentum Beams"

#### **MI5+2D+TF: Magnetic Interfaces and Nanostructures Poster Session**

#### **MANUFACTURING SCIENCE AND TECHNOLOGY GROUP (MS)**

Manufacturing Science and Technology Group's three sessions this year are on two government-industry efforts and a third repeat session on machine learning (ML) for process control. The first government industry effort to be highlighted are those authorized and funded by the CHIPS and Science Act of 2022. Government, Industry and Academic speakers will present on early results of industry direct grants for manufacturing as well as grants for joint R&D and for Workforce Development--especially through STEM education. The second session will highlight what is needed as semiconductor manufacturing reaches its miniaturization limits in two-dimensions (2D), it has moved to 2.5D and 3D which greatly increases the number and importance of metrology steps as well as importance of decreasing process variability. ML although initially considered to be a subset of Artificial Intelligence (AI) and used to train AI, it is now a separate discipline focused more on probability theory and statistics that is becoming widely used worldwide especially in microelectronics' to reduce process variability. In our ML session, speakers from a wide range of microelectronics manufacturing and research organizations will discuss improved or even autonomous process control. To date, commercial applications of ML for process control mainly have been for *ex-situ* parameter development. But for autonomous or other *in-situ* (real-time) uses of ML, energy use could become both an economic and environmental concern. Recently, however, experts have identified best practices that can lower *in-situ* ML energy use by orders of magnitude: For example, selecting efficient ML model architectures while advancing ML quality, such as sparse models versus dense modes, can reduce computation by factors of ~5-10 and using processors optimized for ML training such as TPUs or recent GPUs (e.g., V100 or A100), versus general-purpose processors, can improve performance/Watt by factors of 2-5. For the afternoon session, we note semiconductor manufacturing trends that demand significantly advanced characterization and modelling: As device size shrinks toward the size of the probe being used, structures become more difficult to image accurately; Measuring structures or films that are not accessible from the surface or are hidden under pre-existing layers is a major challenge; In 3D, the complexity of structures increases geometrically with 3D device architectures and accessing some 3D features with non-destructive techniques can be difficult. The third session highlights the need for and progress made to date on a new Department of Energy-led effort to develop an RD&D Roadmap to ensure that microelectronics energy efficiency gets back on the path of doubling energy efficiency every two years. This roadmap involves working groups across the stack as well as for software, power electronics and metrology.

#### **MS1: Chips and Science Act Implementation for Microelectronics (Including Workforce)**

*Dave Anderson*, NYCCreates

*Mark Lundstrom*, Purdue University, "Re-Shoring and Re-Energizing Microelectronics: The Workforce Challenge"

*Mike Molnar*, National Institute of Standards and Technology (NIST)

*Steve Pawlowski*, Micron

*Rao Tummala*, Georgia Tech

*Jan Vardaman*, Tech Search International

#### **MS2: Machine Learning for Microelectronics Manufacturing Process Control**

*Peter Barar*, Synopsys

*Taeyong Jo*, Samsung, Republic of Korea

*Keren Kanarik*, LAM Research, "Humans Partnering with Ai to Create Semiconductor Processes"

*Tom Sonderman*, Sky Water Technology

#### **MS3: Microelectronics R&D for Life-cycle Energy Efficiency**

*Sarah Allendorf*, Sandia National Laboratories, "Microelectronics Energy Efficiency Scaling for 2 Decades (EES2)"

*Greg Lavender*, Intel Corporation, "Energy Efficiency Scaling for 2 Decades and Intel's own RD&D Roadmap"

*Jay Lewis*, Microsoft, "Energy Efficiency Scaling for 2 Decades--an update"

*Gabe Loh*, AMD, "Energy Efficiency Scaling for 2 Decades (EES2) R&D Roadmap Update"

*Godwin Maben*, Synopsys, "Energy Efficiency Scaling for 2 Decades--Report on EES2 RD&D Roadmap"

*Sadasivan Shankar, SLAC National Accelerator Laboratory, "Energy Efficient Scaling in Microelectronics: Enabling a New Era in Computing for a Sustainable Future"*

**MS4: Manufacturing Science and Technology Poster Session**

**MEMS AND NEMS TECHNICAL GROUP (MN)**

The MEMS and NEMS Technology 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+QS: Optomechanics and Quantum Phononics**

*Xiyuan Lu, National Institute of Standards and Technology (NIST)/ University of Maryland, College Park, "Integrated Silicon Carbide Optomechanical Micro-/Nano-Resonators"*

**MN2: Nanomechanics**

*Benjamín Alemán, University of Oregon, "Spatial Mapping and Analysis of Graphene Nanomechanical Resonator Networks"*

