

# THE AVS 64TH INTERNATIONAL SYMPOSIUM & EXHIBITION

On behalf of everyone at AVS, we invite you to submit an abstract to the AVS 64th International Symposium and Exhibition, which will be held October 29<sup>th</sup> – November 3<sup>rd</sup>, 2017 in Tampa, Florida.

The AVS Symposium is one of the premier forums for the presentation and discussion of the science and technology of materials, interfaces, and processing.

The theme of this year's Symposium is "Surfaces, Interfaces and Materials: A New Vision" and promises to be more exciting and forward-looking than ever. A sampling of sessions that encompass this theme include:

- Properties of 2D Materials including electronic, magnetic, mechanical, optical, and thermal properties;
- Beyond Traditional Surface Analysis: Pushing the Limits Engineering a paradigm shift in control of microbes and fouling;
- Materials for Quantum Information Bridging Gaps in Heterogeneously-Catalyzed Reactions;
- Novel Magnetic Order at Interfaces Surfaces and Interfaces in Micro- and Nano-Systems Nanotechnology for Renewable Energy;
- Plasma Processing of Biomaterials;
- Plasma Processing for Nanomaterials & Nanoparticles;
- Frontiers of Photoelectron Spectroscopy in studies of surface and interfacial processes with variable depth probe, high spatial or temporal resolution;
- New Challenges and Opportunities in Surface Engineering;
- New Imaging and Spectroscopy Methodologies;
- Organic/inorganic surfaces and interfaces Membranes and Materials for Food/Water; and
- Processing Industry needs/research opportunities in thin film technology.

In addition, we shall feature programming on cutting edge topical areas. Focus Topics that will be featured at this meeting include 2D Materials; Actinides and Rare Earths; Fundamental Discoveries in Heterogeneous Catalysis; Advanced Ion Microscopy; Novel Trends in Synchrotron and FEL-Based Analysis; Plasma Processing for Biomedical Applications; Scanning Probe Microscopy; Spectroscopic Ellipsometry; Sustainability; Tandem MS; and Tribology. These topics will complement our traditional strong core on fundamental surface science and interfacial phenomena, applied surface science, surface engineering, micro- and nano-electronics, nanometer-scale science and technology, manufacturing science and technology, thin films, plasma science and technology, micro- and nano-electromechanical systems, electronic and photonic materials, biomaterials, and vacuum science and technology.

As you examine the Call for Abstracts, we are sure that you will find many sessions that interest you as well as Oral and Poster sessions that are the perfect fit to present your latest research. Poster presentations are a great way to promote your work and interact one-on-one with many scientists and engineers during an extended time. In addition, some Divisions plan to host Flash presentation sessions, in which poster presenters will each have 2-3 minutes to give an oral presentation summarizing their poster. Awards for posters and oral presentations given by students are also offered by many divisions and groups.

As well as the technical program, there will be an extensive equipment exhibition, 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, we hope that you will find the symposium to be a place to develop 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 on Monday, May 1st.

We look forward to seeing you at AVS 64 in Tampa!

Amy V. Walker  
2017 Program Chair

Eric A. Joseph  
2017 Program Vice-Chair

# PROGRAM COMMITTEE

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Sincrotrone Trieste, Italy  
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Madsen, Lynnette, National Science  
Foundation  
Ohlhausen, Tony, Sandia National  
Laboratory  
Petit, Leon, Daresbury Laboratory, UK  
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Physics ASCR, Czech Republic  
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California at Los Angeles  
Lin, Jianliang, Southwest Research  
Institute  
Mei, Antonio, University of Illinois at  
Urbana-Champaign  
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Shearer, Jeffrey, IBM Research  
Division, Albany, NY  
Sumant, Anirudha, Argonne National  
Laboratory  
Voevodin, Andrey, University of  
North Texas  
Yanguas-Gil, Angel, Argonne  
National Laboratory

## APPLIED SURFACE SCIENCE

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Fisher, Gregory, Physical Electronics USA  
Gaskell, Karen, University of  
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Gamble, Lara, University of Washington  
Hamaguchi, Satoshi, Osaka Univ., Japan  
Howell, Caitlin, University of Maine  
Leggett, Graham, Univ. of Sheffield, UK  
Theilacker, Bill, Medtronic  
Valtiner, Markus, Technische  
Universität Freiberg, Germany  
Weidner, Tobias, Max Planck Institute  
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## BIOMATERIALS PLENARY SESSION

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Bochum, Germany

## ELECTRONIC MATERIALS AND PHOTONICS

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Abate, Yohannes, Georgia State Univ.  
Dietz, Nikolaus, Georgia State  
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Gupta, Shalini, Northrop Grumman ES  
Hilton, Jessica, RHK Technology  
Kapadia, Rehan, University of  
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Kawasaki, Jason, University of  
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Rockett, Angus, Colorado School of  
Mines  
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Tsai, Wilman, Taiwan Semiconductor  
Manufacturing Company  
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Jackson, Bret, University of Massachusetts - Amherst  
Kimmel, Greg, Pacific Northwest National Laboratory  
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### MAGNETIC INTERFACES AND NANOSTRUCTURES

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Hussain, Zahid, Advanced Light Source, Lawrence Berkeley National Laboratory  
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Ohldag, Hendrik, SLAC National Accelerator Laboratory  
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Ng, Tse Nga (Tina), University of California at San Diego  
Sumant, Anirudha, Argonne National Laboratory  
Thundat, Thomas, University of Alberta and The National Institute for Nanotechnology, Canada  
Tian, Wei-Cheng, National Taiwan University, Taiwan, Republic of China  
Wang, Max Zenghui, Case Western Reserve University  
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Burnham, Nancy, Worcester Polytechnic Institute  
Dey, Sonal, SUNY Polytechnic Institute  
Filler, Michael, Georgia Institute of Technology  
Gaskell, Karen, University of Maryland, College Park  
Hanbicki, Aubrey, Naval Research Lab  
Hiebert, Wayne, National Institute for Nanotechnology, National Research Council, Canada  
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Krylov, Slava, Tel Aviv University, Israel  
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Lauter, Valeria, Oak Ridge National Laboratory  
Li, An-Ping, Oak Ridge National Laboratory  
Madsen, Lynnette, National Science Foundation  
Ohldag, Hendrik, SLAC National Accelerator Laboratory  
Ohlhausen, Tony, Sandia National Laboratory  
Pacholski, Michael, The Dow Chemical Company  
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Vitale, Steven, MIT Lincoln Laboratory  
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Wu, Wei, Univ. of Southern California

### NOVEL TRENDS IN SYNCHROTRON AND FEL-BASED ANALYSIS

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Laboratory

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Matthews, Tamlin, The Dow  
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Srivastava, Aseem K., Applied  
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van de Sanden, Richard, FOM Institute  
DIFFER, Netherlands  
Vasquez Jr, Magdaleno, University of  
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Walton, Scott, US Naval Research  
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Yanguas-Gil, Angel, Argonne  
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Yeom, Geunyoung, Sungkyunkwan  
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#### SCANNING PROBE MICROSCOPY FOCUS TOPIC

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Su, Chanmin, Bruker Nano

#### SPECTROSCOPIC ELLIPSOmetry

Chair: Hofmann, Tino, University of  
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Creatore, Mariadriana, Eindhoven  
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Hilfiker, James, J.A. Woollam Co., Inc.  
Hingerl, Kurt, University Linz, Austria  
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Evoy, Stephane, University of  
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Filler, Michael, Georgia Institute of  
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Kay, Bruce D., Pacific Northwest  
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Killelea, Daniel, Loyola Univ., Chicago  
Lauter, Valeria, Oak Ridge National Lab.  
Mullins, David, Oak Ridge National Lab.  
Ohlhausen, Tony, Sandia National Lab.  
Reinke, Petra, University of Virginia  
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Institute of Science and Technology  
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Ohodnicki, Paul, National Energy  
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#### THIN FILMS

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 Steiner, Matthew, Univ. of Virginia  
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 Wang, Xudong, University of Wisconsin-Madison  
 Wheeler, Virginia, U.S. Naval Research Lab  
 Zuilhof, Han, Wageningen University, Netherlands

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 Borichevsky, Steve, Applied Materials, Varian Semiconductor Equipment  
 Carter, Jason, Argonne National Lab.  
 Fedchak, James A., National Institute of Standards and Tech.  
 Hendricks, Jay, National Institute of Standards and Technology  
 Li, Yulin, Cornell Lab for Accelerator-Based Sciences and Education  
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 Martinez, Ted, SLAC National Accelerator Lab  
 Peacock, Neil, Consultant  
 Ricker, Jacob, National Institute of Standards and Technology  
 Stutzman, Marcy, Thomas Jefferson National Accelerator Facility  
 Valente-Feliciano, Anne-Marie, Thomas Jefferson National Accelerator Facility  
 Van Drie, Alan, Tri Alpha Energy  
 Wang, Lily, Los Alamos National Lab

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**2D MATERIALS FOCUS TOPIC (2D):** The 2D Materials (2D) Focus Topic is a crosscutting AVS-wide interdisciplinary forum for discussion of fundamental science and novel applications of emerging 2D materials. The 2D FT reviews the worldwide effort in synthesis, characterization, processing, properties, and applications of 2D materials. Papers are solicited in growth and fabrication; properties including electronic, magnetic, optical, mechanical, thermal properties; characterization including microscopy and spectroscopy; surface chemistry, functionalization, bio and sensor applications; dopants, defects, and interfaces; nanostructures including heterostructures; device physics and applications; novel 2D materials; and novel quantum phenomena in 2D materials.

**2D1+EM+SS+TF** 2D Materials Growth and Fabrication

*Sung-Kwan Mo*, Lawrence Berkeley National Laboratory, "Electronic Structures of Atomically-thin Epitaxially-grown Transition Metal Dichalcogenides"

*Jiwoong Park*, University of Chicago, "Paper and Circuits, only Atoms Thick"

**2D2+EM+MI+MN** Properties of 2D Materials including Electronic, Magnetic, Mechanical, Optical, and Thermal Properties

*Matthias Batzill*, University of South Florida, "Properties of Single Layer Transition Metal Dichalcogenides Grown by Van der Waals Epitaxy"

*Mark Hybertsen*, Brookhaven National Laboratory, "Excitons and Exciton Complexes in Transition Metal Dichalcogenide Monolayers"

**2D3+AS+SA+SP** 2D Materials Characterization including Microscopy and Spectroscopy

*Chia-Seng Chang*, Institute of Physics, Academia Sinica, Taiwan, "Surface and Interface Properties of 2D MoS<sub>2</sub> and WS<sub>2</sub> Materials"

*Kazu Suenaga*, National Institute of Advanced Industrial Science and Technology (AIST), Japan, "Atomic Resolution Analysis of Low-dimensional Hetero-structures by Electron Microscopy and Spectroscopy"

**2D4+BI+MN+SS** Surface Chemistry, Functionalization, Bio and Sensor Applications

*Sara Barja*, The University of the Basque Country, Spain, "Mapping the Effect of Structural Defects on the Properties of MoSe<sub>2</sub> Monolayers"

*Aleksandra Radenovic*, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, "Nanopores in 2D Materials"

**2D5+AS+SS** Dopants, Defects, and Interfaces in 2D Materials

*Jamie Warner*, University of Oxford, UK, "Atomic Structure of Defects, Dopants and Edges in Monolayer Transition Metal Dichalcogenides"

*Kai Xiao*, Oak Ridge National Laboratory, "Heterogeneity in 2D Materials: From Localized Defects, Isoelectronic Doping to Macroscopic Heterostructures"

**2D6+MI+NS+SS+TF** Nanostructures including Heterostructures and Patterning of 2D Materials

*Goki Eda*, National University of Singapore, Singapore, "Exciton Dynamics in 2D Semiconductors and Heterostructures"

*Xiaofeng Qian*, Texas A&M University, "Novel Electronic, Optoelectronic, and Topological Properties of 2D Materials and Their Heterostructures"

**2D7+EM+MN+NS** 2D Device Physics and Applications

*Kaustav Banerjee*, University of California at Santa Barbara, "2D Crystals for Next-Generation Ultra Energy-Efficient Electronics"

*Barbaros Ozyilmaz*, National University of Singapore, Singapore, "Spin Transport Studies in 2D Materials and their Synthesis"

**2D8+MI** Novel 2D Materials

*Philip Kim*, Harvard University, "Electronic and Optoelectronic Properties of van der Waals Heterostructures"

*Sefaattin Tongay*, ETH Zürich, Switzerland, "Fundamentals and Applications of 2D Anisotropic Materials"

**2D9+MI** Novel Quantum Phenomena in 2D Materials

*Tien-Ming Chuang*, Institute of Physics, Academia Sinica, Taiwan, "Atomic Scale Visualization of Topological Quantum Matter"

*Antti-Pekka Jauho*, Technical University of Denmark, Denmark "Nanostructured Graphene: A Platform for Fundamental Physics and Applications"

**2D10** 2D Materials Focus Topic Poster Session

**ACTINIDES AND RARE EARTHS FOCUS TOPIC (AC)**: Actinides and Rare Earths exhibit many unique and diverse physical, chemical and magnetic properties resulting in large part to the complexity of their 5f and 4f electronic structure. The Actinide and Rare Earth Focus Topic Sessions focus on the chemistry, physics and materials science of f-electron materials. Emphasis will be placed upon the 4f/5f electronic and magnetic structure, surface science, thin film properties, and applications to energy-related issues. The role of fundamental f-electron science in resolving technical challenges posed by actinide materials will be stressed, particularly with regard to energy applications, including energy generation, novel nuclear fuels, and structural materials. Both basic and applied experimental approaches, including synchrotron-radiation-based and neutron-based investigations, as well as theoretical modeling computational simulations, will be featured to reconcile the observed behavior in these complex materials. Of particular importance are the issues important to nuclear energy and security, including fuel synthesis, oxidation, corrosion, intermixing, stability in extreme environments, prediction of properties via bench-marked simulations, separation science, and forensics. Specific sessions will be devoted to advances in the theory and measurements of core-level spectroscopies for the study of actinides and rare earths. A new Focus Topic session will broadly address advances in chemistry and materials sciences for environmental management. There will be a special session and focus on science from early career scientists accompanied by a session on education and funding perspectives. Co-sponsored sessions are held with Applied Surface Science (AS), Magnetic Interfaces (MI), Synchrotron Radiation (SA), and Sustainability (SU).

