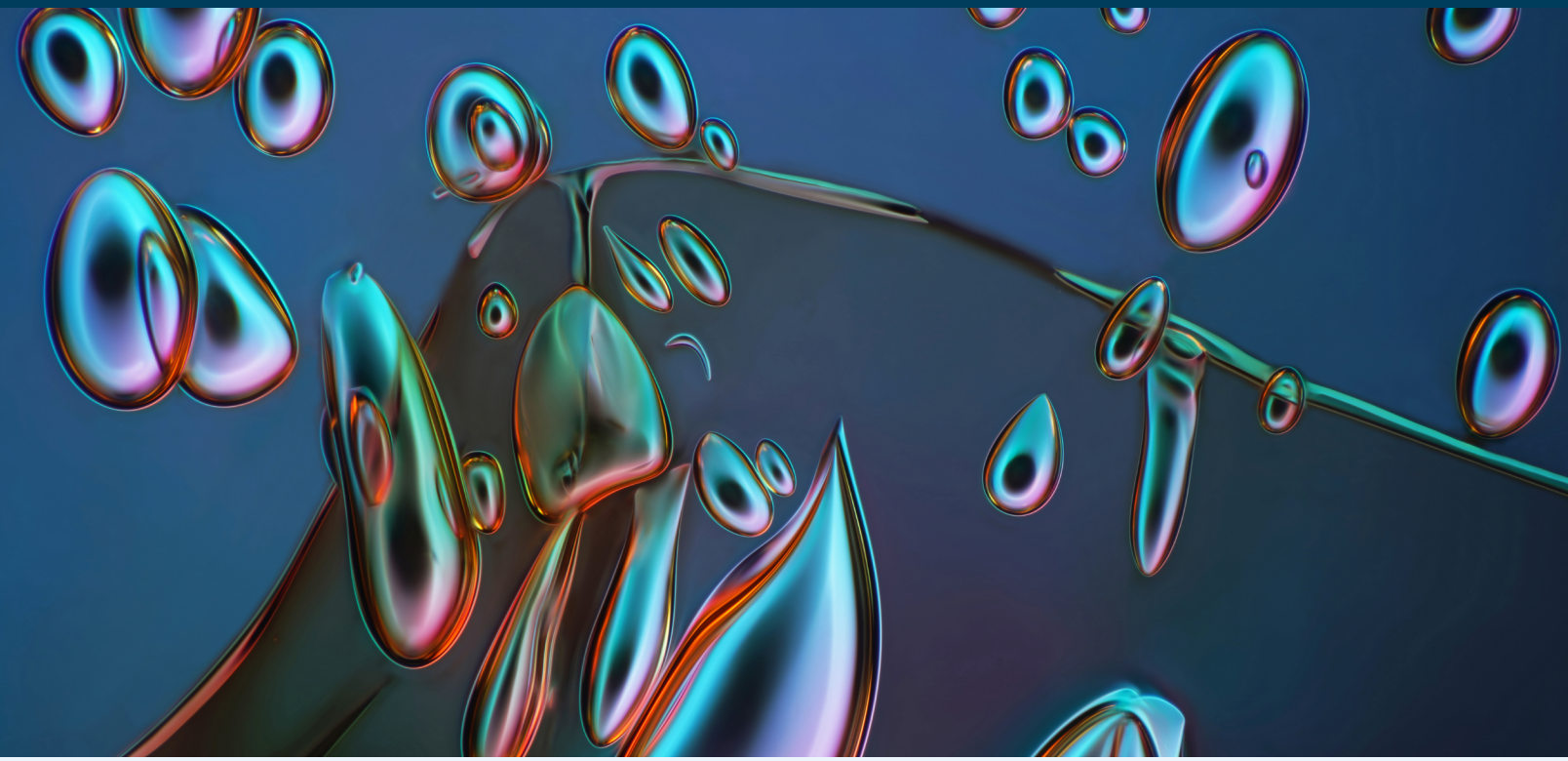
CALL FOR SUBMISSIONS

Opens: **December 2, 2025** | Submission Deadline: **February 10, 2026**



M&M 2026

MICROSCOPY & MICROANALYSIS

August 2-6 • Milwaukee, WI

MSA Microscopy Society of America

MAS Microanalysis Society

www.microscopy.org/MandM/2026

for up-to-date meeting information

M&M 2026
MICROSCOPY & MICROANALYSIS

Grant Jensen
Brigham Young University
President,
Microscopy Society of America

Andy Herzing
National Institute of Standards
and Technology
President, Microanalysis Society

Questions?