**MN3: 2.5D/3D Heterogeneous Integration, High Aspect Ratio Structures, and Advanced Packaging**

**MN4: Radio Frequency MEMS**

*Vikrant Gokhale, Naval Research Laboratory, USA, "Epitaxial Materials and Devices for High Performance Acoustics"*

**MN5: MEMS and BioMEMS: Processes, Materials, and Fabrication**

*Robert Roberts, University of Texas at El Paso, "Additive Manufacturing for 3D Metal Microsystems"*

**MN6: MEMS/NEMS Poster Session**

**NANOSCALE SCIENCE AND TECHNOLOGY DIVISION (NS)**

Nanoscale Science and Technology 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 structures is highlighted, particularly their surface chemistry, energetics, mechanics, and morphology. Specific emphasis will be placed on the key connections between nanoscale physical and chemical phenomena 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 device and material fabrication. All of this understanding is enhanced by recent developments in machine learning and artificial intelligence. The NS program particularly promotes novel physical phenomena emerging in these nanosystems, and their applications for quantum information systems, sensing, and beyond.

**NS1+2D+EM: Light-Matter Interactions at the Nanoscale**

*James Schuck, Columbia University, NY*

**NS2+2D+MN: Quantum Systems and Devices for Novel Sensing Applications**

*Hongkun Park, Harvard University*

**NS3+2D+BI+EM+MI+MN: Nanoscale Materials, Devices, and Structures (Including Synthesis, Fabrication, and Characterization)**

*Jiwoong Park, University of Chicago*

**NS4+EM+MN: Nanophotonics, Metamaterials, and Plasmonic Systems for Quantum Applications**

*Jennifer Dionne, Stanford University*

**NS5+2D+EM+MN: Nanofabrication and Characterization of Low-Dimensional Materials**

*Marija Drndic, University of Pennsylvania*

**NS6+2D+EM+MN+SS: Scanning Probe Microscopy (Techniques and Data Processing)**

*Andreas Heinrich, Ewha Womans University, Republic of Korea*

**NS7+2D+QS: Scanning Probe Microscopy Studies on Quantum Materials**

*Rita Du, university of California san Diego*

**NS8+2D+EM+TF: Nanoscience and Technology Aspects of Energy Research**

*Edward Sargent, Northwestern University*

**NS9+2D+EM+MI: Mixed-Dimensional Novel Material Heterostructures**

*Kate Reidy, Massachusetts Institute of Technology, "Atomic-Scale Design at the 2D/3D Interface"*

**NS10: on-Surface Reactions Studies by Scanning Probe Microscopy**

*Roman Fasel, EMPA (Swiss Federal Laboratories for Materials Science and Technology), Switzerland*

**NS11+MN: Nanoscale Measurement Quality**

*John Villarrubia, NIST*

**NS12+2D+BI+SS: Combined Nanoscale Microscopy**

*Fernando Castro, National Physical Laboratory, "Combined Metrology at the Nanoscale: Advanced Scanning Probe Microscopy to Evaluate Complex Semiconductors"*

**NS13+2D+BI+EL+SS: Chemical Identification with Scanning Probe Microscopy**

*Eric Potma, University of California Irvine*

**NS14: Nanoscale Science and Technology Poster Session**

**PLASMA SCIENCE AND TECHNOLOGY DIVISION (PS)**

The Plasma Science and Technology program highlights state-of-the-art advances in plasma science and associated applications, ranging from fundamental studies of plasma physics and chemistry, plasma-matter interactions to new and advanced applications in plasma processing. Our diverse international community includes researchers from academia, national laboratories, and industry covering topics extending from the latest advancements in basic and applied research for established fields such as semiconductor fabrication to novel and emerging applications, where plasma is either the focus or the enabling tool. One of the exciting features of this years' program is that we have been able to invite back some of the prominent PSTD students from years past to give updates on current plasma research. The program extends over the entire week and includes oral sessions in the morning and afternoon. Each session includes one or more invited lectures given by a well-recognized subject matter expert along with numerous contributed talks. The program will also feature talks by the PSTD *Plasma Prize* and *Young Investigator Award* winner along with student finalists for this years' *Coburn and Winters Award*. In addition, the Plasma Division will seek to form joint sessions with other focus groups, divisions and groups at AVS, with the aim of exposing our community to new areas and also draw a wider audience to our Plasma topics. Special consideration will be given to papers that emphasize issues which are cross-disciplinary in nature. Abstracts with a preview of results and conclusions supported by technical data are favored for oral presentation. Original abstracts are solicited on the following topics, but not limited to:

**PS1: Advanced BEOL: Interconnect Materials and Etching**

*Eric Liu, TEL Technology Center America, "Technology Options to Enable Logic Scaling in Advanced Beol from Patterning to Metal Interconnect Formation"*

