



Microscopy & Microanalysis 2019 Meeting

0:00 / 2:18

Don't miss out on the premier microscopy education and networking event of the year - **Microscopy & Microanalysis 2019** in Portland, Oregon!

Portland provides an ideal summer backdrop for what promises to be another stellar M&M meeting! The Pacific Northwest region is a vacationer's dream, with numerous activities for outdoor enthusiasts and urban adventurers alike. Tax-free shopping; countless local breweries, distilleries, and wineries; legendary Portland food carts and hundreds of restaurants with cuisine from all over the world; unparalleled hiking, camping, boating and sightseeing in the Cascade and Olympic National Parks, the picturesque Oregon Coast, and the stunning Columbia River Gorge.

Don't miss out! **Save the Date (savethedate.pdf)** and plan to attend Microscopy & Microanalysis 2019 with over 1200 platform and poster sessions, workshops, tutorials, and networking events, in addition to four days of the world's largest Microscopy products and services commercial expo hall in the world.

REGISTER NOW (<https://ww2.eventrebels.com/er/Registration/StepRegInfo.jsp?ActivityID=26379&StepNumber=1>)

BOOK YOUR HOTEL ()



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors





(<https://www.zeiss.com/microscopy/int/home.html>)



(<http://www.raith.com/>)



(<http://www.gatan.com/>)

Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Full Symposium Descriptions

- Analytical Sciences Symposia
- Biological Sciences Symposia
- Physical Sciences Symposia

Analytical Sciences Symposia

A01 - Advances in Phase Retrieval Microscopy

ORGANIZERS:

Kai He, Clemson University

Charudatta Phatak, Argonne National Laboratory

Martha McCartney, Arizona State University

Toshiaki Tanigaki, Hitachi Ltd.

In the past few years, there have been significant advances in new detectors, computational algorithms and experimental implementations for phase retrieval down to atomic level in electron and X-ray microscopy, such as 4D-STEM, holography, ptychography, differential phase contrast, etc. This symposium focuses on latest theory, algorithms, and instrumentation developments in phase retrieval microscopy using coherent electrons and X-rays, as well as their applications in quantitative and functional imaging of local strain, polarity, electric and magnetic fields for functional materials and biological matters.

INVITED SPEAKERS:

- Myung-Geun Han, Brookhaven National Laboratory
- Yimei Zhu, Brookhaven National Laboratory
- Lin Zhou, Ames Laboratory

- David Muller, Cornell University
- Colin Ophus, Lawrence Berkeley National Laboratory
- Youssef Nashed, Argonne National Laboratory
- Rafal Dunin-Borkowski, Ernst Ruska-Centre, Germany
- Show-Shiuan, Kao, Tsinghua University, China
- Xiuzhen Yu, RIKEN, Japan
- Sascha Schäfer, University of Oldenburg, Germany
- Wouter Van den Broek, Humboldt University of Berlin, Germany
- Peng Wang, Nanjing University, China
- Naoya Shibata, University of Tokyo, Japan

A02 - Data Acquisition Schemes, Machine Learning Algorithms, and Open Source Software Development for Electron Microscopy

ORGANIZERS:

Eric Prestat, University of Manchester and SuperSTEM, United Kingdom

Francisco de la Peña, University of Lille, France

Philippe T. Pinard, Oxford Instruments NanoAnalysis, United Kingdom

Cutting-edge microscopy does not only require state-of-the-art instruments and detectors but also innovative approaches and programs to collect and analyze data. Recent advances in instrumentation and computing capabilities enable the application of machine learning for the processing of microscopy datasets. Furthermore, the development of sustainable, open-source and user-friendly software is of paramount importance to make these algorithms and workflows available widely in the scientific community and to promote reproducible research. This symposium will feature recent progress in data acquisition scheme, processing workflow, algorithm and software in electron microscopy with a focus on, but not limited to, open-source software and machine learning.

INVITED SPEAKERS:

- Stefan van der Walt, Berkeley Institute for Data Science
- Mike Jackson, BlueQuartz Software
- Chris Meyer, Nion Company
- Kevin Eliceiri, University of Wisconsin-Madison

A03 - Low-Energy X-ray Spectroscopy: Novel Applications Using Soft X-ray Emission Spectroscopy (SXES), Cathodoluminescence (CL) and Synchrotron Techniques

ORGANIZERS:***Anette von der Handt, University of Minnesota******Emma Bullock, Carnegie Institution for Science******Juliane Gross, Rutgers University******Zach Gainsforth, University of California-Berkeley***

This symposium will discuss applications and advances in low-energy X-ray spectroscopy utilizing techniques such as soft x-ray emission spectroscopy (SXES), cathodoluminescence (CL), electron energy loss spectroscopy (EELS), X-ray photoelectron spectroscopy (XPS), synchrotron-based analyses (including both absorption and emission spectroscopy), and the software designed to simulate, fit and model electron and X-ray interactions. Applications to be discussed include but are not limited to geological and extraterrestrial materials, semiconductors, biological materials, ceramics, and metals.

INVITED SPEAKERS:

- Colin MacRae, CSIRO, Australia
- Adam Hitchcock, McMaster University, Canada
- Aurélien Moy, University of Wisconsin-Madison

A04: Recent Developments in Atom Probe Tomography**ORGANIZERS:*****Ty Prosa, Cameca Instruments Inc.******Baptiste Gault, Max-Planck-Institut für Eisenforschung, Germany******David J. Larson, Cameca Instruments Inc.***

The field of atom probe tomography sees current, extensive research to understand field evaporation of different material systems, to establish theories and models, and also to develop methods that address opportunities for improving the technique (e.g. decreased reconstruction artifacts). New instrumentation developments in APT and field ion microscopy (FIM) are contributing to the expanding range of materials that can be analyzed by these techniques. This symposium focuses on key areas of recent theoretical and methodological developments and highlight the contributions on topics related, but not restricted to:

INVITED SPEAKERS:

- Danny Perea, Pacific Northwest National Laboratory
- Ann Chiamonti Debay, National Institute for Standards and Technology

- Leigh Stephenson, Max Planck Institute, Germany
- Claudia Fleischmann, imec, Belgium
- Christian Orberdorfer, Ohio State University
- Jing Fu, Monash University, Australia
- Frédéric De Geuser, Grenoble INP, France

A05 - Leveraging 3D Imaging and Analysis Methods for New Opportunities in Material Science

ORGANIZERS:

Ashwin Shahani, University of Michigan

Roland Brunner, Materials Center Leoben Forschung GmbH, Germany

Wil Harris, Carl Zeiss Microscopy

Erdmann Spiecker, Universität Erlangen-Nürnberg, Germany

In this symposium, we invite contributions from researchers developing or leveraging 3D imaging and analysis methods to drive new discoveries in materials science. This encompasses data acquisition with a variety of microscopy methods (optical, electron, ion, X-ray, neutron, and more) including 3D and multiscale/modal correlative workflows; as well as challenges associated with big data handling, image processing/analysis, and linking imaging data with computational methods (FEM, CFD, etc.). Examples of relevant classes of materials include, but are certainly not limited to, porous materials, complex intermetallics, energy storage and conversion devices, catalysts, bio-scaffolds, fiber-reinforced composites, hierarchical biomaterials, and additively manufactured components.

INVITED SPEAKERS:

- Christian Kuebel, Karlsruhe Institute of Technology, Germany
- Xianghui Xiao, Brookhaven National Laboratory
- Brian Patterson, Los Alamos National Laboratory
- Guillermo Requena, RWTH Aachen University, Germany
- Dave Rowenhorst, US Naval Research Laboratory
- Tresa Pollock, University of California-Santa Barbara
- Erica Lilleoden, Helmholtz-Zentrum Geesthacht, Germany
- Nik Chawla, Arizona State University
- Colin Ophus, Lawrence Berkeley National Laboratory

A06 - Low Voltage, Low Energy Electron Microscopy Imaging and Analysis

ORGANIZERS:***David C. Bell, Harvard University******Natasha Erdman, JEOL USA Inc.******Hector Calderon, Instituto Politécnico Nacional, Mexico***

This symposium will cover the physical and instrumental aspects as well as the application of Low Voltage SEM, TEM and STEM, including Low Dose applications to hard and soft materials imaging and analysis. With this symposium we attempt to find out if there are optimum energies/strategies when working with beam sensitive materials and what are the limitations with respect of resolution, applicable dose, achievable contrast and specimen preparation. Use of novel electron column design, beam deceleration techniques and new detector technologies for improvements of both imaging and microanalysis at low voltages will be covered. Analytical aspects of operating at low electron energies will also be discussed. We encourage submissions from both materials science and biological perspective.

INVITED SPEAKERS:

- Eva Olsson, Chalmers University, Sweden
- Richard Wuhrer, Western Sydney University, Australia
- Shinsuke Asahina, JEOL Ltd., Japan
- Xiaoqing Pan, University of California-Irvine
- Fu-Rong Chen, National Tsing Hua University, Taiwan

A07 - Vendor Symposium**ORGANIZERS:*****Elizabeth Dickey, North Carolina State University******Deborah Kelly, Virginia Carilion Research Institute***

This symposium is a forum for vendors to highlight advances in the development and improvement of their products. It covers new methods and technologies that advance the fields of microscopy and microanalysis for both physical and biological sciences, and provides a forum for exchange of ideas and best practices.

A08 - Current Trends and Challenges in Electron Energy-Loss Spectroscopy**ORGANIZERS:*****Matthieu Bugnet, University of Lyon - CNRS, France******Patricia Abellan, SuperSTEM Laboratory, United Kingdom***

Xiaoqing Pan, University of California-Irvine

Peter Crozier, Arizona State University

Electron energy-loss spectroscopy (EELS) has shed light on countless scientific challenges where correlated (sub)nanometer structural information was key for the elucidation of the local electronic properties and chemistry of materials. This symposium brings together the scientific community for exchanges on the latest research progress in acquisition, processing, and interpretation of low-loss and core-loss EELS. Topics covered include (not limited to): low-energy excitations, q-dependence, aloof EELS, elemental/fine structure mapping, temperature effects and non-destructive analytical characterization of materials by EELS. Studies where EELS is combined with complementary imaging and spectroscopy techniques are also welcomed.

INVITED SPEAKERS:

- Fredrik Hage, Superstem Daresbury, United Kingdom
- Juan-Carlos Idrobo, Oak Ridge National Laboratory
- Lena F. Kourkoutis, Cornell University
- Guillaume Radtke, Université Pierre et Marie Curie - CNRS, France
- Peter Rez, Arizona State University
- Ryosuke Senga, National Institute of Advanced Industrial Science and Technology, Japan
- Luiz Tizei, Université Paris-Sud - CNRS, France
- Xiaoyan Zhong, Tsinghua University, People's Republic of China

A09: Microscopy and Microanalysis for Real-World Problem Solving

ORGANIZERS:

Janet H. Woodward, Buckman

Ke-Bin Low, BASF Corporation

Xiaofeng Zhang, Nanosys Inc.