**AC1+MI+SA+SU** Magnetism, Complexity, and Superconductivity in the Actinides and Rare Earths

*Roberto Caciuffo*, Institute for Transuranium Elements, JRC Karlsruhe, Germany, "Inelastic X-ray Scattering Study of the Crystal Dynamics of Neptunium and Uranium Dioxide"

*Yoshinori Haga*, Japan Atomic Energy Agency, Japan, "New Materials and Electron Correlation in Actinide-based Intermetallic Compounds"

**AC2+AS+SA+SU** Chemistry and Physics of the Actinides and Rare Earths

*Stosh Kozimor*, Los Alamos National Laboratory, "Comparative Chemistry of +3 Actinides"

*Lynda Soderholm*, Argonne National Laboratory, "Comparative Structural Studies of Tetravalent f ions in Solids and in Aqueous Solutions"

**AC3+AS+SA** Nuclear Power, Forensics, and Other Applications

*Rebecca Abergel*, Lawrence Berkeley National Laboratory, "Design of Synergistic Protein-ligand Systems for f-element Coordination, where Separation, Decontamination and Nuclear Medicine Meet"

*Brian Powell*, Clemson University, "Physical and Chemical Characterization of Solid Pu and Np Sources after Multi-year Exposure to Environmental Conditions"

**AC4+MI+SA+SU** Actinide and Rare Earth Theory

*Jochen Autschbach*, University of Buffalo, SUNY, "Magnetic Susceptibility, Magnetic Resonance, and Bonding in Actinide Complexes: Ab-initio Calculations"

*Sasha Shick*, Institute of Physics, ASCR, Czech Republic

*Valerie Vallet*, University of Lille, France, "Probing the Complexity of the Electronic Structure of Volatile Plutonium Oxides"

*Ping Yang*, Los Alamos National Laboratory, "Understanding Surface Chemistry of f-element Oxides using First-principle Methods"

**AC5+SU** Chemistry for Environmental Management/Remediation

*Thomas Albrecht-Schmitt*, Florida State University, "Recent Advances in the Capture of Anionic Radionuclides by Ion-Exchange Materials"

*Sue Clark*, Pacific Northwest National Laboratory, "Advancing Chemistry and Materials Sciences for Environmental Management using New Spectroscopic and Computational Approaches"

**AC6** Early Career Scientists

*Priscila Rosa, Los Alamos National Laboratory, "Emergent Phenomena in 4f heavy-fermion Systems"*

**AC7** Education and Funding Perspectives

**AC8** Actinide and Rare Earth Posters

**APPLIED SURFACE SCIENCE (AS):** The Applied Surface Science Division (ASSD) provides a forum for research in the preparation, modification, characterization, and utilization of surfaces in practical applications. Areas of interest range from nanoscience, polymers, and semiconductor processing to forensic science and biotechnology. The Division has long been the premier gathering place for the global surface analysis community, with historical concentrations in techniques such as SIMS and XPS/Auger spectroscopies, including presentations representing a mixture of cutting-edge applications and the fundamentals supporting the measurement science. We also encourage contributions from non-traditional techniques such as Atom Probe Tomography. The Division is constantly striving to provide a forum for current and mature interests (with sessions such as Quantitative Surface Analysis and Practical Surface Analysis) while identifying key areas for future development. For AVS-64, we are supporting several focus topics: Tribology (TR), Spectroscopic Ellipsometry (EL), Advanced Ion Microscopy (HI), Scanning Probe Microscopy (SP), Frontiers of Synchrotron Radiation in Surface and Interface Science (SA), Tandem MS (TM), Actinides and Rare Earths (AC) and 2D Materials (2D). Several special sessions this year are designed to showcase industrial and novel applications of surface analysis.

**AS1+BI+MI** Practical Surface Analysis: Getting the Most Out of Your Analysis using Complementary Techniques

*Tom Wirtz, Luxembourg Institute of Science and Technology (LIST), Luxembourg, "Correlative Microscopy based on Secondary Ion Mass Spectrometry for High-Resolution High-Sensitivity Nano-Analytics"*

**AS2+BI** Practical Surface Analysis: Complex, Organic and Bio-systems

*Mary Kraft, University of Illinois at Urbana-Champaign, "High-resolution SIMS Imaging of Subcellular Structures"*

**AS3+MI+SS** Quantitative Surface Analysis: Effective Quantitation Strategies

*Rasmus Havelund, National Physical Laboratory, UK, "Quantitative Organic Depth Profiling Using SIMS"*

**AS4+TF** Problem Solving Using Surface Analysis in the Industrial Laboratory

*Daniel J. Hook, Bausch and Lomb, "Employing a Surface and Bulk Analytical Approach to the Synthesis and Characterization of Ophthalmic Biomaterials"*

*Vincent Smentkowski, General Electric Global Research Center, "Surface Analysis in the Industrial Laboratory"*

**AS5+BI+MI+NS+SA+SS** Beyond Traditional Surface Analysis: Pushing the Limits

*Nina Ogrinc Potocnik, Maastricht University, The Netherlands, "Surface Analysis of Intact Biomolecules: the Bigger They Are the Harder They Fly"*

**AS6+2D+NS+SA** 2D, 3D and nD Imaging of Surfaces, Buried Interfaces and Nanostructures

*Jean-Paul Barnes, CEA, LETI, MINATEC Campus, "Correlation of Morphological and Hyperspectral Characterization Techniques for Nanoelectronic and Energy Applications"*

*Karen Kruska, Pacific Northwest National Laboratory, "Insights into Corrosion and Radiation Damage Processes Through 2D and 3D Imaging at the Nanoscale"*

**AS7+BI+SA+SS** Spectroscopy of the Changing Surface

*Iradwikanari Waluyo, Brookhaven National Laboratory, "In Situ Investigation of the Dynamic Transformations of Model Catalyst Surfaces using Ambient Pressure XPS"*

**AS8+SS** Advances in Automation and Data Analysis

*Lev Gelb, University of Texas at Dallas, "Data Analysis in Thin Film Characterization: Learning More With Physical Models"*

*Matthew Linford, Brigham Young University, "Advanced Analysis of XPS and ToF-SIMS Data"*

**AS9+MS** Unlocking the Sample History: Forensics and Failure Analysis

*Thomas Beebe, Jr., University of Delaware, "Surface Analysis of Fine Art: from the Renaissance to The Scream"*

*Peng Lu, General Motors, "Application of Surface Analysis in Understanding Li-ion Batteries Degradation"*

**AS10** Applied Surface Science Poster Session

**BIOMATERIAL INTERFACES (BI):** The Biomaterials Interfaces Division is organizing a series of sessions to provide an interdisciplinary forum for the presentation and discussion of fundamental aspects of bio-interface science and engineering. The need to increase our understanding of the interactions between biomolecules and surfaces, the behavior of complex macromolecular systems at materials interfaces, and interactions between biomolecules, is being driven by the rapid growth in biomedical research and the role these applications play in the fields of biology, biotechnology, protective coatings, diagnostics, dentistry, and medicine. 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: Cells at Surfaces, including cell-material interactions, tissue engineering, cell and tissue characterization at interfaces, regenerative medicine; 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 at Interfaces, including proteins at surfaces, nucleic acids, polysaccharides, adsorption, blood-contacting materials, bioadhesion, and infection and immunity; Characterisation of Biological and Biomaterials Surfaces, including: spectroscopy, imaging, microscopy, optical and mechanical methods of thin film analysis, characterization in

biological media, quantification, chemometrics, microfluidics, time- and spatial resolution, scanning probe techniques; Sensing and Biophysics at Surfaces, including: biological membranes, vesicles, membrane processes, forces, recognition, signaling, biosensors, microfluidics, point-of-care devices, paper based sensors, electrochemistry; Biomaterials and Nanomaterials fabrication, including organic thin films, polymer coatings, hybrid coatings, biologically inspired materials, plasma produced biomaterials, patterning, nanofabrication; Bio from 2D to 3D: Challenges in Fabrication and Characterization, including rapid prototyping, additive manufacturing, 3D structures, tissue formation, implant integration, artificial organs, 3D biofilm structures, 3D Characterization techniques, 3D chemical analysis, 3D tomographic analysis, microscopy, 3D tracking. Special session In honor of Dave Castner's 65th Birthday: Multitechnique Bio-Surface Characterization, with submissions to celebrate Dave Castner's contributions to the AVS. The BI program begins with the traditional Sunday afternoon Plenary Session with presentations by M. Grunze (KIT), J. Aizenberg (Harvard) and M. Alexander (Nottingham). 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** Cells at Surfaces

*Carsten Werner, Leibniz-Institut für Polymerforschung, Dresden, Germany, "Cell-instructive Polymer Matrices for Therapies and Tissue Models"*

**BI2** Engineering a Paradigm Shift in Control of Microbes and Fouling

*Gabriel Lopez, University of New Mexico, "Stimuli Responsive Polymers in Biofouling and Bioadhesion"*

**BI3+AS** Biomolecules at Interfaces

*Markita Landry, University of California at Berkeley, "Synthetic Infrared Nanosensors for Brain Imaging of Modulatory Neurotransmitters"*

**BI4+AS+SA** Characterisation of Biological and Biomaterial Surfaces

*Jonathan Counsell, Kratos Analytical Limited, UK, "XPS – A Surface Analysis Tool for Biomaterial Characterisation"*

**BI5+AS+MN** Sensing, and Biophysics at Surfaces

*Norma Alcantar, University of South Florida, "The Ins and Outs of Functionalized Natural Materials for Applications in Drug Delivery and Separations"*

**BI6+NS** Biomaterials and Nanomaterials Fabrication

*Ellen Fisher, Colorado State University, "Unraveling the Complexity of Plasmas, Nanomaterials and Biomaterials: From Nanoparticles to Tunable Porous 3D Networks"*

**BI7+AS+MI+SA** Bio from 2D to 3D: Challenges in Fabrication and Characterization

*Thomas Boland, The University of Texas at El Paso, "3D Ink-jet Printing for Tissue Engineering"*

**BI8+AS** In Honor of Dave Castner's 65th Birthday: Multitechnique Bio-Surface Characterization

*Buddy Ratner, University of Washington, "Contributions Advancing Surface Technologies: NEXAFS, ESCA, Rhodium (and More)"*

*Matt Wagner, Proctor and Gamble, "A Physical Chemist and a Chemical Engineer Walk Into a Bar...Reflections on Surface & Interface Science"*

**BI9** Biomaterial Interfaces Poster Session with Flash presentations

**SPECTROSCOPIC ELLIPSOMETRY FOCUS TOPIC (EL)**: The FT Spectroscopic Ellipsometry integrates themes ranging from classical material science and thin film characterization to physical and chemical processes at biomaterial interfaces and nanometer scale science. AVS 64 will host three oral sessions dedicated to traditional applications of spectroscopic ellipsometry in optical materials and thin film characterization as well as new and emerging topics. In the first session classical research topics of ellipsometry as for instance optical coatings and inorganic thin films characterization as well as investigation of biological materials and interfaces will be presented. The second session will focus on the characterization of novel optical and electronic materials with subwavelength structures. In the last session of the Spectroscopic Ellipsometry FT we will host presentations on novel experimental and theoretical approaches including as for instance imaging ellipsometry or optical critical dimension analysis techniques as well as contributions related to the microscopic origin of depolarization and decoherence. As a highlight of this FT, the best student paper, which is selected based on the quality of the research, its presentation, and the discussion during the symposium, will be awarded with the Spectroscopic Ellipsometry FT award. Past recipients of the award and rules for entering the competition can be found at <http://www.avs.org/Awards-Recognition/Focus-Topic-Awards/Spectroscopic-Ellipsometry-Focus-Topic>.