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

*Yun Han, TEL Technology Center America, "FEOL Plasma Etch Challenges in 3D Logic Device Fabrication"*

**PS3+NS: Advanced Patterning: EUV, Multipatterning and Alternative Patterning Approaches (Imprint, DSA, etc.)**

*Danilo De Simone, IMEC, Belgium*

**PS4+TF: Plasma Processing for Advanced Emerging Memory Technologies**

*Thorsten Lill, Lam Research Corp., "Etching of High Aspect Ratio Structures at Low Temperatures: Fundamentals and Applications"*

**PS5+TF: Plasma Processing for Advanced Packaging and Heterogeneous Integration**

*Thierry Chevolleau, CEA-Leti, France, "Plasma Etching Processes for Advanced Memory Technologies"*

**PS6+TF: Plasma-engineered Materials and Other Materials Processing: Power Electronics, III-V, Solar Cells, Quantum Computing, Optoelectronics, MEMS, and AR/VR**

*Shin Mou, Air Force Research Laboratory*

**PS7+AP: Plasma Assisted Atomic Layer Etching**

*Wenbin Yang, Lam Research Corporation, "Atomic Layer Etching for High Aspect Ratio Etch Applications"*

**PS8+AP+TF: Plasma Deposition and ALD Processes for Coatings and Thin Films**

*Marceline Bonvalot, University of Grenoble, France, "Combination of Plasma-Based Atomic Scale Deposition and Etching Processes for Advanced Patterning"*

*Nobuyuki Kuboi, Sony Semiconductor Solutions Corporation, Japan, "Prediction and Control of Coverage and Film Property on Deposition Process"*

**PS9+SE: Plasma Sources**

*Christine Charles*, Australian National University, Australia, "From Space Thrusters to Exoplanets Research"

**PS10+SE: Plasma Diagnostics, Sensors, and Control**

*Steven Shannon*, North Carolina State University, "Expanding the Capabilities of Microwave Hairpin Probes"

**PS11+MS: Modelling of Plasmas and Plasma Driven Processes**

*Kallol Bera*, Applied Materials, "RF Hollow Cathode Discharge Characterization using Plasma and Machine Learning Models"

**PS12+MS: Plasma-Surface Modeling**

*David Graves*, Princeton University Plasma Physics Lab, "Modeling and Simulation of Plasma-Surface Interactions in Nanofabrication"

*Du Zhang*, TEL Technology Center America, "Driving Technological Advancements in Plasma Etching Through Simulation-Informed Plasma-Surface Interaction Engineering"

**PS13+MS: AI/ML in Plasma Applications**

*Tetsuya Nishizuka*, Tokyo Electron Ltd., Japan, "Approaches to Virtual Etch Process Experiment and Optimization in High Aspect Ratio Patterning"

**PS14+AS+SS: Plasma-Surface Interactions**

*Peter Bruggeman*, University of Minnesota, "Plasma-Surface Interactions At Atmospheric Pressure: From Liquids To Catalytic Surfaces"

*John Daugherty*, Lam Research Corp., "Plasma-wall Materials Interactions: Implications for Advanced Chamber Design"

*Satoshi Hamaguchi*, Osaka University, Japan, "How Machine Learning Can Help Process Development"

**PS15: Plasmas for the Environment and Sustainability**

*Olivier Guaitella*, LPP, France

**PS16+AS: Plasma Catalysis**

*Elijah Thimsen*, Washington University in St. Louis, "Synthesis of Hydrogen and Structural Carbon Materials from Methane Using Radiofrequency Nonequilibrium Plasma"

**PS17+AS: Plasma Chemistry**

*Alex Fridman*, Drexel University, "Plasma Chemistry in Atmospheric Pressure Gases and Liquids: Fundamental and Novel Applications"

**PS18+SE: Atmospheric Pressure Plasmas and Their Applications**

*Judith Golda*, Ruhr University Bochum, Germany, "Fundamentals of kHz Discharges for Plasma Catalytic Applications"

**PS19: Special Topics for AVS PSTD**

*Luxherta Buzi*, IBM T. J. Watson Research Center, "Plasma Processing Challenges for Emerging Memory Technology"

*Eric Joseph*, IBM T. J. Watson Research Center

*Scott Walton*, Naval Research Laboratory, "Electron Beam Driven Plasmas: Development, Characterization, and Application"

*Geun Young Yeom*, Sungkyunkwan University (SKKU), Korea (Democratic People's Republic of), "Vhf Plasma Enhanced Atomic Layer Deposition of Sinx Using Aminosilane Precursors"

**PS20: Plasma Science and Technology Poster Session****QUANTUM SCIENCE AND TECHNOLOGY FOCUS TOPIC (QS)**

The Quantum Science and Technology Focus Topic will cover innovative quantum technologies that enable us to create, control and manipulate quantum systems. Topics will cover computing approaches such as 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, and microwave to optical conversion schemes etc. Challenges in achieving high performance quantum devices and making precision measurements using quantum systems will be addressed.