TECHNICAL MEETING CONTENT:
2026 Program Chair
Mitra Taheri, Johns Hopkins |Whiting School of Engineering
2026ProgramChair@microscopy.org

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MSA Microscopy Society of America

Visit **http://microscopy.org** to join the Microscopy Society of America online, or for more information about the benefits of MSA membership.

MAS Microanalysis Society

Visit **http://the-mas.org** to find out the benefits of MAS membership.

The Microscopy Society of America (MSA) and the Microanalysis Society (MAS) invite you to attend the Microscopy & Microanalysis (M&M) 2026 meeting in Milwaukee, Wisconsin, from August 2 to August 6, 2026.

Milwaukee, known for its rich cultural heritage, vibrant lakefront, and welcoming Midwestern charm, offers an outstanding setting for M&M 2026. Offering easy access, modern amenities, and plenty to see and do, Milwaukee offers a perfect location for education and an unforgettable summer destination.

The success of each M&M meeting is driven by the dedication of hundreds of symposium organizers who identify emerging research directions and bring together experts from around the world to share their work. For M&M 2026, more than 120 symposium organizers have assembled a robust program, including symposia in the physical sciences, analytical sciences, biological sciences, and cross-cutting topics. We encourage you to support these sessions by submitting abstracts of your own research and contributing to both platform and poster presentations.

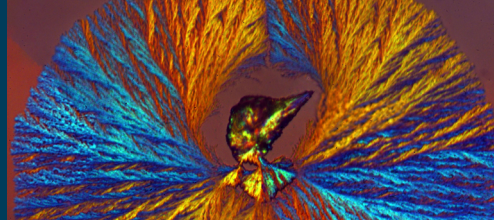
In addition to the symposia, M&M 2026 will feature Pre-Meeting Congresses (PMCs) and Sunday Short Courses, offering unique opportunities for focused learning. Space for these pre-meeting events is limited, so early registration is recommended.

On behalf of MSA, MAS, the M&M 2026 Executive Program Committee, the meeting management team, symposium organizers, and volunteers, we look forward to welcoming you to Milwaukee for an exciting and inspiring Microscopy & Microanalysis 2026

Mitra L. Tehari
Johns Hopkins | Whiting School of Engineering
M&M 2026 Program Chair

MICROGRAPH ON FRONT COVER: ***Bubbly alcohol.*** *Unusual air bubbles in melted polyvinyl alcohol. Polarized light microscopy.* ***Image by Marek Mis, Marek Mis Photomicrography, Suwalk, Poland***

Analytical Sciences/ Instrumentation Advances



A01 Advancements in Forensic Chemistry: Microscopy and Microanalysis Techniques

ORGANIZERS:

Xavier Odihirin, Bristol Myers Squibb
Ravi Kalyanaraman, Bristol Myers Squibb

- Cutting edge research: Presentations on the latest advancements in forensic chemistry.
- Microscopy and microanalysis: Focus on techniques like SEM/EDS, FT-IR, and Raman micro-spectroscopy.
- Trace evidence analysis: Applications in analyzing trace evidence and materials characterization.
- Case studies: Real-world examples demonstrating the use of these techniques and methodologies in forensic investigations.
- Technological innovations: Insights into new technologies and their impact on forensic chemistry.
- Practical challenges: Discussion of the challenges faced by forensic chemists in the field.

A02 Advances in 4DSTEM Experimentation, Analysis and Interpretation

ORGANIZERS:

Ian MacLaren, University of Glasgow
Colin Ophus, Stanford University
Stephanie Ribet, Lawrence Berkeley Nation Laboratory

- 4DSTEM / SEND / SPED.
- Detectors and acquisition systems.
- Processing software, computer infrastructure, machine learning.
- Interpretation and simulation of 4DSTEM results.
- Applications of 4DSTEM.