**EL1+AS+EM+TF** Application of SE for the Characterization of Thin Films

*Alexandra Boltasseva, Purdue University, "Transition Metal Nitrides for Plasmonic Applications: from On-Chip Photonics and Flat Optics to Energy Conversion"*

**EL2+AS+EM** Spectroscopic Ellipsometry: Novel Applications and Theoretical Approaches

*Oriol Arteaga, University of Barcelona, Spain, "Coherent Superposition of Mueller-Jones States: Synthesizing Mueller Matrices with an Ellipsometer"*

**EL3+EM+SS** Optical Characterization of Nanostructured Materials

*Maria Losurdo, University of Bari, Italy, "Broad Range Ellipsometry Shining Light onto Multiphase Plasmonic Nanoparticles Synthesis, Properties and Functionality"*

**EL4** Spectroscopic Ellipsometry Poster Session



**ELECTRONIC MATERIALS AND PHOTONICS (EM):** The Electronic Materials and Photonics Division (EMPD) encompasses the science and engineering of materials, interfaces, and processing that advance electronic and/or photonic device technologies. AVS 64 will include sessions on emerging topics such as quantum information, valleytronic devices, and ultrawide band gap materials, in addition to core topics such as computing beyond Moore's Law, integrated photonics and electronics, charge transport in disordered materials, nanophotonics, radiation hardening, and more. EMPD consistently attracts distinguished invited speakers from around the globe. We will host over 15 invited speakers this year including: Tony Heinz (Stanford University), Teri Odom (Northwestern University), David Awschalom (University of Chicago), Efrat Lifshitz (Technion), Arka Majumdar (University of Washington), and Masataka Higashiwaki (National Institute of Information and Communications Technology), and Nerissa Draeger (Lam Research). A new poster competition will be held at AVS 64 with winning presenters receiving a \$500 cash prize. As in prior years, postdoc travel awards will be available. The EMPD industrial forum will also return and provide an intimate opportunity for students to meet with company representatives.

**EM1** Novel Materials and Devices for Low Power and High Performance Electronics Platforms

*Robert M. Wallace*, The University of Texas at Dallas, "Emerging Materials for Advanced Devices: Integration Challenges and Opportunities"

**EM2+2D+MI** Materials and Devices for Valleytronic Applications

*Tony Heinz*, Stanford University, "Optical Control of the Valley Degree of Freedom in Transition Metal Dichalcogenides"

*George (Yu-Shu) Wu*, National Tsing Hua University, Taiwan, "VOI-based Valleytronics in Graphene"

**EM3+MI+TF** Growth, Electronic, and Magnetic Properties of Heusler Compounds

*Johnpierre Paglione*, University of Maryland, "Topology, Magnetism, and Superconductivity in Ternary Half-Heusler Semimetals"

**EM4** Integrated Photonics and Electronics

*Matt King*, Northrop Grumman, "Development of Chalcogenide Phase Change Materials for RF Switch Applications"

*Arka Majumdar*, University of Washington, "Dielectric Free Form Metasurfaces for Optical Sensing"

**EM5+MN** Materials for Quantum Information

*David Awschalom*, University of Chicago, "Creating Quantum Technologies with Spins in Semiconductors"

*Adam Gali*, Hungarian Academy of Sciences, "Point Defects in Solids for Quantum Technology: Ab initio Simulations and Realization"

**EM6** Charge Transport in Disordered Solids

*David Drabold*, Ohio University, "Electrons and Phonons in Amorphous Semiconductors"

**EM7+MI+NS+SP+SS** Nanoscale Imaging of Electronic and Photonic Nanostructures and Surfaces

*Teri Odom*, Northwestern University, "Evolutionary Design of Multi-functional Optical Metasurfaces"

**EM8+NS** Nanostructures for Electronic and Photonic Devices

*Efrat Lifshitz*, Technion – Israel Institute of Technology, Israel, "Spin Properties in Colloidal Quantum Dots"

*Dimitris Tsoukalas*, National Technical University of Athens, Greece, "Integration of Metallic Nanoparticles in Sensing and Memory Devices for Resistance Modulation and Enhanced Switching"

**EM9+NS** Wide and Ultra-wide Band Gap Materials for Electronic Devices: Growth, Modeling, and Properties

*Ramón Collazo*, North Carolina State University, "A Thermodynamic Supersaturation model for the Growth of AlGaN by MOCVD"

*Masataka Higashiwaki*, National Institute of Information and Communications Technology, Japan, "Ultra-wide-bandgap Ga<sub>2</sub>O<sub>3</sub> Material and Electronic Device Technologies"

**EM10** Radiation Hardened Electronics and Detection

*Vincent Woods*, Pacific Northwest National Laboratory, "Nitride Based Avalanche Photodiode Detector Structures for Nuclear Detection Applications"

**EM11+SS** Surface and Interface Challenges in Semiconductor Materials and Devices

*Nerissa Draeger*, Lam Research Corporation, "Selective Passivation of SiGe and Ge Surfaces for Advanced Device Fabrication"

**EM12** 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 second time the HC focus topic has been organized, and is coordinated with the Surface Science (SS) division. Session topics include theoretical models, nanoscale structures, gas-surface dynamics, novel studies of active surfaces, and bridging gaps in surface science and catalysis. The symposium will highlight connections among theoretical and experimental approaches with the goal of revealing key details of the fundamental chemistry and physics underlying heterogeneous catalysis. Of particular interest are developments in chemical understanding, atomic-level details, and predictive models of reactions catalyzed by metal surfaces.

**HC1+SS** Combined Experimental and Theoretical Explorations of the Dynamics of Heterogeneously Catalyzed Reactions

*Fabio Busnengo*, Instituto de Física Rosario, IFIR, (CONICET - UNR), Argentina, "Dissociative Adsorption of Methane on Surfaces from First Principles Calculations"

*Alec Wodtke*, Georg-August University of Göttingen, Germany, "Building the World's Greatest Microscope: Revealing the Atomic Scale Dynamics of Surface Chemistry"

**HC2+NS+SS** Nanoscale Surface Structures in Heterogeneously-Catalyzed Reactions

*Andrew Gellman*, Carnegie Mellon University, "Chirally Nanostructured Surfaces for Enantioselective Direction of Chiral Surface Chemistry"

*Zhenrong Zhang*, Baylor University, "Catalytic Reactions on TiO<sub>2</sub> and MoS<sub>2</sub>"

**HC3+SA+SS** Mechanisms and Reaction Pathways in Heterogeneously Catalyzed Reactions

*Simon Bare*, SLAC National Accelerator Laboratory, "In situ X-ray Absorption Spectroscopy for Catalyst Design: Opportunities and Limitations"

*Ib Chorkendorff*, Technical University of Denmark, Denmark, "From Surface Science over Nanoparticles to Heterogeneous Catalysis"

*Catherine Stampfl*, The University of Sydney, Australia, "Theoretical Surface Science of Catalytic Materials: an Initio Studies"

**HC4** Advances in Theoretical Models and Simulations of Heterogeneously-Catalyzed Reactions

*Liney Arnadottir*, Oregon State University, "Hindered Translator/Rotor Models for Calculating the Entropy of Adsorbed Species for Improved Micro Kinetic Models Based on Density Functional Theory Calculations"

*Manos Mavrikakis*, University of Wisconsin - Madison, "Reaction Mechanisms and Nature of Active sites on Alloy Catalysts: Combining First-principles, Microkinetic Modeling, and Reaction Kinetics Experiments"

**HC5+SA+SS** Bridging Gaps in Heterogeneously-Catalyzed Reactions

*Gilbert Nathanson*, University of Wisconsin - Madison, "From Battery Electrons to Liquid Electrons: Creation and Reaction of Energetic Species in Water"

*Michael White*, Brookhaven National Laboratory, "Reactivity and Electronic Properties of Supported Metal Oxide and Sulfide Clusters"

**HC6** Fundamental Discoveries in Heterogeneous Catalysis Poster Session

**ADVANCED ION MICROSCOPY FOCUS TOPIC (HI):** AVS 64 will again be host to the Advanced Ion Microscopy focus topic (formerly Helium Ion Microscopy focus topic). The 2017 program will continue with the theme of featuring emerging ion beam technology research and ion beam based nano-scale microscopy, lithography, surface science, and patterning research-applications. Particular attention will be given to research areas for advances in Gas Field Ion Sources (GFIS), with a particular focus on helium ion beam imaging, nano-fabrication, and surface science. In addition, this session will also feature emerging ion beam source technologies and applications, include alternative GFIS ion species (e.g., Ne, N<sub>2</sub>, H), cold beams (Cs, Li, etc.), and advances in LMIS (Ga, Alloy), and other novel ion beam research.

**HI1+BI+NS+TR** Advanced Ion Microscopy Applications

*Paul Dastoor*, University of Newcastle, Australia, "Scanning Helium Atom Microscopy: Imaging with a Deft Touch"

*Hiroshi Mizuta*, Japan Advanced Institute of Science and Technology (JAIST), Japan, "Single-nanometer Functional Graphene Devices Patterned with Helium Ion Beam"

**HI2** Emerging Ion Sources and Optics

*Anne Delobbe*, Tescan - Orsay Physics, France, "LMIS, Plasma, Liquid Ionic Compound or Cold Atoms Ion Source: Options for Focused Ion Beam"

**HI3+NS+TR** Novel Beam Induced Surface Analysis and Nano-Patterning

*Robert Hull*, Rensselaer Polytechnic Institute, "New Approaches to Spectroscopy in the Focused Ion Beam"

*Olga Ovchinnikova*, Oak Ridge National Lab

**HI4** Advances in Ion Microscopy Poster Session

**MAGNETIC INTERFACES AND NANOSTRUCTURES (MI):** Magnetic Interfaces and Nanostructures Division (MI) program features pioneering, controversial, introductory and emerging results in topical areas related to magnetic interfaces and nanostructures. Particular attention will be given to research areas in magnetism that are of strong interest to the AVS community so that maximum overlap with other divisions and focus topics can be achieved. The 2017 MI program topics include: (1) Novel Magnetic Order at Interfaces; (2) Spin Orbit Phenomena at Surfaces and Interfaces; (3) Role of Chirality in Spin Transport and Magnetism; (4) Controlling Magnetism in Oxides and Multiferroics. The list of invited speakers features senior as well as early career scientists from Europe, Asia, the Middle East and the United States with diverse backgrounds. The Magnetic Interfaces and Nanostructures Division offers the Leo Falicov Award to the best graduate student presentation. MI offers a postdoctoral fellow award for the best presented paper at this year's International Symposium.

**MI1+2D+AC+SA+SS** Novel Magnetic Order at Interfaces

*Hyonsoo Yang*, NUS, Singapore, "Chiral and Proximity Induced Magnetism in 2D/Ferromagnetic Heterostructures"

*Jiabao Yi*, The University of New South Wales, Australia, "New Magnetic Materials"

**MI2+2D+AC+NS** Spin-Orbit Phenomena at Surfaces and Interfaces

*Philip King*, University of St. Andrews, UK, United Kingdom of Great Britain and Northern Ireland, "Spin-split States on Oxide Surfaces"

*Kenta Kuroda*, The University of Tokyo, Japan, "Coherent Control over Spin-polarized Dirac Surface State in Topological Insulators"

**MI3+BI+EM+SA** Role of Chirality in Spin Transport and Magnetism

*Karen Michaeli*, Weizmann Institute, Israel, "Role of Chirality in Spin Transport and Magnetism"

*Yossi Paltiel*, The Hebrew University, Israel, "Experimental Realization of CISS Devices using Optical or Electrical Excitation"

**MI4+SA** Controlling Magnetism in Oxides and Multiferroics

*Nian Sun*, Northeastern University, "Integrated Magnetoelectric Materials for Sensing, Power, RF and Microwave Electronics"

*Carlos Vaz*, Paul Scherrer Institut, Switzerland, "Intrinsic Interfacial Phenomena and Spin Structure in Nano and Heterostructures"

**MI5** Magnetic Interfaces and Nanostructures Poster Session

**MEMS AND NEMS (MN)**: The MEMS and NEMS Technology Group (MN) program will highlight recent advances in the broad areas of micro/nanoelectromechanical systems (MEMS/NEMS). It will feature the latest studies of novel materials, processes, devices, and emerging functions and applications of MEMS/NEMS, in various areas including manufacturing, energy, communication, and healthcare. The ability to manipulate and engineer mechanical structures in various emerging low-dimensional materials creates intriguing possibilities of integrating these devices with existing fluidic, electronic and optical on-chip networks. This year's sessions will cover such areas that are thematically related to multiscale phenomena, emerging materials, technologies, and advanced manufacturing for new devices and systems that interact with real world or promise for critical applications, along with advanced fabrication, characterization, integration and packaging of MEMS/NEMS. The program continues to embrace the latest progress in optical MEMS/NEMS, micro/nanophotonics, optomechanics, quantum MEMS/NEMS, resonant systems, CMOS-MEMS, mesoscopic dynamics and dissipation processes, inertial sensors, chemical sensors and lab-on-chip analytical microsystems, harsh-environment transducers, parametric and nonlinear MEMS/NEMS, 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. The AVS64 MN program includes a feature session on the frontier of large scale integration and nanosensors, from gas sensing to mass spectrometry.