Specific sessions will highlight the recent advances and challenges in quantum science and information processing, achieving higher coherence qubits and SiC, diamond and related materials for quantum information sciences. We also plan to have joint sessions with traditional topical area groups and divisions at AVS, aiming to bring together areas traditionally represented at AVS on this new topic.

**QS1: Systems and Devices for Quantum Information**

*Bob Butera*, Laboratory for Physical Sciences, " Hole-based Atomic-scale Quantum Devices in Silicon "

*Jeffrey McCallum*, University of Melbourne, Australia



## **QS2: Systems and Devices for Quantum Computing**

*Stefano Poletto, Rigetti Computing*

## **QS3: High Coherence Qubits for Quantum Computing**

*Jürgen Lisenfeld, Karlsruhe Institute of Technology (KIT), Germany, " Tunneling Defects in Quantum Devices "*

## **QS4: SiC, Diamond and Related Materials for Quantum Information Sciences**

## **QS5: The Quantum Metrology Revolution**

*Fedor Jelesko, University of Ulm, Germany, "Spin Qubits in Diamond"*

## **QS6: Quantum Science and Technology Poster Session**

## **SPECTROSCOPIC ELLIPSOMETRY TECHNICAL GROUP (EL)**

The Spectroscopic Ellipsometry (EL) Topic integrates themes ranging from classical materials science and thin film characterization to nanometer scale science and novel optical sensing concepts. We will host four 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 oral session will focus on the many industrial applications of ellipsometry. The second oral session is dedicated to topics in analytical methods such as the use of artificial intelligence and other state-of-the-art methods to big data in ellipsometric analysis. The third oral session will host presentations on classical research topics of ellipsometry such as optical coatings and inorganic thin-film characterization. Furthermore, presentations on the ellipsometric investigation of novel optical and electronic materials and materials with subwavelength structures will be included. The fourth oral session will focus on emerging technological advances and breakthroughs of spectroscopic ellipsometric instrumentation. The best student paper, which is selected based on the quality of the research, its presentation, and discussion during the symposium, will be awarded with the EL student award. EL will host a poster session.

### **EL1: Industrial Applications of Spectroscopic Ellipsometry**

*Shankar Krishnan, KLA-Tencor, "Spectroscopic Ellipsometry and Reflectometry for Advanced Semiconductor Metrology "*

*Andre Miller, Intel, "Ellipsometry in Industrial Applications"*

### **EL2: Big Data, AI and Analytical Methods**

*Long Le, Vietnam Academy of Science and Technology, Viet Nam, "Decoding 'Maximum Entropy' Deconvolution"*

*Nikolas Podraza, University of Toledo, "Ellipsometry analysis overview"*

### **EL3+TF: Thin Films & Novel Materials**

*Vanya Darakchieva, Lund University, Sweden, " Enhancement of Electron Effective Mass in Semiconductor Materials and 2DEGs Revealed by THz Optical Hall Effect "*

*Rafal Korlacki, University of Nebraska - Lincoln, " Combined Density Functional Theory and Spectroscopic Ellipsometry Studies of Anisotropic Materials "*

### **EL4: Instrumentation**

*M. J. Lee, Samsung, Republic of Korea, "An Overview of Novel Ellipsometry Methods"*

*Troy Ribaud, Onto Innovation, " Ellipsometry Instrumentation in the Mid-Infrared for Semiconductor Metrology"*

### **EL5: Spectroscopic Ellipsometry Poster Session**

## **SURFACE SCIENCE DIVISION (SS)**

The Surface Science Division 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 chemical analysis, materials degradation, and 2D materials. This 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 with water and in liquids, to reactions on alloy surfaces, nanoparticles, and oxide and 2D material surfaces. We showcase advances in photochemistry and molecular organization, and promote experiments 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 Surface Science Division.

### **SS1+AS+TF: Mechanisms at Surfaces and Interfaces**

### **SS2+AS+HC+TF: Overcoming Barriers in Dynamic Processes**

*Paola Quaino, IQAL-UNL – Santa Fe, Argentina*

### **SS3+2D+AS: Surface Science of 2D Materials**

*Kwabena Bediako, UC Berkeley*

#### **SS4+AS+CA: Environmental and Atmospheric Surfaces**

*Vicki Grassian, UC San Diego, "Chemistry of Environmental Interfaces"*

#### **SS5+HC: Photochemistry**

*Victor Batista, Yale University*

#### **SS6+HC: Electrochemistry**

#### **SS7: Liquid-Solid Interfaces**

#### **SS8+2D+AS+HC: Oxide and Chalcogenide Surfaces and Interfaces**

*Mikolaj Lewandowski, Adam Mickiewicz University, Poland, "Ultrathin Iron Oxide, Nitride and Sulfide Films: Bringing the Well-Known Compounds to a Unit-Cell Thickness"*