A03 Advances in Atom Probe Tomography: Instrumentation, Reconstruction, and Novel Applications

ORGANIZERS:

Eason (Yi-Sheng) Chen, Nanyang Technological University
Claudia Fleischmann, imec
Sandra Taylor, Pacific Northwest National Laboratory (PNNL), USA
Se-Ho Kim, Korea University

Sponsored by the Atom Probe Tomography Focused Interest Group

- Latest advances in APT instrumentation and correlated microscopy with APT.
- APT software and modeling, artificial intelligence algorithm for APT.
- Advances in using APT for characterizing structural materials.
- New applications in functional and biological materials characterizations.

A04 Advances in Cryogenic Electron Microscopy for Energy and Quantum Materials

ORGANIZERS:

John Watt, Los Alamos National Laboratory
Michael Zachman, Oak Ridge National Laboratory
Shelly Conroy, Imperial College London
Ismail El Baggari, Harvard University

Sponsored by the Low Temperature EM Focused Interest Group

- Applications of cryogenic S/TEM and EELS for quantum and energy materials.
- Cryogenic sample preparation techniques, including vitrification and cryogenic focused ion beam (cryo-FIB).
- Advancements in cryo-TEM holders, such as variable temperature control, helium cooled, and application of in-situ/operando bias, magnetic field, electric field, or strain.
- Cryogenic techniques paired with advanced TEM techniques, such as 4D-STEM, monochromated EELS, etc.
- Correlative cryogenic techniques and cryogenic transfer workflow between instruments (e.g., APT, CLEM, synchrotron).
- Advanced data acquisition and analysis methods (including AI/ML) for cryogenic microscopy, including synergy with theoretical methods and data science.

A05 Advances in Focused Ion Beam Instrumentation, Applications, and Techniques for Materials and Life Sciences

ORGANIZERS:

Matthew Thorseth, The Dow Chemical Company
Valerie Brogden, Covalent Metrology
Tomoko Borsa, COSINC, University of Colorado Boulder
Vivek Subramanian, Thermo Fisher Scientific

Sponsored by the Focused Ion Beam Focused Interest Group

- Latest developments in novel ion and ablation sources, FIB instrumentation, in-situ micromechanical analysis, and analytical detectors (EDS, WDs, EBSD, EBIC, SIMS, TKD, CL, Raman, etc.).
- Innovations in FIB microscopy including

automation, nanofabrication, lithography, imaging with charge neutralization, progress in simulation and modeling, strategies that enable correlative multimodal analyses, etc.
- Novel sample geometries, milling strategies, non-standard lift-outs for TEM/STEM and APT, and innovative micro and nano-structure prototyping.
- Advances in cryo-FIB in materials and biological sciences and working with beam-sensitive materials, including innovations in targeted liftout and environmentally protected specimen handling and transfer.

A06 Correlative, Multimodal Microscopy, Spectroscopy, and Imaging

ORGANIZERS:

Xiao-Ying Yu, Oak Ridge National Laboratory
Si Chen, Argonne National Laboratory
Kerim Arat, Quantum Design Inc.
Raul Arenal, University of Zaragoza

- Correlative microscopy/spectroscopy instrumentation, methodology, and applications, including electron, x- ray, and photon, based approaches.
- Cryogenic and in-situ sample preparation and handling for both materials and life sciences.
- Data analysis pipelines to accelerate data fusion via ML/AI of data analytics.
- Multimodal measurements of chemical/ phase distributions, dislocation densities, and crystallographic orientations in two, three, and four dimensions.

A07 Electronic and Thermal Characterization of Devices with Electron Microscopy

ORGANIZERS:

B.C. Regan, UCLA
William Hubbard, NanoElectronic Imaging, Inc.
Leopoldo Molina-Luna, TU Darmstadt

- Electronic device functionality depends on electronic and thermal structure that is invisible to standard electron microscopy.
- Differential phase contrast imaging (DPC), 4D scanning transmission electron microscopy (4D STEM), electron beam-induced current (EBIC) imaging, holography, electron energy loss spectroscopy (EELS), and electron backscatter/ transmission Kikuchi diffraction (EBSD/TKD) can map electronic and thermal structure with high spatial resolution.
- Relevant capabilities include the mapping of electrical conductivity, thermal conductivity, connectivity, electric fields, polarization, and/or temperature.
- The symposium will discuss recent progress in methods (including sample preparation) and applications.