**MN1+NS** Multiscale Phenomena and Manufacturing in Micro- and Nano- Systems

*Igor Bargatin*, University of Pennsylvania, "Plate Mechanical Metamaterials: The Thinnest Objects You Can Pick Up by Hand"

**MN2+EM+NS** Optomechanics, Photonics, and Quantum Nanosystems

*Mo Li*, University of Minnesota, "GHz Integrated Acousto-Optics"

*Kartik Srinivasan*, NIST, "Coupling Piezoelectric MEMS to Cavity Optomechanics"

**MN3+BI+SS+TR** Surfaces and Interfaces in Micro- and Nano-Systems

*Sudipta Seal*, University of Central Florida, "Role of Surfaces in Assembly of Ceria Nanostructures"

**MN4+BI** BioMEMS

*Jack Judy*, University of Florida, Gainesville, "Microfabrication and Assembly Processes for Integrating Microelectrode Arrays into Tissue-Engineered Scaffolds for Novel Nerve Interfaces"

**MN5+EM** Energy and MEMS: Heating/Cooling/Calorimetry, Harvesting/Storage, Power/Dissipation

*Chris Keimel*, Menlo Micro, "The Industrialization of MEMS through Materials Innovations"

*Dana Weinstein*, Purdue University, "Electron-Phonon Waltz: Acoustoelectrics in MEMS"

**MN6+NS** Large Scale Integration of Nanosensors

*Sebastien Héntz*, CEA, LETI, MINATEC Campus, France, "Large Scale Integration: A Not-so-simple Cure for Loneliness of Silicon Nanoresonators"

*Peter Hesketh*, Georgia Institute of Technology, "Magnetically Actuated Synthetic Cilia for Microfluidics"

*Genki Yoshikawa*, National Institute for Materials Science (NIMS), Japan, "Nanomechanical Sensors (MSS, AMA) toward IoT Olfactory Sensor Systems"

**MN7+2D** 2D NEMS

**MN8+TR** Tribology and MEMS/NEMS

**MN9** MEMS/NEMS Poster Session

**MANUFACTURING SCIENCE AND TECHNOLOGY (MS)**: MSTG sessions present research topics related to the science and technology of manufacturing. This year we focus on challenges in additive manufacturing, advanced characterization and metrology challenges for IC manufacturing, and sustainable manufacturing. Our session on working with government labs and user facilities enables representatives of these labs and user facilities to present the capabilities of their organizations and how the AVS attendees can work with them.

**MS1+AS** Advanced Surface, Interface, and Structural Characterization for High Volume Manufacturing

*Steven Consiglio*, TEL Technology Center, America, LLC, "Development of Ultra-thin ALD Grown high-k Dielectrics and Interconnect Diffusion Barrier Layers aided by Advanced X-ray Structural Analysis for sub 10nm Nodes"

*Jean Jordan-Sweet*, IBM Research Division, T.J. Watson Research Center, "Impact of Synchrotron XRD Techniques on Microelectronics Manufacturing Technologies"

*Arthur Woll*, Cornell Laboratory for Accelerator-Based Sciences and Education, "The Cornell High Energy Synchrotron Source Upgrade: Current and Future Capabilities for Thin-film Research"

**MS2+SU** Surface and Interface Characterization for Manufacturing of Devices on Textiles and Paper

**MS3** Additive Manufacturing of High Temperature Materials

**MS4** Surface Science and Multi Material Additive Manufacturing

*Arvind Agarwal*, Florida International University, "Thermal Spray for Additive Manufacturing"

*Wojciech Matusik*, MIT

**MS5** Working with Government Labs and User Facilities

**MS6** Topics in Manufacturing Science and Technology

**NANOMETER-SCALE SCIENCE AND TECHNOLOGY (NS)**: The Nanometer-scale Science and Technology Division (NSTD) at AVS explores the science and technology that emerges when material is shrunk to the nanoscale. Nanoscience and Nanotechnology have become pervasive throughout the scientific community as can be attested by the multiple sessions addressing their different aspects at the AVS Symposium. At the NSTD sessions researchers from around the globe will present their work on topics such as nanoscale devices and quantum systems, exploiting nanomaterials for applications in photonics, plasmonics, catalysis, surface chemistry, sensors, biomechanics, imaging, and energy, including nanoscale characterization and spectroscopy. This year, the program will highlight the following: (a) Novel approaches for the nanoscale imaging and characterization of materials; (b) Deposition and use of oxide- and diamond-based nanomaterials; (c) Novel approaches for the fabrication at the nanoscale; and (d) Convergence of nanotechnology with photonics, mechanics, magnetism and electronics. Finally, the program will include a special session on the applications of nanotechnology to renewable energies.

**NS1+AS+EM+MI+SP+SS** Nanoscale Imaging and Characterization

*Renu Sharma*, National Institute of Standards and Technology, "Hybrid Transmission Electron Microscope: an Integrated Platform for in Situ Imaging and Spectroscopies"

**NS2+SP+SS** Advances in Scanning Probe Microscopy

*Roger Proksch*, Asylum Research, an Oxford Instruments Company, "Speed, Resolution and Nanomechanics: the Fourth Decade of Ambient and Liquid AFM Begins"

**NS3** Microwave & Terahertz Spectroscopy of Nanomaterials

*Jeremy Levy*, University of Pittsburgh, "Oxide Nanoelectronics on Demand"

**NS4+HC+SS** Oxides in Nanotechnology

*Ulrike Diebold*, Technical University of Vienna, Vienna, "Metal Oxide Surfaces: Structure, Adsorption, Growth"

**NS5+MN** Nanodiamonds: Thin Films and Applications

**NS6+MN+MS+SS** Nanopatterning, Nanofabrication and 3D Nanomanufacturing

*Andrew Lupini*, Oak Ridge National Laboratory, "Positioning and Manipulating Single Dopant Atoms Inside Silicon"

**NS7+EM+MN+PS+SS** Nanophotonics and Plasmonics

*Naomi Halas*, Rice University, "Towards Active and Sustainable Plasmonics"

**NS8+MN** Nanomechanics

*Vladimir Aksyuk*, National Institute of Standards and Technology, Center for Nanoscale Science and Technology, "Cavity Optomechanical Coupling in Chip-Scale Plasmonic and Photonic Transducers for Nanoscale Measurements and Optical Signal Control"

**NS9+EM+MI** Nanomagnetism and Spintronics

*Roland Wiesendanger*, University of Hamburg, Germany, "The Exciting Physics of Spin Chains Coupled to a Metallic Substrate"

**NS10+EM+SS** Atomic Scale Electronics

*Michelle Simmons*, University of New South Wales, Australia

**NS11+SS+SU** Nanotechnology for Renewable Energy

*David Cahen*, Weizmann Institute of Science, Israel, "Halide Perovskites, How Special Are They?"

*Mark Hersam*, Northwestern University, "NSTD-Recognition Award Talk: Mixed-Dimensional Nanomaterial Heterostructures for Electronic and Energy Applications"

**NS12+EM** Nanometrology in Nanoelectronics

*Alain C. Diebold*, SUNY College of Nanoscale Science and Engineering, "Nanometrology and Nanocharacterization in Nanoelectronics"

**NS13** Nanometer Scale Science and Technology Poster Session

**PLASMA PROCESSING FOR BIOMEDICAL APPLICATIONS FOCUS TOPIC (PB)**: Plasma processing is an ideal way to either create new or modify existing material surfaces for use in various applications, including medicine. The Focus Topic will address the most up to date challenges and latest developments of plasmas interfacing biomaterials and biological systems. This will include plasma processing of biomaterials, pharmaceuticals, and living organisms for biological, therapeutic and agricultural applications. There are two major topical categories in this Focus Topic. One is concerned with plasma synthesis or modification of biomaterials and pharmaceuticals and the other is concerned with the use of plasmas for biological applications as direct therapeutics, including treating infected tissue, wound healing, and cancer treatment, and agricultural applications for example



plant growth, and sterilization. The former covers the chemistry of biomaterial surfaces and biological molecules, biointerfaces, and efficacy of medical devices that are made or modified via plasma processes. The latter covers a field known as plasma medicine, in which biological reactions in living organisms triggered by plasma generated chemically reactive species are discussed. Latest interests in these categories include plasma polymerization and surface modification to increase biocompatibility of materials, plasma processes to create antimicrobial surfaces, biomimetic materials, 3D cell scaffolds, etc., plasma-liquid interaction, plasma-enhanced chemical reactions in liquid, plasma seed and plant treatments, and plasma-cell or tissue interaction. Abstracts on the underpinning methodologies including plasma and liquid diagnostic techniques, biological assay development and simulations are also encouraged. All sessions are co-sponsored by Biointerfaces (BI) and Plasma Science and Technology (PS).

**PB1+BI+PS** Plasma Medicine and Plasma Agriculture

*Gyungsoon Park*, Kwangwoon University, Republic of Korea, "Control for Plant Disease and Development by Atmospheric Pressure Plasma"

*Sylvia Ptasinska*, University of Notre Dame, "Effects of Atmospheric Pressure Plasma Jets on Isolated and Cellular DNA"

*Rob Short*, University of South Australia, Australia, "Plasma Medicine, RONS, Tissue and Cell Models"

**PB2+BI+PS** Plasma Processing of Biomaterials

*Dirk Hegeman*, EMPA - Swiss Federal Laboratories for Materials Science, Switzerland, "Exploring Plasma Coatings Comprising Vertical Chemical Gradients and Multilayers for Biomedical Applications"

*Angeliki Tserepi*, National Center for Scientific Research Demokritosree, Greece, "Plasma Processing for the Realization of Biomems and Biomedical Microdevices"

**PB3** Plasma Processing for Biomedical Applications Poster Session

**PLASMA SCIENCE AND TECHNOLOGY (PS)**: The 2017 Plasma Science and Technology Division (PSTD) Program highlights state-of-the-art advances in plasma research, ranging from fundamental studies of plasma physics and chemistry to applications for semiconductor fabrication, 2D materials and nanomaterials enablement, and plasmas for energy applications. The core program includes thirteen oral sessions and a poster session, as well as additional joint sessions with the "Applied Surface Science", "Electronic Materials" and "Thin Films" divisions as well as "2D" and "Plasmas Processing for Biomedical Applications" focus topics. A special highlight for 2017 is a session to Commemorate the Life and Career of Harold Winters.