#### **SS9+2D+AS+HC: Oxide and Chalcogenide Reactivity**

*Annabella Selloni, Princeton University*

#### **SS10+AS+TF: Thin Film Surface Chemistry**

*Yingge Du, Pacific Northwest National Lab*

#### **SS11+AS: Molecular Organization at Surfaces**

*Steven Tait, Indiana University*

#### **SS12+HC: Alloys and Complex Surfaces**

*Charles Sykes, Tufts University, "Single-Atom Alloy Catalysts: Born in a Vacuum, Tested in Reactors, and Understood In Silico"*

#### **SS13: A Special Session Honoring Wilson Ho**

*Chi Chen, Academia Sinica, Taiwan*

*Zhenchao Dong, University of Science and Technology of China, "Sub-nanometer Resolved Single-Molecule Optical Spectromicroscopy"*

*Nan Jiang, University of Illinois at Urbana-Champaign, "Probing Chemistry at the Angstrom-Scale via Tip-Enhanced Raman Spectroscopy"*

*Ying Jiang, Peking University, China, "Unravelling the Mysteries of Water and Ice: A Journey Starting from Single Water Molecule"*

*Yousoo Kim, RIKEN, Japan*

*Christopher P. Lutz, IBM Research, "Magnetic Imaging of Individual Organic Radicals Using Inelastic Tunneling and Spin Resonance"*

*Steven Sibener, University of Chicago, "On-Surface Chemical Dynamics Probed with Concurrent In Situ STM, Infrared Spectroscopy, and Supersonic Molecular Beams"*

*Joseph Stroscio, NIST, "Unraveling Orbital Magnetism Contributions to Landau Levels in Moiré Quantum Matter"*

#### **SS14: Surface Science Poster Session**

### **THEORY FOR SURFACE PROCESSES AND SPECTROSCOPIES FOCUS TOPIC (TH)**

The object is to demonstrate the diversity of different theoretical approaches that can be used to address problems related to the electronic structure of surfaces. This is important because it has become common for people to believe that there is a single theoretical approach that should be used to address a wide range of problems. This is not the case and a variety of approaches can and should be used to address different problems. Thus, there are problems where periodic methods are preferred, even necessary, and others where methods based on finite (and small) clusters should be used. There are cases where DFT methods are needed to obtain the desired information and others where wavefunction methods should be used. This will be demonstrated by speakers who address their use of different theoretical methods to obtain information to describe and determine the physical and chemical significance of various surface processes. There will also be contributions from people whose primary focus is experimental who will describe the kind of theoretical information that is needed to properly understand the significance of experimental results.

#### **TH1+AS+SS: Introduction and Core-Level Spectroscopies I**

*C. Richard Brundle, Consultant*

*Hans-Joachim Freund, FHI - Berlin, Germany, "X-Ray Photoelectron Spectroscopy as a Useful Tool to Study Surfaces and Model Systems for Heterogeneous Catalysts"*

#### **TH2: Core-Level Spectroscopies II**

*John Rehr, University of Washington, "Cumulant Green's Function Approaches for Satellites and Multiplets in X-Ray Spectra"*

*Bianca Schacheral, Karlsruhe Institute of Technology, Germany*

### **TH3: Electronic Structure Theory**

*Ria Broer*, University of Groningen, Netherlands

*Ping Yang*, Los Alamos National Laboratory, "Enabling Long Time-Scale Quantum Molecular Dynamics Simulations for 5f-Elements"

### **TH4: Electronic Structure and Reactivity**

*Anne Chaka*, Pacific Northwest National Lab

*Ivan Infante*, Basque Center for Materials, Applications, and Nanostructures, Spain

### **TH5: Theory for Surface Processes and Spectroscopies Poster Session**

## **THIN FILM DIVISION (TF)**

The Thin Film Division offers several oral sessions and one poster session. The program will broadly cover thin film fundamentals, materials, processing, and applications. Processing techniques to be highlighted include ALD, CVD, HiPIMS, and other vapor deposition technologies. Sessions related to ALD/ALE and area selective patterning are directly aligned with the Atomic Scale Processing (AP) Focus Topic. We offer sessions dedicated to precursor and process development for 3D, high-aspect ratio architectures, and nanostructured materials. We encourage contributions related to thin film applications in batteries, semiconductor devices, space technologies, superconductors, and quantum computing. We offer sessions on theory, modelling, artificial intelligence, and machine learning for material design and semiconductor manufacturing. We solicit abstracts for in-situ studies of thin films, surfaces, and interface as well as strategies for manipulating microstructures and accessing non-equilibrium phases in thin films. To address the emerging areas of thin film research, we are offering sessions on organic-inorganic hybrid materials and polymeric films as well as metal-organic frameworks and other network materials. Again this year, we will host the popular student-focused session in which Harper Award finalists will share their work in interactive "TED-Talk" style presentations.