A08 Microscopy and Microanalysis for Real World Problem Solving

ORGANIZERS:

Abigail Lindstrom, NIST
Jeremy Beebe, Dow Chemical
Ke Bin Low, Thermo Fisher Scientific
Xiofeng Zhang, Xi'an Jiaotong University

- Real World problem solving using all forms of microscopy and microanalysis.
- Practical applications of correlative methods employing microscopy and related techniques.
- Quantitative approaches for increased confidence in results from non-ideal samples.
- Creative methodologies for preparation and analysis of real works samples.
- Equipment testing, calibration and quality assurance.

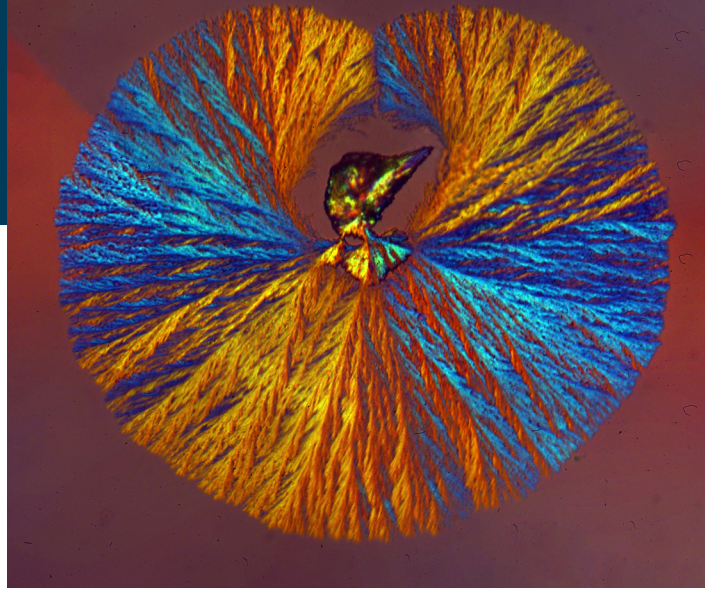
A09 Multi-dimensional and Multi-scale Imaging and Advanced Data Processing—Novel Opportunities in Material Science

ORGANIZERS:

Brian Patterson, Los Alamos National Laboratory
Stephen Kelly, Carl Zeiss X-ray Microscopy
Roland Brunner, Materials Center Leoben Forschung GmbH (MCL)

- Ex- and in-situ imaging methods for material science.
- Hyperspectral mapping of material composition
- Correlative studies including multi-method/scale/ structural- chemical information.
- High resolution structural quantification, strain mapping, orientation analysis – Multidimensional data acquisition and image analysis.
- Predictive and generative AI approaches for image reconstruction, analysis and to uncover the structure property relationship.

Analytical Sciences/ Instrumentation Advances



Ascorbic acid. *Vitamin C, also known as ascorbic acid, is an essential nutrient our body needs to form blood vessels, muscles, and cartilage. Transmitted light polarized microscopy.* ***Image by Albert Wang, Monta Vista High School, Cupertino, CA***

A10 Recent developments and new emergent applications in hardware, accessories and software tools

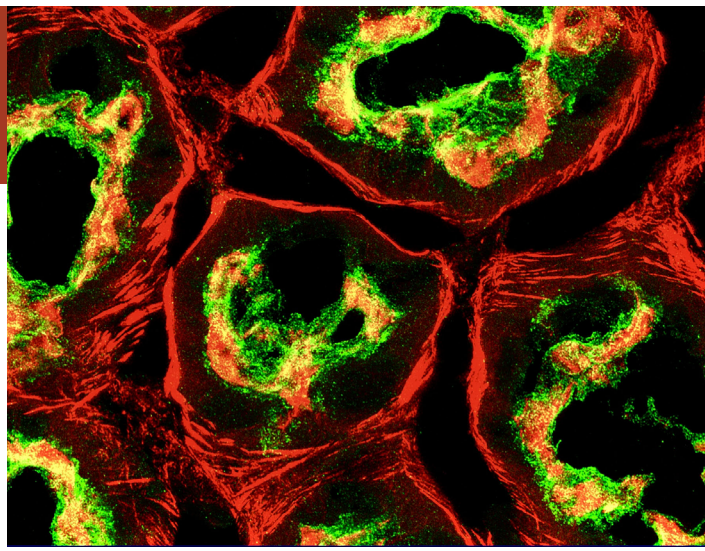
ORGANIZERS:

Shize Yang, Yale University
Andrew Lupini, Oak Ridge National laboratory
David Bell, Harvard University

Sponsored by the ACEM Focused Interest Group

- Latest developments in advanced hardware, accessories and software tools.
- Aberration corrected electron microscopy and emergent applications.
- Automation and AI applications are welcome.

Biological Sciences



Molecular Sentinel. *Endocytic receptor in tubule cells of mouse kidney which monitors and retrieves vital molecules to maintain homeostasis and plays a role in nutrient uptake and toxin clearance. Fluorescence microscopy.* ***Image by Vignesh Ra, Creighhton University, Omaha, Nebraska***

B01 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)

ORGANIZERS:

Claudia Lopez, Oregon Health & Science University
Ed Eng, New York Structural Biology Center
Melanie Ohi, University of Michigan
Teresa Ruiz, University of Vermont

Sponsored by the 3DEM Focused Interest Group

- Structure and function of macromolecular complexes in vitro and in vivo
- Single particle cryo-electron microscopy
- Cryo-electron tomography
- Molecular modeling

B02 Development, Challenges, and Biomedical Applications of Tissue Clearing, Expansion Microscopy, and Volumetric Imaging

ORGANIZERS:

Yongxin Zhao, Carnegie Mellon University
Alan Watson, University of Pittsburgh
Adam Glaser, The Allen Institute of Neural Dynamics

- Cutting-edge tissue clearing methods and their application in biological imaging.
- Development and applications of expansion microscopy techniques in retaining proteins, lipids, and nucleic acids across various tissues.
- Advances in staining, tissue processing, and hardware inspired by emerging imaging needs.
- Innovations in volumetric imaging systems for large tissue samples (e.g., light sheet microscopy, high-speed confocal, tomography).
- Computational tools for handling, visualizing, and analyzing large-scale volumetric imaging data.

B03 Microscopy in Action: Advancing Disease Research and Diagnosis in Humans, Animals, and Plants

ORGANIZERS:

Mike Reichelt, Genentech, Inc.
Claudia Lopez, Oregon Health & Science University

Sponsored by the DBM Focused Interest Group

- Advancement in Light & Electron Microscopy in Disease Research
- Application of Expansion Microscopy in Disease Research
- Correlative Imaging Techniques in Disease Research
- Microscopy in Disease Detection and Diagnostics for Animals and Plants
- AI's Role in Image Analysis and Diagnostics
- Emerging technologies that complement traditional methods

B04 Technical Advances and Transformative Applications of CryoEM

ORGANIZERS:

Claudia Lopez, Oregon Health & Science University
Ed Eng, New York Structural Biology Center
Matthew Peet, MRC Laboratory of Molecular Biology
Yue Yu, Chan Zuckerberg Institute for Advanced Biological Imaging

- Cryo sample preparation, including cryo-FIB.
- EM Instrumentation (cameras, phase plates, automation)
- Imaging modes including STEM and 4D-STEM
- Image processing for single-particle and tomographic reconstructions
- Applications using cutting-edge technology
- Adoption of new technologies

B05 Smaller, Faster, Cheaper—Recent Advances in Super-resolution Microscopy

ORGANIZERS:

Rengasayee Veeraraghavan, The Ohio State University
Jonathan Boyd, Astra Zeneca
Louisa Mezache, Aix-Marseille University

B06 Frontiers in Three-Dimensional Electron Diffraction: Acquisition, Analysis, and Applications in Medical and Pharmaceutical Fields

ORGANIZERS:

Daniel Foley, Johns Hopkins University

- Imaging modes including STEM and 4D-STEM

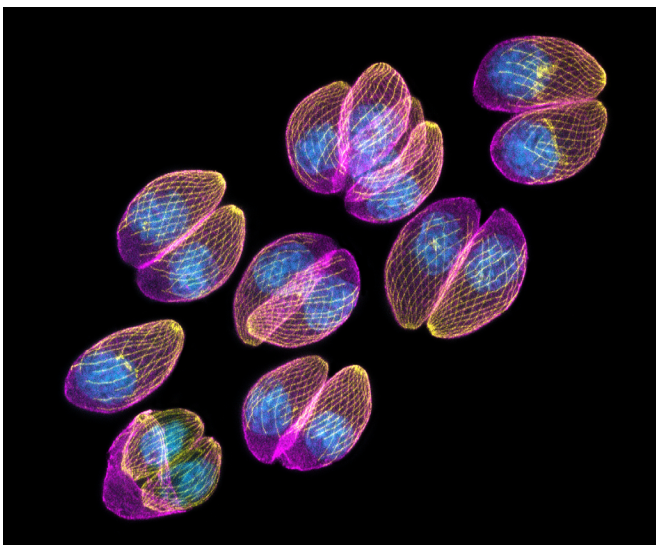
B07 AI-Driven Microanalysis: Transforming Industrial Innovation and Discovery

ORGANIZERS:

Yan Wang, Kraft Heinz Company
Jinping Dong, Cargill
Jonathan Boyd, Astra Zeneca

Sponsored by the Pharmaceuticals Focused Interest Group

- Key Trends and Goals: Design and produce products with desired functionalities (enhanced performance, sustainability, safety, user-friendly features)
- Novel Approaches: Machine learning-related microscopy, Deep learning-based image analysis; Artificial intelligence-driven microstructure characterization
- Practical Applications: Development of new materials with tailored properties; Optimization of manufacturing processes; Improvement of product quality and reliability



Parasite infection. *Toxoplasma parasites, Toxoplasma gondii, after 3 days infection. Fluorescence microscopy.*
Image by Ksena Longrin, University of Edinburgh, United Kingdom

Cross-Disciplinary Sciences

C01 Transmission Electron Microscopy for Beam-Sensitive Materials

ORGANIZERS:
Yi Cui, Stanford University
Kate Reidy, Stanford University
Yuzhang Li, University of California, Los Angles
Yu Han, South China University of Technology

- Applications using cutting-edge technology

C02 Atomic-Scale Hyperspectral Imaging for Materials Characterization

ORGANIZERS:
Dalaver Anjum, Khalifa University
Manuel Roldan Gutierrez, Arizona State University
Sriram Vijayan, Michigan Technologiclal University
Sachan Ritesh, Oklahoma State Umniversity

- Roles of EELS, EDS, and CL in capturing multidimensional chemical and optical information from functional and high-entropy materials.
- Linking Structure and Function at the Atomic Scale: How HSI enables connections between fundamental electronic/optical properties and emergent material behaviors.
- Investigating dynamic processes, such as phase transitions, electrochemical reactions, catalytic activity, or defect evolution under applied stimuli (heat, bias, strain, gas exposure), with HSI techniques (EELS, EDS, CL).

C03 Preservation and Validation of Electron Microscopy Data across the Biological and Physical Sciences

ORGANIZERS:
Stephen Burley, RCSB Protein Data Bank
Wah Chiu, Stanford University/SLAC

- The Worldwide Protein Data Bank (wwPDB) OneDep software system supports complete deposition, rigorous validation, and expert biocuration of experimentally-determined 3D biostructures coming from X-ray crystallography, 3D electron microscopy (3DEM), and NMR spectroscopy.
- Electron images and electric Coulomb potential density maps for biological samples are preserved by two open-access data data resources (EMPIAR, EMDB).
- Atomic coordinates for 3D biostructures studied using single-particle cryoEM and cryoET are preserved by the open-access PDB.
- 3DEM density maps (stored in EMDB) and corresponding atomic coordinate models (stored in PDB) are validated within the wwPDB OneDep system.
- EMPIAR, EMDB, and PDB adhere to the FAIR (Findabiliity, Accessibility, Interoperability, and Reusability) Principles emblematic of responsible data stewardship in the modern era.
- Lessons learned and best practices from biology will be reviewed and opportunities for their adoption within the physics and materials science communities will be explored.