**PS1** Advanced BEOL/Interconnect Etching

*Hiromasa Mochiki*, Tokyo Electron, "Grand Challenges and Evolution in Etch"

**PS2** Advanced FEOL/Gate Etching

*Nobuyuki Kuboi*, Sony Corporation, Japan, "Prediction and Control of Fluctuation of Etching Properties by Simulation Technology"

**PS3+NS** Advanced Patterning

*Ying Zhang*, Applied Materials, "Patterning Challenges and Perspective Solutions for 5nm and Beyond"

**PS4+AS+SE** Atmospheric Pressure Plasmas

*Selma Mededovic*, Clarkson University, "The Role of Bulk Liquid Transport Processes in the Chemistry of a Plasma-Liquid Interface"

*Fred Roozeboom*, Holst Centre / TNO, Netherlands, "Atmospheric Plasma-Enhanced Spatial ALD of Oxides"

**PS5+NS+SS+TF** Atomic Layer Etching I

*Thorsten Lill*, Lam Research Corporation, "Atomic Layer Etching: Fundamentals and Applications"

*Wataru Mizubayashi*, AIST, Japan, "Ge Atomic Layer Etching for High Performance FinFET"

**PS6+NS+SS+TF** Atomic Layer Etching II

*Mingmei Wang*, TEL Technology Center, America, LLC, "Concurrent Simulation and Experiment to Solve Grand Challenges of Plasma Etch"

**PS7+SS** Commemorating the Life and Career of Harold Winters (ALL INVITED SESSION)

**PS8** Modeling of Plasmas

*Andrew Gibson*, LPP, CNRS, Ecole Polytechnique, Université Paris-Saclay, France, "Understanding Particle-Surface Interactions and Their Importance in Plasma Processing: a Plasma Modelling Perspective"

*Satoshi Hamaguchi*, Osaka University, Japan, "Science of Plasma-Surface Interaction for Modern Semiconductor Process Technologies"

**PS9+SS+TF** Plasma Deposition and Plasma Assisted ALD

*Hojun Kim*, Samsung, "Analysis of Species Distribution during an Amorphous Hydrogenated Silicon Deposition using Intermediate Pressure Capacitively Coupled Plasmas"

**PS10+VT** Plasma Diagnostics, Sensors and Control

*Ed Barnat*, Sandia National Laboratory, "Studying Dynamic and Structured Plasma Systems Utilizing Laser-Collision Induced Fluorescence"

*Shota Nunomura*, AIST, Japan, "In-Situ Diagnostics of Processing Plasma and Semiconductor Films for High-Efficiency Silicon Hetero-Junction Solar Cells"

**PS11+NS+SS** Plasma Processing for Nanomaterials & Nanoparticles

*Rebecca Anthony*, Michigan State University, "Non-Equilibrium Plasmas for Nanoparticle Synthesis: from Semiconductors to Metals"

*Kostya Ostrikov*, Queensland University of Technology, Australia, "Plasma Catalysis: a Powerful Blend of the Four States of Matter"

**PS12+AS** Plasma Processing of Challenging Materials

*Erwine Pargon*, LTM - CEA/LETI, France, "Damage Free Plasma Etching Processes of III-V Semiconductors for Microelectronic and Photonic Applications"

*Masaharu Shiratani*, Kyushu University, Japan, "Spatiotemporal Fluctuation of Cvd Plasmas and Film Qualities"

**PS13** Plasma Sources

*Aranka Derzsi*, Wigner RCP, Hungary, "Electron Heating Dynamics in Capacitively Coupled Electronegative Plasmas"

*Osamu Sakai*, Kyoto University, Japan, "High-Density Plasma Generation in Low-Pressure Metamaterial Space"

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

*Olivier Guaitella*, Ecole Polytechnique, France, "Molecule Formation on Dielectric Surfaces under Glow and Dielectric Barrier Discharges"

**PS15+PB** Plasmas for Biomedical Applications

**PS16** Plasma Science and Technology Poster Session

**NOVEL TRENDS IN SYNCHROTRON AND FEL-BASED ANALYSIS FOCUS TOPIC (SA):** The rapid development of experimental tools using synchrotron radiation sources (storage ring (SR) or free electron laser (FEL)), providing photons with micron to Angström wavelength tunability, ultrahigh brightness and short pulse options, has opened unique opportunities to explore the exotic properties of matter hardly accessible by any other techniques. Static and dynamic experiments in many dimensions with desirable spatial, depth and time resolution have led to breakthroughs in understanding and improving the material functionalities. A great part of these studies have been dedicated to explore the materials surface and interfacial properties, playing an essential role in the performance of novel micro- and nano- structured materials with applications in electronic, magnetic, energy and medical devices, and also relevant to some environmental issues. This topical session will provide a forum for communicating the most recent achievements in surface and interface research using SR and FEL radiation from IR to hard X-rays and the prospects for a brighter future.

**SA1+MI** Overcoming the Temporal and Spatial Limits of X-Ray Scattering Methods for In-Situ Analysis

*Aaron Lindenberg*, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory

*Peter Müller-Buschbaum*, Technische Universität München, Germany, "Understanding Solar Cells Structure and Functioning via GISAXS and GIWAXS"

**SA2+AS+HC+SS** Frontiers of Photoelectron Spectroscopy: Surface & Interface Processes with Variable Depth Probe, High Spatial or Temporal Resolution

*Kristina Edström*, Uppsala University, Sweden, "Synchrotron-Based Spectroscopies for Studies of Components of Energy Devices"

*Anders Nilsson*, Stockholm University, Sweden, "Studies of Surfaces and Catalysis in real time with X-ray Free Electron Laser"

**SA3+2D+AC+MI** Recent Advances of Diffracting/scattering and Spectroscopic Methods for Correlated and 2D Materials

*Carla Bittencourt*, University of Mons, Belgium, "Functional Materials Exploited with Spectroscopy and Microscopy"

*Giacomo Ghiringhelli*, Politecnico Milano, Italy, "Recent Breakthroughs using RIXS at ESRF"

*Thorsten Schmitt*, Paul Scherrer Institut, Switzerland, "Resonant Inelastic X-ray Scattering on Low-Dimensional Correlated Transition Metal Oxides and Oxide Heterostructures"

**SA4+AS+HC+SS** In Situ and Operando Characterization of Interfacial Reactions in Energy & Electronic Devices

*Karen Chen-Wiegart*, Brookhaven National Laboratory, "Spectro-Imaging of Functional Materials"

*Regina Dittmann*, Forschungszentrum Jülich, Germany, "Devices Characterization Via in Operando Spectromicroscopy"

*Zhi Liu*, Shanghai University, China, "Probing Electrochemical devices in situ using APXPS"

**SA5+AC+MI** Frontiers in Probing Properties and Dynamics of Novel Heterostructures and Magnetic Nanostructures

*Elke Arenholz*, Lawrence Berkeley National Laboratory, "Photon Science Revealing Exotic Properties of Magnetoelectric Multiferroic"

*Christian Gutt*, University of Siegen, Germany, "Ultrafast Magnetic Order through Disorder - How Ultrafast Spin-Diffusion Leads to New Magnetic Structures"

*Jan Vogel*, Néel Institute, CNRS, France, "Magnetic Skyrmions in Ultrathin Magnetic Nanostructures"

**SA6** X-ray Photon Correlation Spectroscopy for Dynamics Studies

*Laurence B. Lurio*, Advanced Photon Source at Argonne National Laboratory, "Structure and dynamics of Polymer films using coherent beams"

*Anders Madsen*, European XFEL GmbH, Germany, "Forefront Applications of XPCS"

**SA7** Synchrotron and FEL-Based Analysis Poster Session

**ADVANCED SURFACE ENGINEERING (SE):** The program of the Advanced Surface Engineering Division (SE) focuses on all topics related to engineering the properties and functionalities of surfaces of all kinds. Both fundamental scientific and application-oriented contributions presenting experimental and/or theoretical and computational results are welcome. The session "Plasma-assisted Surface Modification and Deposition Processes" invites contributions aimed at understanding or further developing techniques and processes to alter the appearance of surfaces or to synthesise thin films and coatings on surfaces of interest. Topics related to analysis and characterisation of such modified surfaces and new and advanced characterisation techniques will be covered by the session "Nanostructured Thin Films and Coatings". A frequent application of coatings is to protect the underlying surface from environmental influences. The session "Protective Coatings for Tribological Applications" will deal with tribological surfaces and coatings of interest in academia and in industrial and 'real-world' applications. Finally, the session "New Challenges and Opportunities in Surface Engineering" will serve as a forum to gather new ideas and developments in the field. The main focus will be on topics and contributions that show how surface engineering can assist to solve present-day and future problems. Invited lectures will review and highlight the state-of-the-art and latest findings in various topics. Academic, industry and national laboratory scientists, technicians and especially junior researchers and PhD students from various disciplines and all countries are invited to contribute to our technical program, part of the AVS 64, and benefit from meeting/making friends and colleagues in sunny Tampa, Florida, in 2017.

**SE1+PS+SS** Plasma-assisted Surface Modification and Deposition Processes

*Daniel Lundin*, Université Paris-Sud, France, "Key Features of Reactive High Power Impulse Magnetron Sputtering"

**SE2+2D+NS+SS+TF** Nanostructured Thin Films and Coatings

*Johanna Rosen*, Linköping University, Sweden, "Plasma Process Development and Optimized Synthesis of TiB<sub>2</sub> Coatings from DC Magnetron Sputtering, High Power Impulse Magnetron Sputtering, and DC Vacuum Arc"

**SE3+MN** Protective Coatings for Tribological Applications

*Samir Aouadi*, University of North Texas, "Adaptive Ceramic Coatings for Extreme Environments"

**SE4+BI+SS** New Challenges and Opportunities in Surface Engineering

*Paul K. Chu*, City University of Hong Kong, Hong Kong Special Administrative Region of China, "Plasma Surface Engineering of Biomaterials"

**SE5** Advanced Surface Engineering Poster Session

**SCANNING PROBE MICROSCOPY FOCUS TOPIC (SP):** The scanning probe microscopy (SPM) field provides a family of techniques that have revolutionized our understanding of nanoscale interfacial phenomena. Now comprised of more than 20 different types of microscopy, the field has developed advanced tools that are able to image, manipulate and interrogate the functionality of surface features to the level of individual molecules and atoms. Such tools underpin the research activities encompassed by many AVS divisions. This focus topic provides a forum for the discussion of the latest advances and novel applications made in the SPM field. Areas of particular interest include approaches to improving imaging capability, the acquisition of probe-sample interaction data, and novel and emerging applications in physical and chemical functional imaging. These interests are reflected through invited and contributed presentations in 5 key areas, namely: (1) Advances in Scanning Probe Microscopy, (2) Probing Topological States and Superconductivity, (3) Probing Chemical Reactions at the Nanoscale, (4) Probing Spin-Dependent Phenomena, and (5) Probing Electronic Properties.

**SP1+AS+MI+NS+SS** New Imaging and Spectroscopy Methodologies

*Marek Kolmer*, Jagiellonian University, Krakow, Poland, "Two-probe measurements on the atomic-scale wires: ballistic transport through surface states of Ge(001)"

*Bert Voigtländer*, Forschungszentrum Jülich, Germany, "Charge Transport through Nanostructures Measured with Multi-Tip STM"

**SP2+2D+AS+NS+SS** Probing Electronic and Transport Properties

*Yukio Hasegawa*, University of Tokyo, Japan, "Site-specific Conductance Evolution from Tunneling to Point Contact"

*Chih-Kang (Ken) Shih*, University of Texas at Austin, "Electronic Properties of 2D Heterostructures"

**SP3+AS+MI+NS+SS** Probing Chemical Reactions at the Nanoscale

*Yousoo Kim*, RIKEN, Japan, "Investigation of Energy Transfer and Conversion at a Single Molecule with an STM"

*Andrew Wee*, National University of Singapore, Singapore, "STM Study of the Molecule-2D Heterointerface"

**SP4+AS+MI+NS+SS** Probe-Sample Interactions

*Haiming Guo*, Institute of Physics, China, "Probe and Manipulation of Individual Magnetic Atoms/Molecules on Solid Surfaces"

*Joseph Lyding*, University of Illinois at Urbana-Champaign, "STM-Based Nanofabrication and Integrating Nanostructures with Clean Semiconductor Surfaces"

**SP5+SS+TF** Probing Material Growth on the Surface

*Abhay Pasupathy*, University of Columbia, "Nature of the Quantum Metal in a Two-dimensional Crystalline Superconductor"

*Christoph Tegenkamp*, Leibniz Universität Hannover, Germany, "Spin-effects in Low Dimensional Systems Probed by Transport"

**SP6** Scanning Probe Microscopy Poster Session

**SURFACE SCIENCE (SS)**: The Surface Science Division provides a forum for cutting-edge and foundational research that involves solid surfaces and interfaces. Phenomena that take place at the gas-solid and liquid-solid interfaces are prominent within the SS division programs. Technical sessions address atomistic, structural, electronic, and chemical phenomena at surfaces and interfaces, their impact on materials properties, and their implication for technological and environmental processes. Surface chemistry is an important divisional theme, encompassing the kinetics and dynamics of surface processes and chemical events from adsorption and reaction to catalysis. Film and nanostructure growth is another key theme, explored from a fundamental perspective, through the development of new growth and processing methods for materials preparation. Surface chemical modification and photon-driven chemistry at surfaces are important concentrations. Lively sessions are devoted to the surface science of metallic, semiconductor, oxide, and organic surfaces that support unique chemical activity and electronic properties. Surface science applications in high-impact areas, including energy science, microelectronics, nanotechnology, and environmental science, - are highlighted in the program. This Division's overarching goal is to provide the atomistic insights on solid surfaces and interfaces needed to advance our understanding of materials systems and benefit society.