Microscopy and microanalysis of real-world samples present special challenges. Non-ideal samples may not lend themselves to established methodologies for preparation and analysis. Sample amounts and background information about the material and the problem may be limited, and the time frame for producing results may be very short. This symposium will focus on ways in which biologists and physical scientists develop unique and creative solutions for sample preparation, data acquisition, and analysis, providing meaningful results to solve problems in the real world.

INVITED SPEAKERS:

- Zia Rahman, NASA Johnson Space Center
- James Demarest, IBM-Albany Nanotech
- Cathy Vartuli, Apple
- Bryan Tracy, Evans Analytical Group
- Alice Liang, New York University School of Medicine
- Peng Zhang, Evans Analytical Group

A10 - Advances in Focused Ion Beam Instrumentation, Applications and Techniques**ORGANIZERS:**

Suzy Vitale, Carnegie Institution of Washington

Joshua Sugar, Sandia National Laboratories

Bruce Arey, Pacific Northwest National Laboratory

Alan Bahm, Thermo Fisher Scientific

The MSA Focused Ion Beam (FIB) Focused Interest Group (FIG) seeks to promote continuous advancement in the instrumentation, applications and techniques involved in focused ion beam work. The objective of this FIG-sponsored symposium is to provide an overview of recent developments of focused ion beam instrumentation, as well as a platform wherein FIB users can share and discuss new, novel applications and techniques across multiple scientific disciplines. Our emphasis will be on innovative approaches to sample preparation, fabrication, and analytics that go beyond conventional methods.

INVITED SPEAKERS:

- Daniel Perea, Pacific Northwest National Laboratory
- Chad Rue, ThermoFisher Scientific
- C. Cem Tasan, Massachusetts Institute of Technology
- Bartlomiej Winiarski, ThermoFisher Scientific

A11 - Current and Emerging Microscopy for Quantum Information Sciences**ORGANIZERS:**

Miaofang Chi, Oak Ridge National Laboratory

Sonia Conesa-Boj, Delft University of Technology, Netherlands

Lena F. Kourkoutis, Cornell University

Urgent needs for transformative developments in information and energy sciences require the understanding of unusual phenomena at the nanoscale. For example, the strong correlations between electrons, spins, and atoms in many materials, and how they respond to external stimuli (T, E or B) or are modified by atomic structural and chemical defects must be elucidated. However, current experimental tools that can enable visualization, understanding, and control of the electrons, spin states, and ions, are insufficient. This symposium highlights new technique developments, applications, and breakthroughs in characterizing quantum materials and their functionality.

INVITED SPEAKERS:

- Yimei Zhu, Brookhaven National Laboratory
- Ismael El Baggari, Cornell University
- Judy Cha, Yale University
- Ramasse Quentin, SuperSTEM, UK
- Takao Matsumoto, The University of Tokyo, Japan
- Robert Klie, University of Illinois-Chicago
- Katherine MacArthur, Forschungszentrum, Germany
- Michael Zachman, Oak Ridge National Laboratory
- Mathieu Kociak, Universite Paris-Sud, France

A12 - Advances in Cryo-EM Technology

ORGANIZERS:

Mike Marko, Wadsworth Center

Anchi Cheng, NY Structural Biology Center

Radostin Danev, Tokyo University, Japan

Cryo-EM provides single-particle maps with resolution in the sub-3Å range, and sub-tomogram-averaged maps in the 1 nm range, all with the sample in a near-native, hydrated state. This symposium will highlight new technology for specimen preparation, new instrumentation and software that improves the image quality, and processing advancement that pushes the resolution boundary. The symposium will have invited speakers who are key to the latest developments, and will include contributed papers from participants in this exciting field.

INVITED SPEAKERS:

- Robert Glaeser, Lawrence Berkeley National Laboratory
- Mathias Wolf, Okinawa Institute of Science and Technology, Japan

- Keiichi Namba, Osaka University, Japan
- Holger Müller, University of California–Berkeley
- Grant Jensen, Caltech
- Yanyan Zhao, Stanford University

Biological Sciences Symposia

B01 - Multi-Modal, Large-Scale, and 3D Correlative Microscopy

ORGANIZERS:

James Fitzpatrick, Washington University School of Medicine

Ben Giepmans, University Medical Center Groningen, Netherlands

Jacob Hoogenboom, Delft University of Technology, Netherlands

Imaging using electron microscopy has evolved from taking structural 'snapshot' images to generating large and complex multi-dimensional datasets. Correlative Microscopy is a unique approach to locate rare events and has evolved into a semi-routine technique. However, data acquisition, navigation, molecular recognition, and interpretation of biological function still remains a challenge. We seek to highlight scientific innovations such as correlating 3D structural to 3D functional data, multi-color EM to "fingerprint" biomolecules, and volume-EM approaches. By disseminating these methods, as well as initiatives to share volume-EM data we will enable researchers to infer insights into the regulation of organelles, cells and tissues.

INVITED SPEAKERS

- Stephen Adams, University of California–San Diego
- Naomi Kamasawa, Max-Planck Florida
- Junjing Den, Argonne National Laboratory
- Jelena Lovric, Luxemborg Institute of Science & Technology, Luxemborg
- Lucy Collinson, The Crick Institute, United Kingdom

B02 - Element Analysis of Biological Materials

ORGANIZERS:

Peta Clode, University of Western Australia, Australia

Stefan Vogt, Argonne National Laboratory

Nicole Hondow, University of Leeds, United Kingdom

This session will encompass all aspects of elemental and isotopic analysis of cells, tissues, and biominerals. Techniques will include (but not be limited to) electron, ion, and X-ray based analytical platforms. Papers will be expected to cover a wide range of applications from the biomedical and biological sciences, and extend into bio-nanotechnology applications. Submissions will be encouraged from experts through to students, with the view to inspiring interaction between biologists, materials scientists, and microanalysts at all levels.

INVITED SPEAKERS

- Sharon Wolf, Weizmann Institute of Science, Israel
- Nestor Zaluzec, Argonne National Laboratory
- Johan Decelle, Biosciences and Biotechnologies Institute of Grenoble, France
- Tanya Cully, Baylor College of Medicine
- Hugh Harris, University of Adelaide, Australia

B03 - Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals***ORGANIZERS:******Ru-ching Hsia, University of Maryland-Baltimore******Marcela Redigolo, West Virginia University******Han Chen, Penn State College of Medicine***

Microscopy is critically important in the ongoing research, detection, diagnosis and treatment of diseases. Advances that improve rapid and accurate detection and treatment often involve the use of various microscopic techniques in basic and clinical practice and research. These varied techniques provide us with an improved ability to diagnose and study the mechanism, development and pathology of diseases in human, plant and animal specimens. This symposium is an opportunity to share information on the investigation of pathogenic cells, tissues and entire organisms in clinical, diagnostic and research laboratories. Emphasis is placed on using latest microscopy in both clinical and research laboratories.

INVITED SPEAKERS

- Mike Reichelt, Genetech Inc.
- Paul FitzGerald, University of California-Davis

- Terry Morgan, Oregon Health & Science University
- Sue Aicher, Oregon Health & Science University
- Tianyi Mao, Oregon Health & Science University
- Gautam Sarath, University of Nebraska-Lincoln
- Allison Schaser, Oregon Health & Science University
- Matthew Swulius, Penn State University
- Mary Ard, University of Georgia

B04: Cutting Edge Microscopy in the Pacific Northwest

ORGANIZERS:

Claudia Lopez, Oregon Health & Science University /Pacific Northwest Center for Cryo-EM

Douglas Keene, Shriners Hospital for Children

The Pacific Northwest has a diverse scientific community crossing many life science disciplines. Each discipline has unique resources to offer the regional community that many researchers from other scientific focuses may not be aware of. On a national scale and as part of the NIH Transformative High Resolution Cryo-Electron Microscopy program, the "Pacific Northwest Center for Cryo-EM" will be introduced to the community. Researchers are invited to present available resources to foster collaborations and pool resources. This symposium will discuss different advances in both fluorescence and electron microscopy, the use of analytical tools to maximize data information and also visualization.

INVITED SPEAKERS

- Joe Gray, Oregon Health & Science University
- Guillaume Thibault, Oregon Health & Science University
- Jonathan Flores, Portland State University
- Elaine Humphreys, University of Victoria, Canada
- Joshua Vaughan, University of Washington
- Jessica Riesterer, Oregon Health & Science University
- Julia Doh, Oregon Health & Science University
- James Evans, Pacific Northwest National Laboratory
- Graham Rykiel, Oregon Health & Science University
- Xiaolin Nan, Oregon Health & Science University

B05 - Light and Fluorescence Microscopy for Imaging Cell Surface and Structure

ORGANIZERS:

Justin Taraska, NIH - Laboratory of Molecular & Cellular Imaging

David Zenisek, Yale University School of Medicine

David Perrais, CNRS UMR, Institut interdisciplinaire de Neurosciences, France

Xiaolin Nan, Oregon Health & Sciences University

Advances in light and laser fluorescence resolution, particularly those seen in confocal instruments and total internal reflection fluorescence microscopy, continue to reveal both structural diversity and 4D complexity in cell biology. For this symposium we welcome reports on new developments in instrumentation for light, fluorescence, total internal reflection, light sheet and expansion fluorescence microscopy, and correlative microscopies for light, laser and electron instruments. We encourage advances in exocytosis and endocytosis and membrane remodeling, and resolution of cell signaling structures and pathways. Student posters and platform presentations on emerging research in these modalities and methodologies should consider this symposium.

INVITED SPEAKER:

Haining Zhong, Oregon Health & Science University

B06: Pharmaceuticals FIG - Imaging, Analysis, and Regulation of Medical Products, Devices and Data Integrity

ORGANIZERS:

Gianpiero Torraca, Amgen, Inc.

Co-organizer TBD

This symposium will present diverse content related to the manufacturing and use of pharmaceuticals, medical products/devices and data integrity. Content will feature the use of advanced techniques to address the unique problems that arise during drug discovery, vaccine research, formulation, biocompatibility, production, product life cycle, and eventual patient use. In-depth technical presentations will describe the development of methods specially optimized for use with these real-world materials and biological systems, including hybrid and correlative techniques. Additionally, there will be a focus on data integrity, 21 CFR part 11 and understanding regulations as they specifically apply to the pharmaceutical industry.

INVITED SPEAKER:

Matthew Lamm, Merck & Co. Inc.