### **TF1+AP: Novel ALD/CVD Precursors and Processes for High Aspect Ratio Architectures**

*Riikka Puurunen*, Aalto University, Finland

### **TF2: Growth in 3D, High Aspect Ratio, and Nanostructured Materials**

*Mikhael Bechelany*, Institut Européen des Membranes, France, "Membrane Design by Atomic Layer Deposition"

### **TF3+EM: Materials Challenges in 3D Memory**

*Johan Swerts*, IMEC, Belgium

### **TF4+MS: AI and ML for Materials and Semiconductor Manufacturing**

*Kanad Basu*, University of Texas at Dallas, "Machine Learning-based Atomic Layer Deposition"

### **TF5+AP: Thermal Atomic Layer Etching**

### **TF6+AP+EM+PS: Area Selective Processing and Patterning**

*Cathleen Crudden*, Queen's University, Canada, "Area Selective ALD Employing Small Molecule Inhibitors with Carbon as the Heteroatom Equivalent"

### **TF7+AP: Atomic Layer Processing: Integration of Deposition and Etching**

### **TF8+AP+PS: Energy Enhanced ALD**

*Andrew Kummel*, University of California at San Diego

### **TF9+PS: HiPIMS for Emerging and Advanced Materials**

*Stephen Stagon*, University of North Florida

### **TF10+AP+SE+SS: In-situ Studies of Thin Films, Surfaces, and Interfaces**

*Ashley Bielinski*, Argonne National Laboratory, "Measuring the Time-Resolved Heat of ALD Surface Reactions"

### **TF11+EM: Thin Film for Superconductors and Quantum Computing**

*Bharat Jalan*, University of Minnesota, "Engineering Metal Oxidation Using Epitaxial Strain"

### **TF12: Thin Films for Space Applications**

*Frank Greer*, Jet Propulsion Laboratory (NASA/JPL), "Atomic Scale Processing and Surface Engineering to Maximize Microdevice Performance for Remote Sensing and Imaging Applications"

### **TF13: Thin Films for Battery Applications**

*Mark Huijben*, University of Twente, Netherlands, "Superior Microbatteries by Tailoring Epitaxial Interfaces"

### **TF14: Vapor Deposition and Vapor Infiltration for Creating Organic-Inorganic Hybrid Materials**

*Diana Berman*, University of North Texas, "Functional Ceramic Heterostructures via Vapor and Liquid Phase Infiltration of Polymer Templates"

### **TF15: Vapor Deposition of Organic and Polymeric Materials**

*Joerg Lahann*, University of Michigan, "Nanofiber-Decorated Surfaces via LC Templated CVD Polymerization"

## **TF16+SE: Vapor-phase Processes for Depositing or Modifying Metal-Organic Frameworks or Other Network Materials**

*Ola Nilsen, University of Oslo, Norway, "Vapor-phase Processes for Depositing or Modifying Metal-Organic Frameworks or Other Network Materials"*

## **TF17: Controlling Microstructure and Accessing Non-Equilibrium Phases in Thin Films**

*Lauren Garten, Georgia Institute of Technology*

## **TF18+AP: Manufacturing and Scale-Up of CVD and (Spatial) ALD**

*Maksym Plakhotnyuk, ATLANT 3D Nanosystems, Denmark*

## **TF19: Thin Film Poster Session**

## **VACUUM TECHNOLOGY DIVISION (VT)**

The Vacuum Technology Division (VTD) serves as a forum for research in achieving, maintaining, measuring, and analyzing vacuum across a wide range of pressures, gas compositions, and applications. The VTD committee members include representatives from vacuum technology industry, national laboratories, and academic institutions, possessing degrees in the physical sciences and engineering, and at a wide range of career levels, united by their enthusiasm for all things vacuum. Traditionally, the VTD sessions include presentations on pressure measurement, gas composition analysis, leak detection, and vacuum simulation, as well as vacuum systems for particle accelerators, fusion reactors, quantum systems, and gravitational interferometry. Notable recent additions to the VTD program are sessions on fusion reactor vessels and sustainability. The VTD Poster session features the VTD Student Poster Competition, where students of any discipline are invited to share their innovative solutions to vacuum challenges. Awards are also given to exceptional oral presentations by students at the Symposium.