**SS1+NS** Molecular Machines

*Saw-Wai Hla*, Ohio University, "Quantum Molecular Machines"

**SS2+HC** Theory and Modeling of Surfaces

*Angelos Michaelides*, University College London, UK, United Kingdom of Great Britain and Northern Ireland, "Towards a Molecular Level Understanding of the Structure and Dynamics of Water at Interfaces"

**SS3+HC** Dynamical Processes at Surfaces

*Gil Alexandrowicz*, Technion – Israel Institute of Technology, Israel, "A New Approach for Controlling the Rotational Orientation of a Molecule and Studying the Stereodynamics of a Molecule-Surface Collision"

**SS4+EM+HC+MI** Oxides/Chalcogenides: Structures and Reactions

*Jason Weaver*, University of Florida, Gainesville, "Surface Chemistry of Late Transition-Metal Oxides"

**SS5+AS+EM** Semiconductor Surfaces

*Vincent LaBella*, SUNY Polytechnic Institute, "Nanoscale Schotky Barrier Visualization"

**SS6+AS** Surface Science in the Environment

*Barbara Finlayson-Pitts*, University of California, Irvine, "A Challenge for the Surface Science Community: Understanding and Quantifying Heterogeneous Reactions on Surfaces in the Lower Atmosphere"

**SS7** Photochemistry and Photoelectrocatalysis

*Greg Kimmel*, Pacific Northwest National Laboratory, "Photochemistry of Organics on TiO<sub>2</sub>(110)"

**SS8+AS+MI** Organic/Inorganic Surfaces and Interfaces

*Erin Iski*, University of Tulsa, "The Use of EC-STM to Study the Nanoscale Structure and Behavior of Atomically Thin Ag Films on Au Surfaces"

**SS9** Deposition and Growth at Surfaces

*Michael Tringides*, Iowa State University, "Metal Growth on and under Graphene: Morphology, Intercalation and Magnetization"

**SS10+HC** Functional Surfaces by Design

*Michael Trenary*, University of Illinois at Chicago, "Infrared Studies of Reactions Over Single-Atom Alloy Surfaces"

**SS11+HC** Mechanisms of Surface Chemical Reactions

**SS12+HC** New Insights into Metal and Alloy Properties, Chemistry, and Catalysis

**SS13** Surface Science Poster Session

**SUSTAINABILITY FOCUS TOPIC (SU)**: In keeping with worldwide trends and needs, the National Science Foundation (NSF) started an initiative in 2013 to encourage and foster research in Sustainable Chemistry, Engineering, and Materials (SusChEM); in particular, this initiative addresses the interrelated challenges of sustainable supply, engineering, production, and use of sustainable materials and integrated materials systems. Presentations under this Focus Topic will include fundamental research themes such as the replacement of rare, expensive, and/or toxic materials with earth-abundant, inexpensive, and benign materials; recycling of materials that cannot be replaced; and development and characterization of low cost, sustainable, and scalably manufactured materials with improved properties. Also of interest are processes with reduced use of toxic components; processes under ambient conditions, as opposed to extreme temperatures, pressures or other harsh conditions; and increased conservation of natural resources, such as water, raw materials, and energy.

**SU1+AS+EM+MS** Piezoelectrics, Thermoelectrics, and Pyroelectrics

*Xiaoli Tan*, Iowa State University, "Lead-free Piezoelectrics: Composition, Structure, and Mechanism"

*Mary Anne White*, Dalhousie University, Canada, "Thermoelectrics for Sustainable Energy Harvesting"

**SU2+AC+MS+SS+TF** Batteries & Fuel Cells

*Monika Backhaus*, Corning, "Electric Cell Potential Driving Changes in Perovskite Surface Termination and Enabling Catalysis"

*Ana Muñoz-Garcia*, University of Naples, Italy, "First-Principles Design of Mixed Proton-Electron Conducting Oxides and Their Application as Solid-Oxide Fuel Cell Electrodes"

**SU3+2D+MS+NS** Membranes and Materials for Food/Water Processing



*Junhong Chen*, University of Wisconsin-Milwaukee, "Real-time Detection of Water Contaminants Using a Graphene-based Field-Effect Transistor Sensing Platform"

*Susan Duncan*, Virginia Tech, "Protecting Food and Water Quality: Considerations for Materials Innovation"

**SU4+AC+MI+MS** Rare Earths and Other Critical Materials

*George Crabtree*, Argonne National Laboratory, "Critical Current by Design"

*Alex King*, Ames Laboratory, "How Critical Materials Affect Emerging Technologies"

**SU5+2D+MS+NS** Nanocellulose and Other Carbon Materials

*Kenneth Carter*, University of Massachusetts - Amherst, "TEMPO-Free Nanocellulose Synthesis and Nanocellulose Aerogels"

*Kim Nelson*, American Process Inc., "Processing and Applications of Nanocellulose"

**SU6** Sustainability Focus Topic Poster Session

**THIN FILMS (TF)**: The Thin Film Division offers several core oral sessions and one poster session. A broad range of outstanding invited speakers will touch on topics across the breadth of thin film science, technology and applications. There are several sessions dedicated to atomic layer deposition (ALD), encompassing energy conversion and storage, microelectronics, emerging applications, nanostructures, precursors, surface reactions and new innovations in processing. These sessions highlight basic science and the pursuit of applications. We are excited about the core sessions on Thin Films: growth and characterization, self assembled and layer-by-layer growth. We offer thin film application inspired sessions on sessions on magnetic thin films, synchrotron radiation, and photovoltaics. We are also excited to offer new sessions based on thin film processes for 3D and extreme geometries and exploring industrial needs of thin films aligned with new vision of materials development in AVS. We offer students the possibility to give a 2-3 minute talk to introduce their posters at the end of the oral sessions. For the 5th year, we will host a student-only session to highlight the Harper Award candidates in which the student finalists will present their work in an interactive "TED Talk" type of Forum. This is an excellent opportunity for graduate and undergraduate students in the Thin Film area to get together informally for discussions and to provide feedback for the Harper Award presentations of their fellow students. The Thin Film Division is also pleased to solicit nominations for the Distinguished Technologist Award, which serves to recognize individuals who have provided exceptional technical support of thin film research or related development activities.

**TF1+EM** ALD for Energy Conversion, Storage, and Electrochemical Processes

*Julien Bachmann*, University of Erlangen, Germany, "Systematic Investigation of Geometric Effects in Porous Electrodes for Energy Conversion Reactions"

**TF2+EM+MI** Thin Films for Microelectronics

*Jin-Seong Park*, Hanyang University, Korea, "Atomic Layer Deposition of Oxide Semiconductor for Flexible Electronics"

**TF3** ALD Precursors and Surface Reactions

*Anjana Devi*, Ruhr Universitat-Bochum, Germany, "ALD Precursors"

**TF4** Advanced CVD and ALD Processing, ALD Manufacturing and Spatial-ALD

*Jaques Kools*, Encapsulix, "High Speed ALD of Multifunctional ALD Ultrabarriers for Flexible OLED Encapsulation"

**TF5+MI+NS** ALD and Nanostructures

*Riikka Puurunen*, Aalto University, Finland, VTT Technical Research Centre of Finland, Finland, "Recent Developments in the Analysis of ALD/CVD Thin Film Conformality"

**TF6** Emerging Applications for ALD

*Christos Takoudis*, University of Illinois-Chicago, "ALD-based Functionalization of Biomaterials: Recent Developments and Future Challenges"

**TF7** Thin Film Photovoltaics

*Mohammad Khaja Nazeeruddin*, Ecole Polytechnique Fédérale de Lausanne (EPFL), "Stable Perovskite Solar Cells by 2D/3D Interface Engineering"

**TF8+SE** Control and Modeling of Thin Film Growth and Characterization

*Yiping Zhao*, University of Georgia, "Combining Dynamic Shadowing Growth and Colloidal Monolayer to Design Plasmonic Metamaterials"

**TF9** Self-assembled Monolayers and Organic/inorganic Interface Engineering

*Andreas Fery*, Leibniz-Institut für Polymerforschung Dresden, Germany, "Responsive and Interactive Polymeric Coatings"

**TF10** Area-selective Deposition and Sequential Infiltration Synthesis Growth

*Tony Maindron*, CEA, France, "Thin-film Encapsulation for OLED-based (Micro)displays"

**TF11+MI** Thin Films for Magnetic and Optical Applications

*Adam Hauser*, University of Alabama, "Paths to Low Spin Damping in Intermetallic Thin Films"

**TF12+SA** Thin Films for Synchrotron & Magnetism Applications

*Jolien Dendooven*, Ghent University, Belgium, "In-situ Synchrotron-based Characterization of Noble Metal ALD Processes"

**TF13** Processes for 3D and Extreme Geometries

*John Abelson*, University of Illinois at Urbana Champaign, "Coating and Infilling 3D Geometries by Low-T CVD: HfB<sub>2</sub> throughout 0.5 mm Thick CNT Forests"

**TF14** Industry Needs/Research Opportunities in Thin Film Technology

*Mahendra Pakala*, Applied Materials, "Physical Vapor Deposition of Emerging Resistive Memories"

**TF15** Thin Films Poster Session

**TANDEM MS FOCUS TOPIC (TM):** Tandem Mass Spectrometry involves isolating selected ions, fragmenting the mass selected species, and detection of the fragmented ions to assist in elucidating the chemical structure of these analytes. The ability to identify ions in the complex and congested mass spectra produced by organic macromolecules pose a major challenge, particularly for in situ techniques such as mass spectrometry imaging (MSI). However, tandem MS provides a versatile analytical method to elucidate and validate peak assignments. The 2017 tandem MS Focus Topic will feature sessions on i) the recent expansion of tandem MS in surface science, ii) its application in the analysis of complex organic materials, including but not limited to the polymers, organic-electronics, peptides, and metabolites, as well as, its versatile range of applications in MSI methodologies (i.e. MALDI, DESI, and SIMS), iii) fundamental investigations and advanced tandem MS methodologies and iv) data processing methods (i.e. database searching, in silico fragment analysis software). The FT will also include applications, new instrumentation, and advanced data analysis methods that utilize high mass resolution to improve confidence in peak assignments (i.e. Fourier transform-based MS).

**TM1+AS** New Instrumentation Featuring Tandem MS

*Hua (Teresa) Tian*, Penn State University, "In situ Tandem MS of Lipids using Imaging GCIB-SIMS"

**TM2** Applications in Mass Spectrometry Imaging using Tandem MS

*Jorg Hanreider*, Sahlgrenska Academy, Sweden, "In Situ Identification of Plaque Pathology Associated Lipids in Experimental Alzheimer's Disease"

**TM3** Fundamentals and Advancements in Tandem MS

*Chad Weisbrod*, The National High Magnetic Field Laboratory, "Coupling Front-end Electron Transfer Dissociation to Ultra-High Field FTICR-MS"

**TM4** Putting the Pieces Together: Data Analysis of MSn

*Theodore Alexandrov*, EMBL Heidelberg, Germany, "Metabolite Annotation for Ultra-HR Imaging Mass Spectrometry: MS1 and Beyond"

**TM5** Tandem MS Poster Session

**TRIBOLOGY FOCUS TOPIC (TR):** The 2017 Tribology Focus Topic will feature sessions on nanoscale wear with applications in nano-metrology and nano-manufacturing, molecular origins of friction, lubricants and coatings, and friction in biological systems. Sessions are jointly sponsored by the Applied Surface Science (ASSD) Division, Thin Films (TF), Nanometer-scale Science and Technology (NSTD), and Biointerfaces (BI). Our focus is on linking of nanoscale information (either simulations or experiments, but preferably both) to macroscale observations. Presentations will carry a materials focus in areas such as thin film deposition, solid lubricants, nanocomposites designed for tribological function, self-healing interfaces, wear-resistant polymers, and biomaterials. Contributions will consider advances in in-situ, molecularly specific, spatially resolved approaches to the quantitative characterization of tribological interfaces as well as accounts of numerical computation and molecular modeling of tribological materials and biomaterials. In addition to the four oral sessions, we will have a poster session, which will provide an opportunity for personal exchange and discussion of results with colleagues.

**TR1+AS+HI+NS** Nanoscale Wear: Applications to Nano-metrology and Manufacturing

**TR2+AS+HI+NS+SS** Molecular Origins of Friction

*Philip Egberts*, University of Calgary, Canada, "The Influence of Environmental Exposure and the Substrate on the Lubricating Properties of Two-Dimensional Materials"

*M. Clelia Righi*, University of Modena and Reggio Emilia, Italy, "Fundamental Understanding of Interfacial Adhesion and Tribochemistry by *Ab Initio* Calculations"

**TR3+AC+TF+VT** Lubricants and Coatings

*Maria-Isabel De Barros Bouchet*, Ecole Centrale de Lyon - LTDS, France, "Superlubricity of Hard Compliant Carbon Coatings with Green Lubricants: Role of Surface Chemistry and Structural Changes"

*Martin Dienwiebel*, Karlsruhe Institut for Technology (KIT), Germany, "Structure Evolution in Tribological Interfaces Studied by Multilayer Model Alloys"

**TR4+BI** Friction in Biological Systems

*Michelle Blum*, Syracuse University, "Mechanics and Tribology for Design of Advanced Biomaterials"

*Laurence Marks*, Northwestern University, "Carbon, Carbon Everywhere, from Catalysts to Hip Implants"

**TR5** Tribology Poster Session

**VACUUM TECHNOLOGY (VT):** The Vacuum Technology Division (VTD) provides a forum for research in achieving, maintaining, measuring, and analyzing vacuum across a wide range of pressures and applications. The 2017 VT oral program topics include: (1) (Novel Methods of) Vacuum Measurement, Calibration and Primary and Industry Standards, (2) Gas Dynamics, Simulation and Partial Pressure Analysis, (3) Vacuum Pumping and Material Outgassing, (4) Accelerator and Large Vacuum Systems. Additionally, we present special sessions in Vacuum Technology: History, MEMS in Vacuum Technology, Vacuum in Cryogenic Environments and Transport. The VT Poster session Tuesday evening features the VT Student Poster Competition, with a first place award of up to \$500, where students of any discipline are invited to share their innovative solutions to vacuum equipment challenges. Student presenter awards will also be given for the best presentations. To be eligible for a student prize, the presenter must be registered as a student and present the work in a VT poster or oral session.