B07: 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)**ORGANIZERS:**

Melanie Ohi, University of Michigan Life Sciences Institute

Elitza Tocheva, University of British Columbia, Canada

Teresa Ruiz, University of Vermont

Our understanding of the 3D structure and functional subtleties of complex biological systems has skyrocketed due to recent advances in EM imaging technology and hybrid methodologies. This symposium will highlight structural studies of macromolecules, microorganisms, cells, and tissues using state-of-the-art high-resolution techniques. These techniques include electron crystallography, single particle cryo-EM, helical reconstruction, STEM; AFM, X-ray crystallography, and molecular modeling. Biological topics of interest include: cellular architecture, metabolism, trafficking, communication, and division; gene regulation, transcription, and translation; host-pathogen interactions and virus structure; In situ studies using TEM and SEM, and all aspects of structure-function studies of biological assemblies.

INVITED SPEAKERS:

- Melody Campbell, University of California-San Francisco
- Javier Vargas, McGill University, Canada
- Jun Liu, Yale University
- David Veessler, University of Washington
- Elizabeth Kellogg, Cornell University

B08 - Cryo-EM - from Physics to Cell Biology: Honoring the Remarkable Legacy of Ken Downing**ORGANIZERS:**

Melanie Ohi, University of Michigan Life Sciences Institute

Eva Nogales, University of California-Berkeley, Lawrence Berkeley National Laboratory

This symposium will honor Dr. Ken Downing's legacy by showcasing work in single particle cryo-EM, cryo-electron tomography, and microscopy methods that build on his seminal discoveries. Dr. Downing, MSA Fellow and former president, was a titan in the field of

electron microscopy (EM). His scientific accomplishments span an amazing range of widely-recognized techniques and methods. Work in his laboratory led to the first high-resolution structure of tubulin using electron crystallography and he made important contributions in the current "resolution revolution" in single particle cryo-EM. Perhaps even more importantly, Ken Downing was a wonderful mentor to the next generation of scientists.

INVITED SPEAKERS:

- Sharon Wolf, Weizmann Institute, Israel
- Haixin Sui, Wadsworth Center
- Robert Glaeser, University of California-Berkeley
- Huilin Li, Van Andel Research Institute
- Charles Sindelar, Yale University

B09 - From Images to Insights: Working with Large Data in Cell Biological Imaging

ORGANIZERS:

Kedar Narayan, National Institutes of Health-National Cancer Institute

Camenzind Robinson, St. Jude Children's Research Hospital

Jonathan Lefman, NVIDIA Corporation

"So you've collected these massive image data. Now what?" Technological advances in cell biological imaging have resulted in the generation of massive amounts of data, yet the ability to handle (store, move, access, use, share) these data often lags far behind, especially in smaller labs and core facilities. Appropriate integration and correlation of disparate data streams at various scales, automated feature extraction, and portability of automated solutions remain daunting. This symposium aims to address issues and solutions stemming from large image data in cell biology, including image processing, correlation and segmentation, as well as archiving, annotating and distributing large data especially in the context of available or open-source options.

INVITED SPEAKERS:

- Graham Johnson, Allen Institute of Cell Science
- Bobby Kasthuri, Argonne National Laboratory
- Mehrtash Babadi, Broad Institute
- Eric Perlman, HHMI-Janelia
- Peter Li, Google

Physical Sciences Symposia

P01 - *In situ* TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

ORGANIZERS:

Dongsheng Li, Pacific Northwest National Laboratory

Haimei Zheng, Lawrence Berkeley National Laboratory and University of California-Berkeley

Benjamin Bammes, Direct Electron

Yu Han, King Abdullah University of Science and Technology, Saudi Arabia

In situ imaging and spectroscopy techniques have emerged as primary tools for characterizing the dynamics of materials formation. The development of *in situ* capabilities for TEM has led to rapid advances in our understanding of nucleation, growth, assembly in colloidal, electrochemical, organic, semiconductor, and other systems. The symposium covers a broad range of topics including particle nucleation, crystal growth, phase transformations, polymeric and organic/inorganic self-assembly, electrochemical processes, and interface dynamics in gases and liquids. This symposium aims to provide a platform of discussion to understand the physics and chemistry of materials formation for researchers from various fields.

INVITED SPEAKERS:

- Dong Su, Brookhaven National Laboratory
- Layla Mehdi, University of Liverpool, England
- BC Regan, University of California-Los Angeles
- Peter Crozier, Arizona State University
- Eric Stach, University of Pennsylvania
- Frances Ross, Massachusetts Institute of Technology
- Daliang Zhang, King Abdullah University of Science & Technology, Saudi Arabia
- Qian Chen, University of Illinois-Urbana-Champaign
- Eli Sutter, University of Nebraska-Lincoln

P02 - Microscopy and Microanalysis of Nuclear and Irradiated Materials

ORGANIZERS:***Chad Parish, Oak Ridge National Laboratory******Khalid Hattar, Sandia National Laboratories******Pater Hosemann, University of California-Berkeley******Assel Aitkaliyeva, University of Florida***

Materials for modern and future nuclear energy systems will be subject to high radiation damage doses, high temperatures, severe corrosion, and other extreme conditions. Designing materials to withstand these conditions, and understanding the response of materials to service or irradiation testing, requires high fidelity microstructural characterization. This symposium intends to bring together experts in nuclear materials science and advanced microscopy, with an emphasis on application of latest-generation methods of microscopy and microanalysis, such as atom probe tomography, aberration-corrected microscopy, transmission Kikuchi diffraction, plasma FIB, advanced data analytics, scanned probe microscopy and nano-mechanics, in situ microscopy, and other new methods, to problems in both traditional and cutting-edge nuclear and irradiated materials.

INVITED SPEAKERS:

- Colin Judge, Canadian Nuclear Laboratory (CNL), Canada
- Jonathan Hinks, University of Huddersfield, United Kingdom
- Shen Dillon, University of Illinois
- Farida Selim, Bowling Green State University
- Joel Ribis, Commissariat à L'énergie Atomique (CEA), France

P03 - Revealing the Fundamental Structure of Soft and Hard Matter by Minimizing Beam-Sample Interactions**ORGANIZERS:*****Joerg Jinschek, The Ohio State University******David Flannigan, University of Minnesota******Dalaver H. Anjum, King Abdullah University of Science & Technology (KAUST), Saudi Arabia******Stig Helveg, Haldor Topsoe A/S, Denmark***

Atomic-scale studies performed on beam-sensitive soft and hard matter, including metal-organic frameworks, zeolites, polymers, catalysts, liquid crystals, emulsions, etc. often require novel electron microscopy characterization approaches. It is thus of critical

importance to develop new techniques and concepts that control the probing beam in both space and time, to optimize the detection of every scattering event, and to understand the role of sample temperature and environment on irradiation-induced defect accumulation. We welcome submissions involving the development or optimization of EM imaging techniques as well as electron detection tools and schemes that aim for characterizing matter in its genuine atomic state.

INVITED SPEAKERS:

- Christian Kisielowski, Lawrence Berkeley National Laboratory
- Renske van der Veen, University of Illinois
- Joe Patterson, University of California-Irvine
- Lena Kourkoutis, Cornell University
- Nestor Zaluzec, Argonne National Laboratory
- Yu Han, King Abdullah University of Science and Technology, Saudi Arabia
- June Lau, National Institute of Standards and Technology
- Erik Kieft, Thermo Fisher Scientific, Netherlands
- Oh-Hoon Kwon, National Institute for Science and Technology, Korea
- Andrew Stevens, Optimal Sensing
- Angus Kirkland, University of Oxford, United Kingdom
- Allen (Nan) Jiang, Arizona State University

P04 - Spectroscopy and Imaging of Nanostructured Low-Z Materials in the Electron Microscope

ORGANIZERS:

Dan Hodoroaba, Federal Institute for Materials Research and Testing (BAM), Germany

Andrew Stewart, University of Limerick, Ireland

Meiken Falke, Bruker Nano GmbH, Germany

Accurate morphological, structural and chemical analysis of low-Z materials at the nanoscale is possible by high-resolution electron microscopy and related spectroscopies/microscopies, but often presents substantial challenges. The symposium invites contributions on qualitative and quantitative analysis of nanostructured light element materials, be that organic, inorganic, bio-, bio-mimetic materials, nano-inclusions or the challenge of quantifying light elements in a heavy matrix. We accept a wide range of techniques. High-Resolution SEM, TEM, STEM in SEM combined with EDS, EELS, CL, or in combination with Raman or Auger electron spectroscopy when used to improve the quantification of the analysis of low-Z materials are welcome.

INVITED SPEAKERS:

- Ute Kaiser, University of Ulm, Germany
- Masami Terauchi, Tohoku University, Japan
- Vinayak Dravid, Northwestern University
- Silvia Richter, RWTH Aachen, Gemeinschaftslabor für Elektronenmikroskopie (GfE), Germany
- David McComb, Ohio State University
- Scott Findlay, Monash University, Australia
- René Sachse, Technical University Berlin, Germany

P05 - Theory and Applications of Electron Tomography in the Materials Sciences**ORGANIZERS:*****Peter Ercius, Lawrence Berkeley National Laboratory******Robert Hovden, University of Michigan******Sandra Van Aert, University of Antwerp, Belgium***

Transmission electron microscopy (TEM) and scanning TEM (STEM) reveal the structure of materials across the nano-scale with achievable resolutions below one Ångstrom. However, these are only two-dimensional (2D) projections of complex three-dimensional (3D) structures. 3D morphology and composition are critical to determine the function of nano-structures used across many fields—such as energy, catalysis, and electronics. The success of electron tomography has fueled rapid innovation in quantitative, sub-nanoscale 3D analysis in electron microscopy that include recent achievements of atomic resolution and methods to determine the 3D structure from few or even a single projection image.

INVITED SPEAKERS:

- Mary Scott, University of California-Berkeley
- Annick De Backer, EMAT - University of Antwerp, Belgium
- Rafal Dunin-Borkowski, Ernst Ruska-Centre, Germany
- Jianwei Miao, University of California-Los Angeles
- Peng Wang, Nanjing University, China

P06 - *In situ* TEM of Nanoscale Materials and Electronic Devices for Phase Transformation Studies

ORGANIZERS:

Leopoldo Molina-Luna, Technische Universität Darmstadt, Germany

Lin Zhou, Ames Laboratory

Judy Cha, Yale University

Thomas Pekin, University of California-Berkeley

Phase transformations of nanoscale materials, and corresponding changes in material properties and functionalities, are critical for fundamental science and device applications. In situ transmission electron microscopic (TEM) observations of such phase transformations provide atomic scale information to illuminate the transformation mechanisms and processes, and reveal complexities associated with the phase transformations. This proposed symposium invites in situ (S)TEM experiments that apply heating, cooling, electrical biasing, and mechanical testing to induce and probe phase transformations of functional materials and devices at the nanoscale.