### **VT1: Vacuum Measurement, Partial Pressure, and Gas Analysis**

*Masatoshi Ono, Vacuum Products Corporation, Japan, "Novel Diaphragm Vacuum Gauge"*

### **VT2: Vacuum Pumping and Extreme High Vacuum**

### **VT3: Gas Dynamics, Modeling, and Simulation**

### **VT4: Leaks, Flows, and Material Outgassing**

*Brad Shaw, Leak Testing Corporation, "Improved Reliability of High Sensitivity Leak Testing of Large Chambers"*

### **VT5: Aerospace and Large Vacuum Systems**

*Michael Zucker, LIGO, "Update on the A+ Upgrade to LIGO and the COSMIC Explorer"*

### **VT6: Particle Accelerators**

*Christina Vallgren, Terapet, Switzerland, "Terapet: Improving Proton Therapy for Cancer Treatment"*

### **VT7: Particle Control, Quality Control, Ultraclean Systems**

*Faye Delphine, CNES, France, "On Ground and In-Orbit Decontamination Strategies for Space Equipment"*

### **VT8: Vacuum Technology for Quantum Applications**

*Oliver Burrow, Strathclyde University, UK, "Stand-Alone Vacuum Cells for Compact Ultracold Quantum Technologies"*

*Richard Versluis, TNO/QuTech, Delft, Netherlands, "Hybrid Quantum-HPC Computing Clouds in Europe"*

### **VT9: Vacuum Technology for Fusion Research**

### **VT10: Two Is Better Than One: Coupled Phenomena**

*Mengjia Gaowei, Brookhaven National Laboratory, "Cs Intercalation of 2d Material Encapsulated Photocathodes"*

### **VT11: Environmentally Sustainable Vacuum Technology**

*Yohei Yoda, EBARA, Japan, "Saving Energy of Subfab Equipment for Semiconductor Manufacturing"*

### **VT12: Vacuum Technology Poster Session**

## **SPECIAL SESSIONS & EVENTS**

**AVS 69 PLENARY LECTURE:** Will be held on Monday, November 6, 2023, 5:30-6:30 p.m. and following by the AVS 69 Welcome Mixer.

## **BIOMATERIALS PLENARY SESSION (ALL-INVITED) (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: Coupled Phenomena in Biomaterial Systems (ALL-INVITED SESSION)**

*Kerstin Blank, Johannes Kepler University, Linz, Austria, "Mechanoresponsive Proteins - from Molecular Mechanisms Towards Applications in Biology and Materials Science"*

## **NANOSCALE SCIENCE AND TECHNOLOGY PLENARY SESSION (ALL-INVITED) (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: Nanoscience and Technology Division Plenary Session (ALL-INVITED SESSION)**

*Sergei Kalinin*, University of Tennessee Knoxville

## **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 69 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 I**

## **UNDERGRADUATE POSTER SESSION (UN)**

AVS 69 will host the third 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 7-9, 2023). Please contact [exhibits@avs.org](mailto:exhibits@avs.org) for additional information. You may also review our website [www.avs.org](http://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. Our Call for Late Breaking Abstracts will launch in early August with a September 14, 2023 deadline. Submissions will be used to fill holes in the program and they must be submitted via the AVS website by Thursday, September 14, 2023. Notification of acceptance/rejection will be made soon thereafter. Please check the [AVS 69 website](http://www.avs.org) 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](mailto:jeannette@avs.org) or Yvonne Towse at 212-248-0200 ext. 222 or [yvonne@avs.org](mailto:yvonne@avs.org).

**ONLINE ABSTRACT SUBMISSION ONLY: [www.avsSymposium.org](http://www.avsSymposium.org)**

**Deadline: 11:59 p.m. ET, Wednesday, May 10, 2023**

**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 Portland, Oregon, 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.avs.org/awards>). Please contact Angela Klink, Member Services Administrator, ([angela@avs.org](mailto: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, 2023 and should be submitted through the AVS online award submission site. Nomination information is available on [www.avs.org](http://www.avs.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avs.org](mailto: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.avs.org](http://www.avs.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avs.org](mailto:angela@avs.org)) Applicants should use the AVS online award submission site. **The deadline is May 10, 2023.**

### **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 August 2023) and the student should apply for the grant by return e-mail to the AVS National Office. The application deadline is Monday, September 25, 2023. Should your application be approved, you will receive an e-mail notification by Monday, October 2, 2023. Grants will be given on a random basis until the 2023 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**

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 2023 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 2024.

Students wishing to participate in the competition should complete the application on the awards submission site and **submit an abstract by May 10, 2023.**

**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. Markus Valtiner, [valtiner@iap.tuwien.ac.at](mailto:valtiner@iap.tuwien.ac.at)

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, 2023.**

**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 10, 2023.**

**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. 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 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 10, 2023.**

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 10, 2023**. 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 2023. 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 2022 were Qnami, Bruker, Heidelberg Instruments, Nanoscribe, Nanosurf, RHK Technology, and SPECS.