**VT1** New Methods of Vacuum Measurement

*Ove Axner*, Umeå University, Sweden, "Fast-Switching Dual Fabry-Perot Cavity-based Optical Refractometry – A Powerful Technique for Drift-Free Assessment of Gas Refractivity and Density"

**VT2** Partial Pressure Analysis

*Kathrin Altwegg*, University of Bern, Switzerland, "ROSINA/Rosetta: Exploring the Origin of our Solar System with Mass Spectrometry in Space"

**VT3** Material Outgassing and Vacuum Pumping

*Richard Green*, National Research Council, Canada, "Weight of Water on the Solid Surface in Air and Vacuum"

**VT4** Gas Dynamics, Modeling, and Simulation

*Paul Dozoretz*, Integrated Process Solutions, MKS Instruments Inc., "A Rigorous Approach to Effluent Gas Management for the Vacuum Processing Industry"

**VT5** Leaks, Flows, Outgassing

**VT6** Large Vacuum Systems

*Rai Weiss*, Massachusetts Institute of Technology, "Vacuum Technology that Enabled the Detection of Gravitational Waves"

**VT7** Surface Science for Accelerators

*Anne-Laure Lamure*, CERN, Switzerland, "Adsorption/Desorption from Amorphous Carbon Coating at Cryogenic Temperatures"

**VT8** Extreme High Vacuum

*Julia Scherschligt*, National Institute of Standards and Technology, "Quantum Approach to Extreme High Vacuum Metrology"

**VT9** Particle Control, Quality Control, Ultraclean Systems

*Lutz Lilje*, DESY, Germany, "Particle Contamination Control in the Accelerator Vacuum Systems of the European XFEL"

**VT10** Transfer, Manipulation and Vacuum Suitcases

*Urs Maier*, Ferrovac GmbH, Switzerland, "UHV- and Cryo-transfer between Independent Analytical Instruments"

**VT11+MN** MEMS for Vacuum Technology

*Wei Yang*, PD Sciences LLC, "Silicon-micromachined Turbomolecular Pump"

**VT12** Vacuum Desorption

*Markus Bender*, GSI Helmholtzzentrum für Schwerionenforschung GmbH, Germany, "New Aspects on Heavy Ion-Induced Desorption and Their Impact on Next Generation Accelerators"

**VT13** History

*Paul Arnold*, Pressure & Vacuum Measurement Solutions, MKS Instruments, Inc., "Development of an Electrostatic Triode Getter-Ion Pump, 1967-1973"

**VT14** The History and Future of Materials, Surfaces and Interfaces (ALL INVITED SESSION)

*Robert Franz*, Montanuniversität Leoben, Austria

*Joe Greene*, University of Illinois, "The 14-billion Year History of the Universe Leading to Modern Materials Science"

*Caitlin Howell*, Harvard University, "Bio-inspired Materials Interfaces for Biological Control"

*Daniel Killelea*, Loyola University Chicago, "Surface Structures at High Oxygen Coverages on Rh(111) and Ag(111)"

*Ashlie Martini*, University of California Merced, "Single Asperity Contact and Sliding"

*Virginia Wheeler*, U.S. Naval Research Laboratory, "The Power of Atomic Layer Deposition: Changing the World One Layer at a Time"

*Angel Yanguas-Gil*, Argonne National Laboratory, "Structure of Sub-nm Oxides Synthesized by Atomic Layer Deposition: From Isolated Cations to the Emergence of Crystallinity"

**VT15** Vacuum Technology Poster (and Student Poster Competition)

## **SPECIAL SESSIONS & EVENTS**

**BIOMATERIALS PLENARY SESSION (BP)**: The Biomaterials Interfaces program kicks off with the now traditional Biomaterials Plenary Session. This year we are pleased to have presentations from three eminent scientists who have made significant contributions to our field. Under the overarching AVS conference scheme "Surface, Interfaces and Materials - A new vision", the session "Engineering a paradigm shift in control of microbes and fouling" will bring together scientists to discuss current approaches in understanding and controlling microbial adhesion at interfaces. Michael Grunze has made substantial contributions in the field of protein and adhesion resistant interfaces. Through surface functionalization both, fundamental adhesion processes, hemocompatibility and antifouling functionalization were achieved. In particular recognized are the correlation of fundamental physical surface parameters and quantitative biological data as well as the application and the development of spectroscopic methods for in situ and in vivo investigations of biointerfaces and cells. Joanna Aizenberg has made substantial contributions in understanding basic principles of biological architectures and the economy with which biology solves complex problems. She uses biological principles as guidance in developing new, bio-inspired synthetic routes and nanofabrication strategies that lead to advanced materials and devices, with broad implications in fields ranging from architecture to energy efficiency to medicine. Among recent innovations are SLIPS coatings that provide non-toxic antifouling protection of surfaces. Morgan Alexander develops materials for application in biological environments, characterising relationships between the surface and biological response. Understanding these relationships is critical in the development of the biomaterials of the future and is the theme running through his group's work across a variety of biomedical application areas spanning bacterial adhesion to controlling stem cell response. Much progress has been made in discovering new biomaterials

using a materials screening approach. The session will close with the opportunity for further discussions at our traditional Plenary Reception.

**BP1** Plenary - Engineering a Paradigm Shift in Control of Microbes and Fouling

*Joanna Aizenberg*, Harvard University, "Say 'No' to Biofouling!"

*Morgan Alexander*, Nottingham University, UK, "Engineering Serendipity: High-Throughput Discovery of Materials That Resist Bacterial Attachment"

*Michael Grunze*, KIT, Germany, "Environmentally Friendly Artificial Non-Fouling Surfaces: Quo Vadis?"

**EXHIBITOR TECHNOLOGY SPOTLIGHT (EW):** Abstracts are solicited from AVS64 Exhibitors for presentations to symposium attendees during technical session breaks on exhibit days. Papers submitted and material presented during the presentation must provide technical information and/or analysis using a specific exhibitor product, technique or service. The Exhibitor Technology Spotlight will emphasize: New instrumentation, products, services, techniques and/or new applications in research, industrial, manufacturing or processing; Technology transfer from R&D to manufacturing; Scale-up aspects and innovations in manufacturing practices; Technology/economic aspects and market impact of new and innovative scientific and/or engineering technologies. The 20 minute presentations will be held in stage area of the exhibit hall and will take place during symposium session breaks to ensure maximum attendance. Cost is \$600 (\$500 for Corporate Members). For space availability, contact Jeannette DeGennaro: [Jeannette@avs.org](mailto:Jeannette@avs.org)

**EW1** Exhibitor Technology Spotlight 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 and professional literature, educational material, career services and publications from numerous publishers. 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 (October 31-November 2, 2017). 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).

**THE HISTORY AND FUTURE OF MATERIALS, SURFACES AND INTERFACES:** Please join us on Wednesday afternoon for the "History and Future of Materials, Surfaces and Interfaces" session. This special all-invited session will kick off with Joe Greene talking about "The History of Materials." Joe is the first scientist to win the prestigious George Sarton Award for Science History given by the History of Science Society. We will then take a look at what's to come with talks given by the future stars of AVS.

**AVS PRESENTATIONS ON DEMAND:** This year we are inviting all Symposium presenters to submit their PowerPoint slides as a PDF for inclusion in the AVS Technical Library. All presenters will be contacted prior to the meeting with the instructions and deadlines. We hope you will consider participating in this exciting program!

**AVS LATE BREAKING SESSION:** There will be opportunities for presentation of post-deadline discoveries in all fields relevant to the AVS membership. Submissions that address topics in surfaces, interfaces, films, nanometer-scale phenomena, emerging technologies, or new innovations. Abstracts will be solicited starting in mid-July for either (1) an individual 20 minute oral presentation, or (2) a poster presentation. Late Breaking Abstracts will be used to fill holes in the program and they must be submitted via the AVS website by Friday, August 25, 2017. Notification of acceptance/rejection will be made soon thereafter. Please check the AVS 64 ([www.avs.org](http://www.avs.org)) website for details and submission guidelines in mid-July.

**AVS SHORT COURSES:** Short courses that offer specialized training in specific areas of vacuum science and related technologies will be offered all week, commencing on Monday, October 30, 2017. Registration and additional details will be posted on the AVS website in early 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.avsymposium.org](http://www.avsymposium.org)**

**Deadline: 11:00 p.m. ET, MONDAY, May 1, 2017**

**Supplemental data (1-2 pages, 1MB) will also be accepted via the submission site. Instructions may be found at the web site above.**

***\*\*\*Please Note: A presenter may present one (1) paper only (either ORAL or 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 AWARDS & TRAVEL GRANTS**

All award applications for AVS National and Division/Group awards may be found at the following link: (<http://www.avsymposium.org/Awards-Recognition>). Please contact Angela Klink, Member Services Administrator, ([angela@avsymposium.org](mailto:angela@avsymposium.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, 2017 and should be submitted through the AVS online award submission site. Nomination information is available on [www.avsymposium.org](http://www.avsymposium.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avsymposium.org](mailto:angela@avsymposium.org)).

### **NATIONAL STUDENT AWARDS**

**Students may apply for one National Student Award and one Division/Group Award in a given year.** Each year, the AVS solicits nominations for eight graduate student awards. These are the Russell and Sigurd Varian Award, the Nellie Yeoh Whetten Award, the Dorothy M. and Earl S. Hoffman Award, two Dorothy M. and Earl S. Hoffman Scholarships (N.B. the Hoffman Award and Scholarships are distinct from the Hoffman Travel Grants described below) and three Graduate Research Awards. The nomination procedures are on [www.avsymposium.org](http://www.avsymposium.org) or through Angela Klink (212-248-0200, ext. 221 or [angela@avsymposium.org](mailto:angela@avsymposium.org)). Applicants should use the AVS online award submission site. The deadline is May 1, 2017.

### **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 (late June 2017) and the student should apply for the grant by return e-mail to the AVS National Office. The application deadline is Friday, August 18, 2017. Should your application be approved, you will receive an e-mail notification by Friday, September 15, 2017. Grants will be given on a random basis until the 2017 funds are depleted. Funds for the grant recipients will be available at the Symposium Registration Manager's desk, and you will also be asked to present a student I.D. Please note that all travel grants must be collected at the meeting.

### **DIVISION/GROUP STUDENT AWARDS**

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

The **Applied Surface Science Division** is offering student awards. Students who would like to compete for the awards need to **submit** an abstract for a poster or talk to one of the ASSD or ASSD co-sponsored sessions. **Presentation during an AVS Symposium session is required for eligibility.** If the ASSD has more than three applicants for the student award, the ASSD Student Award Committee Chair may ask the student candidates to submit an extended abstract, which will be used to down select the number of finalists to three. The three award finalists will present a "capsule" (3-slide, 5-minute) presentation to the judges during the Tuesday night ASSD Business Meeting. The winner will be selected based upon presentation skills, scientific merit and originality of their work. The awards consist of three cash prizes totaling up to \$1,000. The student that wins the best presentation award will be reimbursed for meeting registration at the student rate for the following year's AVS meeting and ASSD will ask the award winner to submit an abstract to an ASSD or ASSD co-sponsored session. Students wishing to participate in the competition should complete the application on the awards submission site and **submit an abstract by May 1, 2017.**

The **Biomaterial Interfaces Division** is offering student awards (\$250, \$150 and \$100) for the best Flash Presentation or Poster based on their thesis research. All student presenters will be considered for the prizes automatically, and 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 final degree was awarded are not eligible to compete for the student prize. Inquiries may be addressed to Prof Stephanie Allen, [stephanie.allen@nottingham.ac.uk](mailto:stephanie.allen@nottingham.ac.uk).

The **Electronic Materials and Photonics Division (EMPD)** Student Poster Award is given at the annual AVS International Symposium and Exhibition to encourage students to present their research in the EMPD poster session 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 must submit an abstract for a poster presentation that meets all Symposium requirements and deadlines through the normal submission web portal. All poster presenters present at the EMPD poster session will be automatically considered for the EMPD Student Poster Awards and they will be judged on the scientific merit and originality of their research, their contribution to it, as well as the quality of their presentation. EMPD Student Poster Awards consist of a certificate and a \$500 cash prize. Multiple awards are anticipated. Inquiry may be directed to the EMPD Program Chair, Dr. Michael Filler ([mfiller@gatech.edu](mailto:mfiller@gatech.edu)).