INVITED SPEAKERS

- Xiaoqing Pan, University of California-Irvine
- Sang Oh, Sungkyunkwan University (SKKU), Korea
- Joerg Jinschek, Ohio State University
- Kai He, Clemson University
- Dongsheng Li, Pacific Northwest National Laboratory
- Scott Mao, University of Pittsburgh
- Mills Michael, Ohio State University
- Shirley Meng, University of California-San Diego

P07 - Electron Crystallography of Nano-structures in Nanotechnology, Materials and Bio-Sciences**ORGANIZERS:**

Sergei Rouvimov, University of Notre Dame

Roberto Reis, Northwestern University

Alex Eggeman, University of Manchester, United Kingdom

Electron crystallography is a powerful tool for studying the atomic arrangement of nano-scale structures and their organization into micro-structures and objects, applicable to man-made as well as naturally occurring (biological) materials. This symposium aims to address recent developments in electron diffraction, both experimental (including the growth of scanning diffraction approaches) as well as new detectors allowing the study of

materials that were traditionally unsuitable for electron microscopy. The aim is to bring together researchers from physical and biological sciences to share understanding with particular focus on novel materials/systems, new data analyses and computational methods applied to such rich structural data.

INVITED SPEAKERS

- Lukáš Palatinus, Institute of Physics of the Czech Academy of Sciences, Czech Republic
- Josh Kacher, Georgia Tech
- Randi Holmestad, Norwegian University of Science and Technology (NTNU), Norway
- Jim Ciston, Lawrence Berkeley National Laboratory
- Jose Rodriguez, University of California-Los Angeles

P08 - Microscopy and Spectroscopy of Nanoscale Materials for Energy Applications

ORGANIZERS:

Chongmin Wang, Pacific Northwest National Laboratory

Matthew T. McDowell, Georgia Institute of Technology

Yuanyuan Zhu, University of Connecticut

We have witnessed significant progress in the development of new microscopic and spectroscopic techniques based on photons, electrons and ions that have improved spatial and temporal resolution. This has resulted in the unprecedented ability to investigate local structure and chemistry coupled with charge and mass transport in energy materials and devices. This symposium will focus on recent advances in microscopy imaging, diffraction and spectroscopy methods and their application to probe structural and chemical properties of materials with different dimensionalities, such as 2D materials, for energy applications, including batteries, fuel cells, catalyst, photovoltaics and thermoelectric systems.

INVITED SPEAKERS:

- Lin Gu, Chinese Academy of Science, China
- Lena F. Kourkoutis Cornell University
- Ruoqian Lin, Brookhaven National Laboratory
- Chaoying Niu, University of Delaware
- Xiaoqing Pan, University of California-Irvine
- Jennifer Dionne, Stanford University

- Thomas Hansen , Technical University of Denmark, Denmark
- Raymond Unocic, Oak Ridge National Laboratory
- Katherine Jungjohann, Sandia National Laboratories
- Eric Stach, University of Pennsylvania

P09 - The Success of TMBA: TEM and STEM Developments in Techniques, Applications and Education

ORGANIZERS:

Masashi Watanabe, Lehigh University

Joseph Michael, Sandia National Laboratories

Paul Kotula, Sandia National Laboratories

Techniques and applications of TEM and STEM are developing at an increasing rate. Reasons include computerization and automation, aberration correction, cryo-microscopy and others. TEM and STEM users can focus more on the data that is available from the instrument and less on the actual operations. Initially, users were educated in the laboratory, more recently, education is through textbooks and lecture courses. This symposium will include developments in TEM and STEM and to link these to improvements in the way TEM and STEM knowledge is transferred by TMBA (successful Textbooks of Microscopy from Basics to Advances, a.k.a. Too Many Bloody Acronyms!).

INVITED SPEAKERS:

- Hamish Fraser Ohio State University
- Grace Burke, Manchester University, United Kingdom
- John Hunt, Gatan
- James Bentley, Oak Ridge National Laboratory
- Christopher Kiely, Lehigh University

P10 - Applications of Integrated Electron Probe Microscopy and Microanalysis Techniques in Characterizing Natural and Synthetic Materials

ORGANIZERS:

Donggao Zhao, University of Missouri-Kansas City

Minghua Ren, University of Nevada-Las Vegas

Owen Neill, University of Michigan

Electron microbeam techniques, such as SEM/ESEM, EPMA and TEM/STEM, use a focused electron probe or a small parallel electron beam to bombard a specimen and generate signals at a scale from micrometer down to Angstrom level. These signals include secondary electron (SE), backscattered electron (BSE), characteristic X-ray, Cathodoluminescence (CL), transmitted electron, diffracted or scattered electron, etc. Information acquired using these signals includes image, chemistry and crystal structure of a specimen at micrometer, nanometer and sub-Angstrom levels. The proposed symposium sessions will cover applications of integrated electron probe microscopy and microanalysis techniques in characterizing natural and synthetic materials.

INVITED SPEAKERS:

- Hailiang Dong, Miami University
- Anette von der Handt, University of Minnesota
- Zhenyu Chen, Chinese Academy of Geological Sciences, China
- Karen Wright, Idaho National Laboratory
- Huifang Xu, University of Wisconsin
- Yong Wang, University of Missouri-Kansas City
- Julien Allaz, ETH Zürich, Switzerland
- Shuiyuan Yang, China University of Geosciences, China

P11 - Advances in Characterization of Geological and Extraterrestrial Samples

ORGANIZERS:

Bradley De Gregorio, U.S. Naval Research Laboratory

Kultaransingh (Bobby) Hooghan, Weatherford Laboratories

Lori Hathon, University of Houston

This symposium would be a forum for the exchange of knowledge regarding the formation, history, and use of geological and extraterrestrial samples enabled by advances in microscopy and microanalytical techniques. Invited papers would include investigations of natural samples where microscale and nanoscale imaging and analytical techniques are essential for characterization. Of particular interest would be novel applications of advanced microscopy and microanalysis to geological problems and innovative solutions to long-standing technical challenges for sample preparation and characterization. Target attendees would include scientists and engineers with backgrounds in a broad range of imaging and analytical techniques, but with research interests related to geological and extraterrestrial samples.

INVITED SPEAKERS:

- Shogo Tachibana, University of Tokyo, Japan
- Neyda Abreu, Penn State-Du Bois
- Mohammad Piri, University of Wyoming

P12 - New Frontiers in Atom Probe Tomography Applications**ORGANIZERS:*****Baishakhi Mazumder, University at Buffalo******Arun Devaraj, Pacific Northwest National Laboratory***

This symposium aims to focus on the key areas of where atom probe tomography (APT) is being deployed to provide near-atomic scale compositional analyses and relate this information to physical properties of biological activities. Indeed, APT is used for characterizing an ever-increasing diverse range of material systems starting from wide variety of alloys, semiconductors, large band gap insulators and more recently different minerals and biomaterials. Its use in biology and medicine is also being pushed, following early efforts over 30 years ago. This symposium will cover the use of APT to provide a unique characterization of all types of materials.

INVITED SPEAKERS:

- Paul Van der Heide, IMEC, Belgium
- Julie Carney, The University of Sydney, Australia
- Tong Li, Ruhr-Universität Bochum, Germany
- Phillip Kürnsteiner, Max Planck Institute, Germany
- Josiah Lewis, Washington University in St.Louis

P13 - Advanced Characterization of Components Fabricated by Additive Manufacturing**ORGANIZERS:*****Isabella van Rooyen, Idaho National Laboratory******Mukesh Bachhav, Idaho National Laboratory******Federico Sciammarella, Northern Illinois University******Cesar Terrazas, The University of Texas-El Paso***

Additive manufacturing (AM) has emerged as a global disruptive technology in industries such as advanced transportation, nuclear, aerospace for manufacturing complex three-dimensional components by the deposition of ceramic, alloy, or metal precursors. AM

techniques provide a unique advantage for multiple industries due to the shortened development and fabrication times, quality of the product, and repeatability of the process. This symposium is intended to be an information exchange forum for cutting-edge microscopy and microanalysis techniques to assess the microstructural design aspect of existing materials and novel materials by various AM method types.

INVITED SPEAKERS:

- Samantha Webster, Northwestern University
- Tao Sun , Argonne National Laboratories
- Arash Samei, University of Illinois-Chicago
- Xiaoli Yan, University of Illinois



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Plenary Speakers

The M&M 2019 Executive Program Committee is very pleased to present two of the three 2017 Laureates of the Nobel Prize in Chemistry "for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution" and shared with Jacques Dubochet.

Joachim Frank, Ph.D.

Professor of Biochemistry, Molecular Biophysics, and Biological Sciences, Columbia University

Studying Kinetics by Counting Particles in Time-Resolved Cryo-EM

Dr. Joachim Frank's major contribution to the field has been in developing mathematical and computational methods for processing and analyzing cryo-EM images of multiple randomly-oriented molecules within a sample and compiling them into a representative 3D structure.

Dr. Frank used his algorithms to generate the first 3D images of the ribosome - a large structure made of several proteins and RNA strands, which is responsible for translating RNA into proteins inside cells in all organisms. With this distinctive technique, when combined with Dubochet's method of ice-embedding, information on conformational changes of macromolecules in their native states can be obtained, which enables a deeper understanding of the way 'molecular machines' function in cells. Structures of many molecules that resist crystallization and hence cannot be studied by X-ray crystallography can now be elucidated. Initially, the resolution that could be obtained was limited by the poor performance of recording media. This technical problem was solved 7 years ago with the introduction of cameras capable of detecting single electrons. The development of cryo-electron microscopy has revolutionized the imaging of biomolecules and propelled biochemistry into a new era. By now, about 1500 structures of proteins and

RNA-protein complexes have been solved and entered in a public database, making this knowledge a fast growing and increasingly important contribution to molecular medicine and the development of drug therapies.

Dr. Frank's achievements were recognized with MSA's Distinguished Biological Scientist award in 2003, and he was named an MSA Fellow in 2009.



Richard Henderson, Ph.D.

Professor of Biochemistry, Medical Research Council Laboratory of Molecular Biology (MRC LMB) - Cambridge, United Kingdom

Single-Particle CryoEM: Potential for Further Improvement

Dr. Richard Henderson developed TEM into a tool for the direct determination of the structure of proteins, and applied it most notably to two-dimensional (2D) crystals of the purple light-harvesting protein, bacteriorhodopsin. Images and electron diffraction patterns of many 2D crystals of bacteriorhodopsin from multiple angles were acquired using low-dose electron exposures, and combined to generate a 3D image of the protein. He continued to refine this technique over many years until he produced images at similar resolutions as those from X-ray diffraction. Later, Dr. Henderson turned his attention to the development and improvement of methods of high-resolution electron cryo-microscopy and single particle structure determination. With colleagues, he advanced these techniques for exploring high resolution ultrastructure of membrane proteins, protein complexes and other non-crystalline biomolecules in solution. During this journey, Dr. Henderson made critical contributions to many of the single particle electron microscopy approaches, including pioneering the development of direct electron detectors.