The **Plasma Science and Technology Division Student Poster Prize** recognizes recognizes poster presentations submitted to PSTD at the annual AVS International Symposium. The winning poster presentation is characterized by the presenter's excellence in research, clarity of the delivery, and depth of knowledge, in response to the examination of the judges. **Eligibility and how to apply:** The PSTD Student Poster Prize is given to a student presenter whose poster is accepted by the PSTD division at the annual AVS International Symposium. Candidates for the award must be a registered graduate or undergraduate student in an accredited academic institution at the time of the presentation, a member of the AVS and the PSTD, and first author on the poster presentation. The finalists of PSTD's Coburn and Winters Award are not eligible for the poster award. All accepted student poster presenters who meet these criteria will be automatically entered into this competition. **Selection process:** The Poster Prize winner(s) will be selected by a group of judges appointed by the PSTD Executive Committee and based on the following criteria: Scientific merit and originality; Quality of the poster content; Clarity and engagement of the presentation; Response to questions and depth of knowledge. **Winner announcement and award ceremony:** The winner(s) of the PSTD Student Poster Prize will be announced during the PSTD Annual Business Meeting at the AVS International Symposium, or at a time determined by the Executive Committee. The award certificate will be presented to the recipient.

**John Coburn and Harold Winters Student Merit Award** 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. **Eligibility and how to apply:** 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. **Selection Process:** 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 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 finalists based on the quality of both the research and oral presentation. The overall winner will receive an additional cash prize and certificate. **Winner announcement and award ceremony:** The winner(s) of the Coburn & Winters Award will be announced during the PSTD Annual Business Meeting at the AVS International Symposium, or at a time determined by the Executive Committee. The award certificate will be presented to the recipient. All materials should be submitted through the award submission site and must be received on or before **May 10, 2023**.

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 on 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 10, 2023.**

**Thin Film Division James Harper Award Graduate Student Award:** The Thin Film 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 10, 2023.**

**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 10, 2023**. 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](mailto: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](mailto:julia.s@nist.gov)). **Deadline is May 10, 2023.**

### **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, 2023.** 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 Jonathan Counsell ([jonathan.counsell@kratos.co.uk](mailto:jonathan.counsell@kratos.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 10, 2023. 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](mailto:asedawards@avs.org)) such that it is received by the Abstract Submission Deadline May 10, 2023. 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. Markus Valtiner, [valtiner@iap.tuwien.ac.at](mailto:valtiner@iap.tuwien.ac.at). Deadline May 10, 2023.

**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](mailto: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) a copy of the accepted abstract, (ii) a recommendation letter from her/his advisor, (iii) her/his CV, plus (iv) a cover letter should be sent to Markus Donath ([markus.donath@uni-muenster.de](mailto:markus.donath@uni-muenster.de)) by **October 1, 2023**.

**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: Nikolai N. Klimov ([nklimov@nist.gov](mailto:nklimov@nist.gov)) as a single PDF file. For consideration, **the application must be sent by 11:59 PM CDT, July 20, 2023**. 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 2023. 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 2022 were Qnami, Bruker, Heidelberg Instruments, Nanoscribe, Nanosurf, RHK Technology, and SPECS.

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 2024, and the **deadline is July 20, 2023**. The nomination material should include a nominating letter, biographical material, and 3 supporting letters, which should be emailed as a single pdf file to Nikolai N. Klimov ([nklimov@nist.gov](mailto:nklimov@nist.gov)). 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 2022 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: Sebastian Engelmann ([suengelm@us.ibm.com](mailto:suengelm@us.ibm.com)). **Nomination deadline: May 10, 2023**

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 Sebastian Engelmann ([suengelm@us.ibm.com](mailto:suengelm@us.ibm.com)). **Nomination deadline: May 10, 2023.**

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 Devika Choudhury ([dchoudhury.avs@gmail.com](mailto:dchoudhury.avs@gmail.com)). **Deadline: May 10, 2023.**

**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. This award was created in 2015 by the New Mexico Chapter of AVS to honor its founders and their many contributions. The AVS New Mexico Chapter 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 to Devika Choudhury [dchoudhury.avs@gmail.com](mailto:dchoudhury.avs@gmail.com) by **July 22, 2023**.

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 two criteria: The nominee is not older than thirty-eight (38) years of age during 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. 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](mailto:julia.s@nist.gov)). **Deadline: May 10, 2023**.

**Theodore E. Madey Award:** AVS, in cooperation with the Polish Vacuum Society (PVS), is pleased to solicit nominations for the 2025 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. 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 2025 award should be sent by email to: Angela Klink, AVS Member Services Administrator, [angela@avs.org](mailto:angela@avs.org) by March 31, 2024.**