**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 the 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 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 should complete the application on the awards submission site and a copy of the submitted AVS abstract and a letter of recommendation before the abstract deadline of May 1, 2017.

**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 (2pg max.) 5) completed application materials should be submitted through the awards submission site by the deadline of May 2, 2017.

**MEMS and NEMS Technical Group** is pleased to announce a "**Best Paper Award**" competition at the AVS Symposium and Exhibition. The award includes a cash prize (\$500) and a certificate to the well deserving student presenting his/her paper in an oral or poster session of the MN group. Both graduate and undergraduate students are eligible. The candidates will be judged on the quality, originality of his/her research and their skill in presentation (oral/poster). In addition, the MEMS/NEMS Group is supporting a Registration Waiver Award to the well deserving graduate/undergraduate student submitting an abstract to the MN session. This award will be solely based on the quality of work mentioned in the abstract. In order to qualify for the competition, interested candidates should submit a cover letter describing their intent to compete for any one of the above mentioned awards along with a copy of their AVS abstract, current CV and application through the awards submission site by May 1, 2017.

The **Nanometer-Scale Science and Technology Division Graduate Competition** brings recognition to outstanding research by graduate students giving oral presentations in NSTD sessions at AVS international symposia. Applications can be submitted by: 1) going to the awards submission site and selecting the appropriate box, 2) uploading a cover letter, a resume, and your AVS abstract by May 1, 2017. The abstract must be submitted to an NSTD sponsored or co-sponsored session, and at least one of the co-authors on the abstract must be an AVS member at the time of submission; the AVS member co-author(s) and the symposium session should be mentioned in the cover letter. All finalists will be selected by the NSTD Awards Committee, and they will be informed by Sept. 1, 2017. All finalists must present a five minute talk (with additional time for questions) at the NSTD Awards Competition, which is planned for noon on Wednesday of the symposium. 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 2017 are Asylum Research and RHK Technology.

**John Coburn and Harold Winters Student Award in Plasma Science and Technology:** Required Application Materials: 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. A maximum of six finalists will be selected on the basis of technical and scientific merit and originality of research. Each finalist will receive a cash award of \$500 and must present their paper in a closed door session. This 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 on the basis of the oral presentations, the quality of research, the clarity of the presentations, and the potential for the research to advance the field of plasma science. The winner's award consists of an additional cash prize of \$500. The selection of finalists and the award winner is made by the PSTD Executive Committee. These awards are contingent upon acceptance of the abstract for presentation in a PSTD session at the AVS International Symposium. Submissions are limited to one application from a particular research group unless previously discussed with the Awards Coordinator. All materials should be submitted through the AVS award site by May 1, 2017.

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. This is the oldest student award in AVS, presented since 1981. A candidate 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 the Ph.D. degree in the year of the Symposium. Up to a maximum of five finalists will be selected to compete with posters during the Surface Science poster session; these poster presentations are in addition to any different presentation they are registered for at the International Symposium. The main selection criteria include both scientific content and presentation skill. The winner will receive a cash prize of \$1000 and a certificate. The winner's name will appear in the list of previous winners published yearly in the Symposium technical program and on the plaque that is on display at the Symposium. The other finalists will receive a cash award. Traum award applicants should submit 1) a copy of the abstract submitted to 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 1, 2017.

**Thin Film Division James Harper Award and Graduate Student Award:** The 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, and the Harper Award will be given for the best oral presentation during a special event at the Annual Symposium. The award will consist of a plaque and cash prize of \$800. Runners-up will receive Thin Film Graduate Student Awards of \$500. 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. 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. Application materials should be submitted through the awards submission site. Deadline: May 1, 2017.

**Vacuum Technology Division Student Poster Competition:** Dubbed the "Junkyard Wars of Vacuum Technology" the Vacuum Technology Division sponsors a competition for student posters that describe the design, development, and/or use of "student-built vacuum systems." Winning posters may represent vacuum systems that are not necessarily state-of-the-art technology; they often reflect ingenious designs 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 1, 2017. 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, Dr. Jim Fedchak ([james.fedchak@nist.gov](mailto:james.fedchak@nist.gov)).

**Vacuum Technology Division Student Presenter 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 for an oral presentation through the normal symposium submission web portal which meets the AVS symposium requirements and deadlines, and must be able to give an oral presentation (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. The application may be done by going to awards submission site. Inquiry may be directed to the VTD Student Coordinator, Dr. Jim Fedchak ([james.fedchak@nist.gov](mailto:james.fedchak@nist.gov)). Deadline is May 1, 2017.

## **FOCUS TOPIC AWARDS**

The **Focus Topic on Fundamental Discoveries in Heterogeneous Catalysis (HC)** announces **The Surface Science Top Presentation Award**, a competitive award that will be given to the best student/postdoc presentation in the Heterogeneous Catalysis Focus Topic sessions at the Annual Symposium. The awardee will be announced at the end of the final HC Focus Topic session and will receive an award certificate and prize money of \$500. All student and postdoctoral contributions are automatically entered in the pool of contenders for the award. The student presentations are judged based on the scientific merit of the presented work, the presentation, and the post-presentation discussion. The award committee consists of members of the HC committee and other senior members of the community present during the meeting. The HC Focus Topic Committee gratefully acknowledges the Surface Science, an Elsevier journal, for sponsoring the awards. This award will be offered for the first time at the 2017 meeting in Tampa, FL. Further information can be found at <http://www.avs.org/Awards-Recognition/Focus-Topic-Awards/Fundamental-Discoveries-in-Heterogeneous-Catalysis>

The **Focus Topic on Spectroscopic Ellipsometry (EL)** announces a competitive student award which will be given to the best student presentation in the Spectroscopic Ellipsometry Focus Topic sessions at the Annual Symposium. The awardee will be announced at the end of the last EL Focus Topic session and will receive an award certificate and prize money of \$500. All student contributions are automatically entered in the pool of contenders for the award. The student presentations are judged based on the scientific merit of the presented work, the presentation, and the discussion. The award committee consists of



members of the Focus Topic committee and other senior members of the Ellipsometry community present during the meeting. The Focus Topic Committee gratefully acknowledges J.A. Woollam Co., Inc. for sponsoring the awards. Past recipients of the award and rules for entering the competition can be found at <http://www.avs.org/Awards-Recognition/Focus-Topic-Awards/Spectroscopic-Ellipsometry-Focus-Topic>.

### **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 the same as the AVS International Symposium regular abstract submission deadline. 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.

The **AVS Biomaterial Interfaces Division (BID)** invites applications for the Early Career Researcher (ECR) Award. Open to all people submitting abstracts to any BI supported session at the Annual Symposium, the prize consists of symposium registration and \$250 towards travel costs as well as an honorary presentation in the relevant BI session. The nominee's Ph.D. or equivalent degree must have been earned less than 10 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 abstract. Application materials will be reviewed and the award winner chosen by the BID Executive Committee. Application materials should be sent by email to: Prof Stephanie Allen, [stephanie.allen@nottingham.ac.uk](mailto:stephanie.allen@nottingham.ac.uk). Deadline: May 1.

The **Electronic Materials & Photonics Division** welcomes applications for the EMPD Postdoctoral Award of up to \$500 for postdoctoral fellows who will be presenting EMPD papers at this year's International Symposium. Interested postdocs should send electronically by Friday, September 15<sup>th</sup>: (i) a copy of his/her accepted abstract showing program number, (ii) a recommendation letter from his/her advisor, and (iii) his/her vitae, plus (iv) a cover letter of request to Prof. L.J. Brillson; Email: [brillson.1@osu.edu](mailto:brillson.1@osu.edu); Tel: 614-292-8015.

**Magnetic Interfaces and Nanostructures Division:** The MIND Postdoctoral Award recognizes outstanding contributions to the areas of interest of MIND. The award comes with a certificate and a cash prize for the winner. Postdoctoral fellows who will be presenting MIND papers at this year's International Symposium are welcome to apply. The application consists of (i) a copy of the accepted abstract, (ii) a recommendation letter from her/his advisor, (iii) his/her CV, and (iv) a cover letter. The request should be sent by the deadline (October 1st) of the symposium year to Markus Donath ([markus.donath@uni-muenster.de](mailto:markus.donath@uni-muenster.de)).

The **Nanometer-Scale Science and Technology Division Postdoctoral Competition** brings recognition to outstanding research by postdoctoral scientists giving oral presentations in NSTD sessions at AVS international symposia. Postdocs who are within five years of their PhD at the time of the 2017 National Symposium are eligible to apply, and should send a cover letter, resume, and their AVS abstract to the NSTD Awards Coordinator: Sergei V. Kalinin ([sergei2@ornl.gov](mailto:sergei2@ornl.gov)), in a single PDF file. The abstract must be accepted to an NSTD sponsored or co-sponsored session, and at least one of the co-authors on the abstract must be an AVS member at the time of submission; the AVS member co-author(s) and the symposium session should be mentioned in the cover letter. Deadline July 31 All postdoctoral award finalists will be selected by the NSTD Awards Committee, and they will be informed by Sept. 1, 2017. All finalists must present a five minute talk (with additional time for questions) at the NSTD Awards Competition, which is planned for noon on Wednesday of the symposium. The winner will be selected based on the quality of the talk, the responses to subsequent questions, and the level of the research. The postdoc NSTD 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 2017 are Asylum Research and RHK Technology.

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 2018, the deadline is July 31, 2017. The nomination consists of a nominating letter, biographical material, and supporting letters. Specific guidelines as well as the completed nomination should be emailed to: Sergei V. Kalinin ([sergei2@ornl.gov](mailto:sergei2@ornl.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 sponsors, who are Asylum Research, Bruker, RHK Technology, and SPECS.

The **Plasma Science & Technology Division** is pleased to solicit nominations for the Plasma Prize, which is awarded annually for outstanding contributions to the field of plasma science and technology. Please submit ONLY the following required application materials: (1) A one-page description citing the reason for the nomination and (2) a biography and Curriculum Vitae of the nominee. Nominations must be submitted as a pdf file by email to: Sumit Agarwal ([sagarwal@mines.edu](mailto:sagarwal@mines.edu)) Nomination deadline: May 1, 2017.



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 and is still very involved in the AVS. The nominee must be a young scientist or engineer who has contributed outstanding theoretical and experimental work in an area important to the Thin Film Division of AVS. 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, and 3) a biography and CV of the nominee. It is expected that an applicant will also submit an Abstract to the Annual Symposium. Application materials will be reviewed and the award winner chosen by the TFD Executive 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 Jay Lewis; [jay.lewis@darpa.mil](mailto:jay.lewis@darpa.mil) by May 1, 2017.

**Thin Film Division Distinguished Technologist Award:** The Thin Film Division is pleased to solicit nominations for a new award, the 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. Eligibility: 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. Nature of the Award: 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. Establishment and Support: This award was created in 2015 by the New Mexico Chapter of AVS to honor its founders and their many contributions. The New Mexico Chapter of AVS provided the endowment for this Award. Nomination and Selection Procedure: 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 Executive Committee. Application materials should be sent by email to [jay.lewis@darpa.mil](mailto:jay.lewis@darpa.mil) by May 1, 2017.

The **VTD Early Career Award** strives to recognize outstanding experimental and/or theoretical work related to vacuum science and technology by a scientist or engineer early in their career. The contributions can be directly in the field of vacuum science such as vacuum metrology and measurement, gas dynamics, or designing vacuum equipment, or to related fields such as gas analysis or surface science for accelerator applications. The nominee does not have to be a current member of the AVS. To be eligible, the nominee must meet AT LEAST ONE of the following three criteria: The nominee is not older than thirty-six (36) years of age during of the year in which the award is made; the nominee is within 10 years of their undergraduate degree or 5 years of their graduate degree during the year which the award is made; or the nominee holds an early career membership in the AVS. Final eligibility will be subject to the judgment of the VTD Early-Career sub-committee. The award consists of an \$800 cash award and a certificate setting forth the reasons for the award. The awardee is expected to give an invited talk in one of the VTD sessions at the AVS National Symposium during the year in which the award is given. Limited travel support for attending the AVS National Symposium may be available upon request. 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 James Fedchak ([james.fedchak@nist.gov](mailto:james.fedchak@nist.gov)) by April 3, 2017.

**Theodore E. Madey Award:** AVS, in cooperation with the Polish Vacuum Society (PVS), is pleased to solicit nominations for the **2019 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; and (2) demonstrated leadership in international collaborative research. Nominations of mid-career scientists are especially encouraged. 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), awards, and major invited talks; and 4) complete list of publications. Nomination documents must all be in PDF format. Nominations of more than one person will not be considered. 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 2019 award should be sent by email to: Angela Klink, AVS Member Services Administrator, [angela@avs.org](mailto:angela@avs.org) by March 31, 2018.**