Dr. Richard Henderson was presented with MSA's Distinguished Biological Scientist award in 2005, and was named as an MSA Fellow in 2009.



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Pre-Meeting Congresses

- Separate registration fee required. See **registration information** (</MandM/2019/registration/fees.cfm>), and form for details (online registration open/available March 3, 2019).
- See individual PMC listings below for information on meals and breaks.

X60 Third Annual Pre-Meeting Congress for Students, Post-Docs, and Early-Career Professionals in Microscopy and Microanalysis

(/MandM/2019/program/congress_x60.cfm)

Saturday, August 3, 2019 • 8:30 AM - 5:00 PM

Separate registration required.

INCLUDED IN REGISTRATION FEE:

Friday evening social event; breakfast, AM Break, Lunch, PM Break, Saturday evening banquet

Organized by the Microscopy Society of America Student Council (StC)

FINAL PROGRAM AGENDA and PRESENTATIONS (PMCx60 Program.pdf)

PROGRAM CHAIR:

Ethan Lawrence, Arizona State University

This pre-meeting congress is organized by and for students, postdocs, and early-career professionals, and provides:

- A forum for early-career professionals to deliver presentations to peers ahead of the meeting;

- Opportunities to share research and data in an engaging, non-intimidating, and interactive setting;
- Expanded professional networking, and career development mentoring from recent graduates;
- The opportunity to win awards, determined by peer voting.

X61 NexTEM: Next-Generation Transmission Electron Microscopy (NexTEM_2019_Announcement.pdf)

(Please click on the above title to view & download topic and speaker information.

Click [HERE \(x61_agenda.cfm\)](#) to see the detailed agenda.

Sunday, August 4, 2019 • 8:30 AM - 5:00 PM

Separate registration and fee required.

INCLUDED IN REGISTRATION FEE:

Breakfast, AM Break, Lunch, PM Break, Reception

Supported by the Aberration Corrected Electron Microscopy FIG.

ORGANIZERS:

Steven R. Spurgeon, Pacific Northwest National Laboratory

Mitra L. Taheri, Johns Hopkins University

Demie Kepaptsoglou, SuperSTEM, United Kingdom

We are grateful to our X61 sponsors for their generous support:

Direct Electron
INNOVATION PROPELLING DISCOVERY



GATAN



HUMMINGBIRD
SCIENTIFIC





(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)

RAITH (<http://www.raith.com/>)
NANOFABRICATION



(<http://www.gatan.com/>)

Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Microscopy Outreach Sessions

X91 Microscopy Explorations for Families and Kids of All Ages

X92 Microscopy Outreach - ProjectMICRO

The Project MICRO workshop is located in the MSA Megabooth all week after the Exhibit Hall opens. Visit the Outreach booth every day to see how to set up different stations in a classroom, and share your experiences with how you have fun with microscopy outreach. See different microscope systems for use in a classroom, in action; peruse the books suitable for elementary school age children; and put your name into a draw for the daily door prize.



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (mailto:AssociationManagement@microscopy.org) – **Terms of Use** (/terms.cfm)



Sunday Short Courses

- All Sunday Short Courses start at 8:30 AM and end by 5:00 PM.
- Mid-morning and mid-afternoon coffee breaks are provided.
- Breakfast and lunch are on your own.
- A Certificate of Attendance will be emailed to each participant.

X-10 High-Resolution Structure Determination by Cryo-EM: What Could Possibly Go Wrong?

LEAD INSTRUCTORS:

Anchi Cheng, New York Structural Biology Center

Steve Ludtke, Baylor College of Medicine

- Specimen preparation and plunge-freezing choices and considerations
- Data collection - Camera and TEM parameters, TEM automation
- Initial image processing from raw data
- Single-particle reconstruction, choices and validation
- Structure modeling and results presentation

X-11 Super-Resolution Microscopy: Potential, Mechanics, Implementation, and Practicalities

LEAD INSTRUCTORS:

Bryan Millis, Vanderbilt University

Simon Watkins, University of Pittsburgh

- What is "super-resolution microscopy" and do you need it?
- What are the various approaches available and how does each work?
- What are the strengths and weaknesses of each method?
- Practicalities of running super-resolution imaging in a multi-user facility

- How practical is live-cell super-resolution microscopy?
- Common pitfalls of super-resolution microscopy

X-12 Selecting and Optimizing Image Information in the SEM and VPSEM

LEAD INSTRUCTOR:

Bradley Thiel, SUNY Polytechnic Institute

- Understanding the imaging options for materials and biological application-specific SEM use
- Determining specific conditions for the most-relevant sample imaging
- Modern electron detection systems and stage/column variables for SEM/VPSEM
- Tools for measurement and resolution determination

X-13 Modern Electron Crystallography for Materials Sciences and Biology

LEAD INSTRUCTORS:

Sergei Rouvimov, University of Notre Dame

Roberto Reis, Northwestern University

Peter Moeck, Portland State University

- Recent developments in electron crystallography for nanomaterials including soft and biological materials
- Basics of scanning electron diffraction methods for microstructure analysis including bio-crystals
- Electron crystallography applications for structural biology, including protein crystals
- Cryo-electron crystallography, including single-particle cryo-EM
- New experimental and computer-simulation techniques to improve the speed and reliability of structure characterization

X-14 In Situ and Operando Approaches to TEM

LEAD INSTRUCTORS:

Robert Sinclair, Stanford University

Peter Crozier (tentative), Arizona State University

This course will introduce the fundamental concepts for in situ electron microscopy, and will include:

- Hot stages

- Gas cells
- Liquid cells
- Biasing holders
- Magnetic field
- Light illumination

X-15 Data Analysis in Materials Science

INSTRUCTORS:

Duncan Johnstone, University of Cambridge, United Kingdom

Katherine E. MacArthur, Forschungszentrum JÄ¼lich, Germany

Magnus Nord, University of Antwerp, Belgium

Eric Prestat, University of Manchester, United Kingdom

Joshua Taillon, National Institute of Standards and Technology

- Introduction to HyperSpy and related Python libraries for multi-dimensional image and spectra processing and analysis
- Machine learning
- Big data analysis strategies
- Curve fitting of multi-dimensional datasets
- EELS and EDS analysis
- Atomic resolution image analysis



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (mailto:AssociationManagement@microscopy.org) – **Terms of Use** (/terms.cfm)



PHYSICAL SCIENCES TUTORIALS

X40 Following the Electrons: Simulation for High-Resolution STEM and CBEDs

PRESENTER:

Mark P. Oxley, Oak Ridge National Laboratory

Mark Oxley is a research scientist in the Materials Science and Technology Division at Oak Ridge National Laboratory. His expertise is the simulation and quantification of scanning transmission electron microscopy images and spectroscopy. He is also working on the accurate simulation of 4D STEM data sets to be used as training sets for deep learning algorithms.



- Introduction to basic STEM simulation techniques and the requirement for convergence
- Simulation of electron energy loss spectroscopy for core and low loss excitations
- The importance of including the contribution of electrons that have undergone thermal diffuse scattering
- Convergent beam diffraction patterns: requirements for quantitative simulation

X41 Entrepreneurship in the Microscopy Community

PRESENTER:

Daniel Masiel, Integrated Dynamic Electron Solutions

Dan founded Integrated Dynamic Electron Solutions (IDES) fresh out of grad school. IDES allows researchers to illuminate nanoscale dynamics with its line of time-resolved imaging products spanning femtosecond to millisecond time scales.

- Instrumentation development and commercialization
- Practical steps to take when starting your own business
- Business start-up best practices
- Financing a scientific instrumentation company



X42 Efficient Phase Contrast Imaging via Electron Ptychography

PRESENTER:

Timothy J. Pennycook, Max Planck Institute for Solid State Research, Germany

Timothy Pennycook is a Scientist at the Max Planck Institute for Solid State Research. His research focuses on developing methods to extract the maximum information out of samples, including using dose efficient 4D STEM methods such as ptychography to see beam sensitive materials more clearly before they are destroyed. He programmed the first implementation of single side band ptychography which has now evolved into ptychoSTEM, a free and open source package for performing ptychography.



- Introduction to ptychography
- Hardware considerations; fast cameras
- Introduction to the free and open source ptychoSTEM package
- Processing the data and performing post collection aberration correction and optical sectioning

BIOLOGICAL SCIENCES TUTORIALS

X43 Expanding the Computational Toolbox for CryoEM

PRESENTER:

Alberto Bartesaghi, Duke University

Alberto Bartesaghi, PhD is currently an Associate Professor of Computer Science, Electrical Engineering and Biochemistry. He pushed the resolution of cryoEM protein structure determination during his tenure as a post-doctoral fellow and staff scientist at the National Cancer Institute in the Sriram Subramaniam lab.



- Robust strategies for particle picking and sorting

- Per-particle frame alignment for high-resolution cryoEM
- Data-driven approaches for optimal exposure weighting
- Unsupervised image sorting using Machine Learning algorithms
- Towards fully automated cryoEM workflows

X44 High-End Data Collection for Single-Particle Cryo-EM

PRESENTER:

Felix Weis, The European Molecular Biology Laboratory - Heidelberg, Germany

Felix Weis joined EMBL Heidelberg in April 2017. He is a cryo-EM support scientist taking care of the EMBL platform, providing help, training and support to internal users as well as to external visitors of the facility. His research interests cover many aspects of cryo-EM, including sample preparation, imaging and processing.



- Sample optimization
- Acquisition strategies
- Automation and throughput
- Alternatives for difficult samples

X45 Tips and Tricks for High-Pressure Freezing / Freeze Substitution

PRESENTER:

Martin Schauflinger, University of Missouri

REPLACEMENT: *Christopher Buser, Oak Crest Institute of Science*

Christopher Buser, PhD is currently a senior faculty member at Oak Crest Institute of Science in Electron & Atomic Force Microscopy. His principal research interests include application of high-resolution imaging for biomedical contract research, and development of preparation techniques for atomic force microscopy.



- Sample preparation for high-pressure freezing
- Sample loading into a high-pressure freezer
- Modifying freeze substitution solutions
- Quick freeze substitution



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)



(<http://www.raith.com/>)



(<http://www.gatan.com/>)

Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Technologists' Forum Sessions

X30 - Utilization of the National NIH funded Cryo-EM Centers: Transformative High Resolution Cryo-Electron Microscopy

CHAIRS:

Claudia Lopez, Oregon Health & Science University

Janice G. Pennington, University of Wisconsin-Madison

- Sample preparation "Do's & Don'ts"
- Best approaches for data collection>
- Direct Electron detectors: uses and preferences
- Data processing and handling
- Best practices in a national laboratory
- "Personalities" of different centers

X31 - Roundtable: Technical Careers in Microscopy - For the Love of Microscopy

CHAIRS:

Phoebe J. Doss, University of Texas Southwestern Medical Center

Janice G. Pennington, University of Wisconsin-Madison

A panel of technologists with diverse backgrounds will discuss their careers in microscopy. Learn how they found out about microscopy, why they chose it, and how their career has evolved through the years. The panel will include early and late career technologists from academia and industry. Learn how to become a Certified Electron Microscopy Technologist (CEMT) and what it can do for you to promote your career. Join in the conversation and share your story!

- Technologists from diverse backgrounds in microscopy will speak about their careers.

- How did they find out about microscopy as a career? Why did they choose that instead of all the other options available?
- How has their career developed through the years and what advice do they have for technologists new to the field?

X32 - Imaging Resin Embedded Samples for Serial Block Face Imaging or Array Tomography

CHAIRS:

Janice G. Pennington, University of Wisconsin-Madison

Phoebe J. Doss, University of Texas Southwestern Medical Center

- Array tomography, a technique for imaging serial sections for 3D reconstruction, will be compared with SBFSEM and FIB SEM
- Tips for resin embedding of samples for SEM imaging
- Tips for preparing serial sections for array tomography
- Techniques for correlative light and electron microscopy



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



MEETING AWARDS

How to Apply For an M&M Meeting Award:

As part of the on-line paper submission process, an applicant must flag his or her paper for award consideration. Only one paper may be designated per applicant.

The applicant must appear as first author and presenter of the paper submitted for award. The applicant must provide the name, title, institution, and e-mail address of his or her supervisor, who will be contacted to provide a supporting letter and confirmation of applicability for the indicated award category (e.g. student, post-doc, or technical staff).

GENERAL CONSIDERATIONS:

Award applicants will automatically be considered for memorial scholarships, conferred by MSA based on the generous support of society sponsors. Applicants who have previously received an M&M Meeting Award will not be considered for a second award in the same category.

STUDENTS:

All full-time students enrolled at accredited academic institutions are eligible. High school, undergraduate, and graduate students are encouraged to apply. Applicants are not required to be members of the sponsoring society.

POSTDOCTORAL RESEARCHERS:

All full-time postdoctoral researchers are eligible. Applicants are not required to be members of the sponsoring society.

PROFESSIONAL TECHNICAL STAFF MEMBERS:

Full-time technologists are eligible. In addition, the applicant must be a member of the sponsoring society, current in his or her dues for the year of the meeting.

AMOUNT OF AWARD:

M&M Meeting Awards and memorial awards consist of full meeting registration and up to \$1,000 for travel-related expenses. Original receipts must be provided to receive travel reimbursement. All award winners also receive an invitation to the Presidents' Reception, held on the Tuesday evening of the meeting.

NOTIFICATION OF AWARD:

All award applicants will be notified of their award status approximately eight weeks following the Call for Papers deadline. Unsuccessful applicants will be permitted to withdraw their papers, should their ability to attend the meeting be contingent on the award, within one week following notification.

REQUIREMENTS OF AWARD:

All award winners must present their paper in person at the M&M meeting in order to receive their award. Awardees are expected to attend and participate in the entire meeting, which runs from Sunday evening's opening reception through late Thursday afternoon. Awardees are required to attend the Monday morning plenary session, at which their award will be conferred.

ONSITE AWARDS

The M&M meeting's co-sponsoring societies confer competitively judged awards at the meeting.

MSA Student Poster Awards

We believe poster presentations are an excellent format for all participants to engage in intensive discussion with other researchers in the field. To especially encourage students to take advantage of this opportunity and submit papers for poster presentation, MSA provides cash awards to the most outstanding student posters (first author) each day (up to one in each of three categories).

Diatome Poster Awards

All posters illustrating the use of diamond knife ultramicrocrotomy are eligible. Prizes include cash and Swiss watches.

MAS Best Paper Awards

MAS annually confers awards for papers presented at the M&M meeting deemed to be best in four categories.

Each comes with a cash award generously provided by MAS Sustaining Members.

A NEW MICROGRAPH COMPETITION!

Microscopy Today Micrograph Awards

Scientifically significant micrographs:

Published category (images published in 2018)

Open category (unpublished images)

Video category (movies and 3-D reconstructions)

Submission site will be available in January through the M&M and MSA websites.

Deadline for submission is February 21, 2019

Prizes awarded at M&M 2019 in Portland, Oregon!



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Vendor Tutorials

Company	Booth	Title	Date
3D-Micromac AG	816	Laser-Based Sample Preparation for Microstructure Diagnostics with microPREP	Monday, Aug 5, 2019
Anton Paar USA	910	Surface Characterization with Anton Paar	Monday, Aug 5, 2019
Applied Beams LLC	952	CaesiumXL: new life for your FEI XL-series SEM	Monday, Aug 5, 2019
Clark-MXR, Inc.	1204	Nano- to micro scale fabrication with femtosecond lasers	Monday, Aug 5, 2019
COXEM Co. Ltd.	744	New High Speed SEM Auto-Focus and Auto-B/C with the EM-30 NEXT	Monday, Aug 5, 2019
DigiM Solution LLC	1254	Cloud image processing with data management, AI, and image-based simulation	Monday, Aug 5, 2019
Direct Electron	518	Advancements in Materials Science Enabled by Direct Detection Cameras	Monday, Aug 5, 2019
Electron Microscopy Sciences /Lattice Gear	938	Preparing Surfaces and Cross Sections for Analysis using Dry, Clean and Touchless Methods	Monday, Aug 5, 2019
Electron Microscopy Sciences/Latticegear	938	Surface & Cross Section prep for Analysis	Monday, Aug 5, 2019

Company	Booth	Title	Date
EMCN/ MA-tek	T452	K-kit Meets All Needs for Liquid TEM	Monday, Aug 5, 2019
Gatan	928	4D STEM Diffraction Imaging: An Introduction to Data Acquisition and Processing	Monday, Aug 5, 2019
Henan Zhongjingkeyi Technology Co./ MA-Tek Inc.	T452	K-kit Meets All Needs for Liquid TEM	Monday, Aug 5, 2019
JASCO Inc	1054	Raman Imaging	Monday, Aug 5, 2019
MIPAR Image Analysis	1154	Alternatives to EBSD for Grain Analysis	Monday, Aug 5, 2019
NenoVision	750	AFM-in-SEM: Discover advantages and unique features of correlative imaging	Monday, Aug 5, 2019
point electronic GmbH	549	Improved BSE workflow and quantitative analysis with the new COMPPASS detector	Monday, Aug 5, 2019
Quantum Design Inc.	822	Correlative In-Situ Analysis of Nanostructured Materials by Combination of AFM, SEM, and FIB"	Monday, Aug 5, 2019
RMC Boeckeler	828	The PTFE: A fluorescence ultramicrotome for correlative imaging.	Monday, Aug 5, 2019
Ted Pella Inc	1338	Processing for Light and Electron Microscopy Immunohistochemistry Using the PELCO BioWave	Monday, Aug 5, 2019
TMC	422	Installing Active Vibration Isolation for SEMs, upgrading firmware and monitoring performance	Monday, Aug 5, 2019

Company	Booth	Title	Date
TTP Labtech	1147	Introducing chameleon “ next generation sample preparation for single particle Cryo-EM	Monday, Aug 5, 2019
Vibration Engineering Consultants	1642	The Importance of the Site Survey: What it Reveals, How to Interpret the Data and Why You Should Work with an Independent Provider	Monday, Aug 5, 2019
Vitatech Electromagnetics	712	ACS and Passive Shielding Integration	Monday, Aug 5, 2019
Digital Surf	1352	Apply color to SEM images quickly and easily	Monday, Aug 5, 2019
Physical Electronics	812	The Complimentary Nature of Surface Analysis Techniques (AES/XPS/TOF-SIMS) to Microscopy	Monday, Aug 5, 2019
SEMTECH Solutions, Inc.	530	Converting Used SEMs to Win10 Capable Systems	Monday, Aug 5, 2019
SEMTECH Solutions, Inc.	530	BSE Imaging Demonstration on a XL30 ESEM	Monday, Aug 5, 2019
3D-Micromac AG	816	Laser-Based Sample Preparation for Microstructure Diagnostics with microPREP	Tuesday, Aug. 6, 2019
Agilent Technologies-iLab Solutions	1651	Implementing a Core Facility Management System Leaves Time for Science	Tuesday, Aug. 6, 2019
Anton Paar USA	910	Surface Characterization with Anton Paar	Tuesday, Aug. 6, 2019
Applied Beams LLC	952	CaesiumXL: new life for your FEI XL-series SEM	Tuesday, Aug. 6, 2019
Bruker	638	An alternative method for ultrafast EBSD mapping	Tuesday, Aug. 6, 2019

Company	Booth	Title	Date
Bruker	638	EDS Quantification of electron transparent samples in TEM and T-SEM	Tuesday, Aug. 6, 2019
DigiM Solution LLC	1254	Cloud image processing with data management, AI, and image-based simulation	Tuesday, Aug. 6, 2019
Digital Surf	1352	Particle analysis and classification	Tuesday, Aug. 6, 2019
Direct Electron	518	Applications of 4D STEM in Materials Science	Tuesday, Aug. 6, 2019
E.A. Fischione Instruments, Inc.	846	Optimal TEM specimen preparation post-FIB milling: PicoMill™ TEM specimen preparation system	Tuesday, Aug. 6, 2019
EMCN/ MA-tek	T452	K-kit Meets All Needs for Liquid TEM	Tuesday, Aug. 6, 2019
Ephemeron Labs	1447	Quantitative EBIC and current based imaging	Tuesday, Aug. 6, 2019
Fluid Imaging Technologies	448	Introduction to Flow Imaging Microscopy - Rapid Particle Characterization and Enumeration in a Fluid Stream	Tuesday, Aug. 6, 2019
Gatan	928	Advanced EELS Analysis: Spectral Fitting, PCA and Standards Based Quantification	Tuesday, Aug. 6, 2019
Henan Zhongjingkeyi Technology Co./ MA-Tek Inc.	T452	K-kit Meets All Needs for Liquid TEM	Tuesday, Aug. 6, 2019
Hitachi High Technologies America	1438	Modern SEM-based STEM Imaging and Tips	Tuesday, Aug. 6, 2019
HREM Research Inc.	537	Rigid/non-rigid distortion correction	Tuesday, Aug. 6, 2019

Company	Booth	Title	Date
Hummingbird Scientific	1045	In-situ TEM biasing of different sample geometries at elevated or cooled temperatures	Tuesday, Aug. 6, 2019
ibidi USA, Inc.	438	Intro to ibidi StageTop Incubator	Tuesday, Aug. 6, 2019
ibss Group, Inc.	1552	SEM Hydrocarbon Mitigation	Tuesday, Aug. 6, 2019
IDES, Inc.	1451	Electrostatic Subframing, Compressive Sensing, and Kilohertz TEM Video	Tuesday, Aug. 6, 2019
JASCO	1054	Infrared Microscopy	Tuesday, Aug. 6, 2019
JEOL USA, Inc	623	4D STEM with the pixelated STEM detector "4D Canvas"	Tuesday, Aug. 6, 2019
Leica Microsystems	538	Presentation and Hands-on Session: EM ICE High Pressure Freezing system: Unique offerings by Leica Microsystems	Tuesday, Aug. 6, 2019
Linkam Scientific Instruments	551	Tools for Cryo Correlative Microscopy	Tuesday, Aug. 6, 2019
Microscopy Innovations	1049	Next-generation Automated Biological Specimen Prep for TEM	Tuesday, Aug. 6, 2019
MIPAR Image Analysis	1154	Challenging Micrograph Analysis: The Latest in Computer Vision	Tuesday, Aug. 6, 2019
NenoVision	750	AFM-in-SEM: Discover advantages and unique features of correlative imaging	Tuesday, Aug. 6, 2019
Nion Co.	1102	Latest Developments with Nion Microscopes	Tuesday, Aug. 6, 2019

Company	Booth	Title	Date
Object Research Systems	937	How Deep Learning Actually Works: Understanding this huge leap in imaging science	Tuesday, Aug. 6, 2019
Physical Electronics	812	Using AES, EDS, and FIB to Detect, Identify, and Image Buried Metallic Particles	Tuesday, Aug. 6, 2019
point electronic GmbH	549	How to measure height in SEM with BSE topography	Tuesday, Aug. 6, 2019
Protochips	644	In Situ TEM: Creating more realistic experimental environments for materials research by precisely controlling the introduction of humidity	Tuesday, Aug. 6, 2019
Quantum Design Inc.	822	Correlative In-Situ Analysis of Nanostructured Materials by Combination of AFM, SEM, and FIB"	Tuesday, Aug. 6, 2019
SEMTECH Solutions, Inc.	530	Converting Used SEMs to Win10 Capable Systems	Tuesday, Aug. 6, 2019
SEMTECH Solutions, Inc.	530	BSE Imaging Demonstration on a XL30 ESEM	Tuesday, Aug. 6, 2019
Technex Lab Co., Ltd.	443	How good are the Permanent Magnetic Lenses for the electron microscopy?	Tuesday, Aug. 6, 2019
Thermo Fisher Scientific	1038	Aquilo™ cryo-FIB - the leading platform for cryo-tomography sample preparation	Tuesday, Aug. 6, 2019
TMC	422	Installing Active Vibration Isolation for SEMs, upgrading firmware and monitoring performance	Tuesday, Aug. 6, 2019
TTP Labtech	1147	Introducing chameleon - next generation sample preparation for single particle Cryo-EM	Tuesday, Aug. 6, 2019

Company	Booth	Title	Date
TVIPS	720	CMOS based TEM Camera Technology	Tuesday, Aug. 6, 2019
Vitatech Electromagnetics	712	ACS and Passive Shielding Integration	Tuesday, Aug. 6, 2019
ZEISS Microscopy	1117	A Sneak Preview of the Latest Atlas 5 2D & 3D Features for Crossbeam and SEM Microscopes	Tuesday, Aug. 6, 2019
zeroK NanoTech	715	New High-Performance FIB and SIMS Systems	Tuesday, Aug. 6, 2019
3D-Micromac AG	816	Laser-Based Sample Preparation for Microstructure Diagnostics with microPREP	Wednesday, Aug. 7, 2019
Analitex	820	New TEM software for automated phase analysis and identification of compounds	Wednesday, Aug. 7, 2019
Applied Beams LLC	952	CaesiumXL: new life for your FEI XL-series SEM	Wednesday, Aug. 7, 2019
DigiM Solution LLC	1254	Cloud image processing with data management, AI, and image-based simulation	Wednesday, Aug. 7, 2019
Digital Surf	1352	SEM image 3D reconstruction	Wednesday, Aug. 7, 2019
Direct Electron	518	Unique Benefits of the DE-64 for Cryo-EM	Wednesday, Aug. 7, 2019
E.A. Fischione Instruments, Inc.	846	Versatile and reliable sample preparation for SEM: Model 1061 SEM Mill	Wednesday, Aug. 7, 2019
EMCN/ MA-tek	T452	K-kit Meets All Needs for Liquid TEM	Wednesday, Aug. 7, 2019
FOM Networks, Inc.	528	Keep Track of User Safety Training Records with FOM	Wednesday, Aug. 7, 2019

Company	Booth	Title	Date
Gatan	928	What's New in Gatan Microscopy Suite?	Wednesday, Aug. 7, 2019
Henan Zhongjingkeyi Technology Co./ MA-Tek Inc.	T452	K-kit Meets All Needs for Liquid TEM	Wednesday, Aug. 7, 2019
Hitachi High Technologies America	1438	SPARKLE II - Electron Based Electron Microscope Chamber and Specimen Cleaning System	Wednesday, Aug. 7, 2019
HREM Research Inc.	537	Quantitative Differential Phase Contrast	Wednesday, Aug. 7, 2019
Hummingbird Scientific	1045	Next generation operando TEM liquid cell sample holders	Wednesday, Aug. 7, 2019
Leica Microsystems	538	Presentation and Hands-on Session: Serial Sectioning for Array Tomography with the ARTOS 3D	Wednesday, Aug. 7, 2019
Linkam Scientific Instruments	551	Tools for Cryo Correlative Microscopy	Wednesday, Aug. 7, 2019
Microscopy Innovations	1049	Automated Immunogold Labeling of Biological Specimens for TEM	Wednesday, Aug. 7, 2019
MIPAR Image Analysis	1154	Bio Image Analysis: Detecting Complex Features	Wednesday, Aug. 7, 2019
NenoVision	750	AFM-in-SEM: Discover advantages and unique features of correlative imaging	Wednesday, Aug. 7, 2019
Nion Co.	1102	Nion Swift - A tool for Data Acquisition, Analysis, and Advanced Microscopy	Wednesday, Aug. 7, 2019
Object Research Systems	937	Customized Deep Learning Solution in Twenty Minutes	Wednesday, Aug. 7, 2019
point electronic GmbH	549	Rediscovering EBAC imaging mode in SEM	Wednesday, Aug. 7, 2019

Company	Booth	Title	Date
Protochips	644	Operando liquid-electrochemical TEM for monitoring the charge/discharge processes inside Li/Na-ion Batteries	Wednesday, Aug. 7, 2019
Quantum Design Inc.	822	Correlative In-Situ Analysis of Nanostructured Materials by Combination of AFM, SEM, and FIB"	Wednesday, Aug. 7, 2019
RMC Boeckeler	828	Automated section collection using ATUMtome and ASH2 for the CLEM workflows	Wednesday, Aug. 7, 2019
SEMTECH Solutions, Inc.	530	Converting Used SEMs to Win10 Capable Systems	Wednesday, Aug. 7, 2019
SEMTECH Solutions, Inc.	530	BSE Imaging Demonstration on a XL30 ESEM	Wednesday, Aug. 7, 2019
Thermo Fisher Scientific	1038	Mitigating Charge in an SEM	Wednesday, Aug. 7, 2019
TMC	422	Installing Active Vibration Isolation for SEMs, upgrading firmware and monitoring performance	Wednesday, Aug. 7, 2019
Vibration Engineering Consultants	1642	The Importance of the Site Survey: What it Reveals, How to Interpret the Data and Why You Should Work with an Independent Provider	Wednesday, Aug. 7, 2019
Vitatech Electromagnetics	712	ACS and Passive Shielding Integration	Wednesday, Aug. 7, 2019
ZEISS Microscopy	1117	"Nice image, what am I looking at?" - Nano-analysis on the HIM using VECTOR 500 SIMS	Wednesday, Aug. 7, 2019



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors



(<https://www.tescan.com/en-us/>)



(<http://www.jeolusa.com/>)



(<https://www.hitachi-hightech.com/us/>)



(<https://www.zeiss.com/microscopy/int/home.html>)



(<http://www.raith.com/>)



(<http://www.gatan.com/>)

Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Social Events, Tours & Activities

Events and Activities Sponsored and Organized by the Pacific Northwest Microscopy Society (Local Host Committee)

For reservations and directions: <https://squareup.com/market/pacific-northwest-microscopy-society> (<https://squareup.com/market/pacific-northwest-microscopy-society>)

Pub Crawl



Tuesday, August 6, 2019

8:00 to 10:30pm

Meet at the Convention Center (specific location TBA)

\$6/person

Advance registration required!

Join your PNMS host committee for an evening of local beer and socializing. We will visit 3 Portland breweries, all within walking distance of the convention center, that serve a variety of beers from sours to stouts. Your first round is free!

Willamette River Dinner Cruise



This event is made possible by the generous support of Stacie Kirsch at EMS and Paul DeGeorge at Marine Reef International.

Enjoy dinner and a Portland river tour aboard the Portland Spirit!

Wednesday, August 7, 2019

6:30 - 9:30 PM

(6:00 PM boarding from the Salmon St. / Naito Parkway embarkation in downtown Portland.)

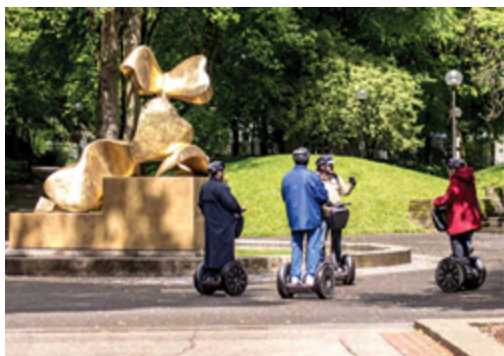
\$45 per person

\$25 per person (students only - will be verified)

Space is limited! Advance reservations required!

Fresh Northwest cuisine, grand scenery and a warm summer evening are the main ingredients you need for a memorable dinner cruise. Join fellow M&M attendees for a chartered 2.5-hour sail aboard the Portland Spirit (<http://www.portlandspirit.com> (<http://www.portlandspirit.com>)), a 150' yacht with panoramic views from 3 decks, two of which are enclosed and climate controlled. The cruise will take you on a unique tour through downtown Portland on the Willamette River while you enjoy your dinner. Several full service no-host (cash) bars provide wine and other beverage service.

Portland Segway Tour - Discover Portland on a Segway!



Tuesday August 6, 2019

4:00 - 6:00 PM; meet at Lovejoy Fountain Park (find it on Google Maps)

\$30/person

Advance registration required (limited to 15 people)



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors





(<https://www.zeiss.com/microscopy/int/home.html>)



Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management** (<mailto:AssociationManagement@microscopy.org>) – **Terms of Use** (</terms.cfm>)



Post-Deadline Posters

The deadline for submitting a post-deadline poster has now passed.

The Call for Papers for M&M 2020 in Milwaukee, Wisconsin will be posted by December 3, 2019. Mark your calendar!

Click on each paper title to link to the submitted post-deadline paper. All Post-Deadline Papers below will be presented as Posters on Monday, August 5, 2019, from 3-5 PM, in the poster area of the M&M 2019 Exhibit Hall.

Post-deadline papers are not included in the program or proceedings.

Board Number	Presenter Name	Paper Title
PDP-1	Yingge Du	Imaging the Phase Evolution Processes in Brownmillerite-Structured Strontium Ferrite Thin Films (abstracts/PDP-1.pdf)
PDP-2	Szu-Chi-Chung	A Two-Stage Dimension Reduction Method for Cryo-EM Image Processing (abstracts/PDP-2.pdf)
PDP-3	William Hubbard	A Strain Map Tensor Rotation and Strain Field Mapping Script for Digital Micrograph (abstracts/PDP-3.pdf)
PDP-4	Christopher Russo	Patterned Functionalization of Graphene Specimen Supports for CryoEM with a Low-energy Plasma Instrument (abstracts/PDP-4.pdf)
PDP-5	Yifei Yuan	Revealing the Atomistic Kinetics of Phase Transition from 2D Layers to 1D Tunnels in Transitional Metal Oxides (abstracts/PDP-5.pdf)
PDP-6	Christopher Own	NASA Extreme Environment Mission Operations: First Underwater Spectroscopic Scanning Electron Microscopy (abstracts/PDP-6.pdf)
PDP-7	Justin Ondry	Using Electron Dose Rate Controlled High Resolution TEM to Study Dislocation Dynamics in Imperfectly Attached CdSe Nanocrystals (abstracts/PDP-7.pdf)

PDP-8	Samuel Rogers	The Oxidation of 316 Stainless Steel and its Effect on Galling Behaviour (abstracts/PDP-8.pdf)
PDP-9	Hirofumi Iijima	Development of Cryo High-Resolution Transmission Electron Microscope Equipped with Cold Field Emission Gun for Structural Biology (abstracts/PDP-9.pdf)
PDP-10	Yuzhang Li	Cryogenic-Electron Microscopy for Battery Materials (abstracts/PDP-10.pdf)
PDP-11	Robert Keyse	Useful Technique to Help with 3D Sectioning in the Search for Nanoparticles (abstracts/PDP-11.pdf)
PDP-12	Stephen Aro	Large Area SEM Imaging in Coatings Research (abstracts/PDP-12.pdf)
PDP-13	Harsha Gwalani	Simulation of Solute Clusters in Metallic Systems (abstracts/PDP-13.pdf)
PDP-14	Kexi Yi	3D Reconstruction of the Yeast Cell Using Array Tomography (abstracts/PDP-14.pdf)
PDP-15	Rina Yokoi	High-Brightness Bunched Electrons Using a Semiconductor Photocathode and Optimized Acceleration Field (abstracts/PDP-15.pdf)
PDP-16	Lina Mizuno	Fine Structure of Plasmon Hybridization on Au Nanotriangles via STEM-EELS (abstracts/PDP-16.pdf)
PDP-17	Jackson Spurling	Characterization of B6Si as an Active Filler for 3D Printing (abstracts/PDP-17.pdf)
PDP-18	Anhong Zhou	Cytoprotective Effect of Antioxidant on Diesel Exhaust Particles-Induced Lung Cancer Cells Damage Using Raman Spectroscopy (abstracts/PDP-18.pdf)
PDP-19	Carley Goodwin	A MicroCT Investigation of Dentin Tubules in a Human Upper Molar (abstracts/PDP-19.pdf)
PDP-20	Takafumi Ishida	Atomic Resolution Imaging with an Electron Bessel Beam in Aberration Corrected Scanning Transmission Electron Microscopy (abstracts/PDP-20.pdf)
PDP-21	Anna Walkiewicz	Ultrathin Metal Coatings as a Solution for Successful SEM Imaging of Nano-electrospinning Fibers (abstracts/PDP-21.pdf)
PDP-22	Circe Verba	Microanalysis of Rare Earth Elements in Coal Prep Fines (abstracts/PDP-22.pdf)
PDP-23	Westley Collins	Element Peak Shift in WDX (abstracts/PDP-23.pdf)
PDP-24	Anthony Fogl	Surface Deformation of Plastic and Composite Substrates as a Function of Temperature (abstracts/PDP-24.pdf)

PDP-25	Kiminori Toyooka	Fluorescence Detection of Fluorescence-labeled Organelles In-resin Section using Antifade Reagents in Correlative Light and Electron Microscopy (abstracts/PDP-25.pdf)
PDP-26	Gethin Owen	A Minimally Destructive Correlative Tomography Workflow for Characterizing Large Heterogeneous Samples (abstracts/PDP-26.pdf)
PDP-27	Jucheol Park	Energy Loss Near Edge Structure (ELNES) spectra of High-k Dielectric Thin Films: First-Principles Calculations using the Wien2k (abstracts/PDP-27.pdf)
PDP-28	Jeremy Axelrod	Phase Contrast Electron Microscopy Using Lasers (abstracts/PDP-28.pdf)
PDP-29	Mi-Hyang Sheen	"Comparison of Microstructure Evolution in Copper Thin Films Prepared by AC and DC Reactive Magnetron Sputtering" (abstracts/PDP-29.pdf)
PDP-30	SeHo Kim	Nanoparticle Sample Preparation for Atom Probe Tomography: Electroplating Fixation (abstracts/PDP-30.pdf)
PDP-31	Melinda Shearer	Analyzing Complex Coatings Systems using Time-of-Flight Secondary Ion Mass Spectrometry (abstracts/PDP-31.pdf)
PDP-32	Casey McKinney	High Burnup UO₂ Bubble Structure Characterization Utilizing Focused Ion Beam Tomography (abstracts/PDP-32.pdf)
PDP-33	Charudatta Phatak	"Automated Data Curation for Electron Microscopy using the Materials Data Facility" (abstracts/PDP-33.pdf)
PDP-34	Sunah Kwon	In-situ STEM Observation of Copper Migration with Graphene as Diffusion Barrier under Bias-Temperature-Stress (abstracts/PDP-34.pdf)
PDP-35	Jason Tam	UV-based In-situ Cleaning System for the Chamber of Electron Microscope (abstracts/PDP-35.pdf)
PDP-36	Hsin-Hung Lin; Wei-Hau Chang	Revising the Structure of an Initiating RNA Polymerase II at Near 3 Å... Resolution with Small-tilt Single Particle Cryo-EM (abstracts/PDP-36.pdf)
PDP-37	Zuzana Nichtova	Transgenic Sarcoplasmic Reticulum-Mitochondria Linker in Mouse Heart (abstracts/PDP-37.pdf)
PDP-38	Yu-Chih (Grace) Lo	A Lower Image Background Helps the 3D Reconstruction of Small Complexes in NF-κB Activation (abstracts/PDP-38.pdf)
PDP-39	Mol Mir	Making Data Interactive: 3D EM of Dividing Cells in a Regenerating Planarian (abstracts/PDP-39.pdf)
PDP-40	Saiphaneendra Bachu	Atomic Structure of Vertical and In-Plane Heterostructures Formed by Two-Dimensional MoS₂ and ReS₂ (abstracts/PDP-40.pdf)

PDP-41	Philipp Pelz	Phase Retrieval of the Scattering Matrix and Aberration Retrieval from Scanning Diffraction Measurements (abstracts/PDP-41.pdf)
PDP-42	Melissa Santala	"Measurement of crystallization kinetics in phase change materials using multiple microscopic techniques" (abstracts/PDP-42.pdf)
PDP-43	Irene Andreu	Interaction Between Cyanobacteria and Microplastics in Suspension by CryoSEM (abstracts/PDP-43.pdf)
PDP-44	Naohiko Kawasaki	"Direct observation of standing waves formed by waveguide mode in thin Si specimen using STEM-Cathodoluminescence spectroscopy" (abstracts/PDP-44.pdf)
PDP-45	Janet Gbur	Characterization of Corrosion in Stainless Steel Percutaneous Leads Located Exterior to the Body Using Advanced Imaging Techniques (abstracts/PDP-45.pdf)
PDP-46	Steven Goodman	Effects of Postnatal Hyperoxia Exposure on Cardiac Muscle Examined with 3D Serial Block Face SEM using Rapid Automated Sample Preparation (abstracts/PDP-46.pdf)
PDP-47	Andrew Thron	Studying The Oxidation Behaviour of InAlN Thin Films Using Aberration Corrected STEM and EELS (abstracts/PDP-47.pdf)
PDP-48	Ellen Lavoie	Plant Sample Prep for TEM: the Good vs. the Bad of Chemical Fixations (abstracts/PDP-48.pdf)
PDP-49	Andrew Howe	The Electron Bio-Imaging Centre (eBIC) (abstracts/PDP-49.pdf)
PDP-50	Yi Zhang	Probing Single Mn atom in doped MoS₂ Monolayer (abstracts/PDP-50.pdf)
PDP-51	David Bell	Three Dimensional SEM Examination of Porous Polymer Membrane Using the ThermoFisher Apreo VolumeScope (abstracts/PDP-51.pdf)
PDP-52	Melainia McClain	Automated Heavy Metal Tissue Staining for Serial Block Face Imaging with the ASP-1000 (abstracts/PDP-52.pdf)
PDP-53	Tyler Lewis	Histone Variant H2A.Z Nucleosome Incorporation Confers Unique Structural Characteristics of Chromatin (abstracts/PDP-53.pdf)
PDP-54	Mengyu Wu	Pushing Single-Particle Cryo-EM To The Theoretical Size and Resolution Limits At 200 keV (abstracts/PDP-54.pdf)
PDP-55	Fredrik Gustavsson	Characterization of Embedded Secondary Phase Carbides in Low-alloyed Martensitic Steels using a Combination of High-resolution Techniques (abstracts/PDP-55.pdf)



(<https://www.microscopy.org/>)



(<http://www.microbeamanalysis.org/>)



2019 Sponsors





Copyright © 2023 Microscopy Society of America

11130 Sunrise Valley Drive, Suite 350, Reston, VA 20191 – Tel: (703) 234-4115 – Fax: (703) 234-4147

Email: **Association Management (mailto:AssociationManagement@microscopy.org)** – **Terms of Use (/terms.cfm)**