C04 Living on the Edge: Real-Time Processing and Decision Making at the Microscope

ORGANIZERS:
Benjamin Miller, Gatan
Steven Spurgeon, National Renewable Energy Laboratory
Wei-Chang (David) Yang, National Institute of Standards and Technology
Mary Scott, University of California, Berkeley

- Automated and Autonomous EM Data Acquisition and Curation
- Approaches for Guided Experimentation or Triggered Experimental Response
- Real-Time Classification Through Machine Learning and Related Approaches
- Multi-Modal Microscopy Data Collection and Fusion
- Case Studies of Real-Time Decision Making for Microscopy Applications

C05 Innovative Approaches to Microstructural Analysis: EBSD, ECCI, and 3D Techniques Across Disciplines

ORGANIZERS:
Tirzah Abbott, Northwestern University
Julia Deitz, Sandia National Laboratory
Stuart Wright, Ametek
Ben Britton, The University of British Columbia

- Innovative Microstructural Analysis: Highlights advanced techniques such as EBSD, ECCI, and 3D analysis to transform understanding across various disciplines.

- EBSD and Associated Methods: Explores applications of EBSD, TKD, and STEM-in-SEM for detailed microstructure and defect characterization in materials science and geosciences.
- ECCI for Contrast: Uses ECCI to achieve high-contrast imaging, particularly effective in thin films and low kV environments.
- 3D Techniques and Advanced Hardware: Leverages plasma FIB, laserFIB, and on/near-axis TKD detectors for comprehensive 3D microstructure reconstructions.
- Technique Integration: Emphasizes in situ methods, machine learning, and correlative workflows to advance microstructural analysis.

C06 Automation in Microscopy from Image Acquisition to Image Analysis, Data Visualization, and Management

ORGANIZERS:

Daria Monaenkova, Dow
Ellen Keene, Dupont
Matthew Boebinger, Oak Ridge National Laboratory
Alexis Williams, Oakridge National Laboratory

- Innovative and practical image analysis techniques and image processing tools including AI/ML
- Automated image analysis for real-time process feedback and control for high-throughput analysis
- Exploration of edge computing technologies and their integration into high-throughput environments for efficient and real-time decision-making
- Strategies and challenges for data handling, storage and data visualization, especially big data
- Strategies to report imaging methods and image analysis protocols

C07 Lens on Engagement

ORGANIZERS:

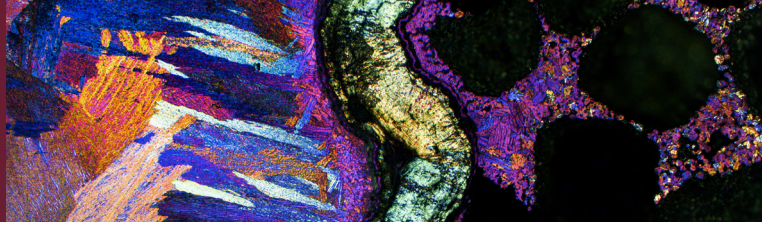
Rosa Diaz, Purdue University
Martha McCartney, Arizona State University
Liza-Anastasia DiCecco, Pennsylvania State University/ University of Waterloo
Louisa Mezache, Institute of NeuroPhysiopathology

- Showcasing how students, scientists, and faculty are expanding engagement and career development in microscopy through innovative and scalable initiatives.
- Learning and examining effective strategies for broadening engagement, mentorship, and expanding opportunities in microscopy recruitment.
- Showcasing research narratives in microscopy that emphasize engagement and the expansion of knowledge across different communities.
- Bridging engagement practice with institutional support to shape a more connected future for microscopy.

C08 Vendor Symposia

Mouse brain. *Cryosection of mouse brainstem showing Purkinje neurons. Irreversible loss of Purkinje cells is a hallmark of various neurological conditions, leading to significant impairments in coordination, balance, and speech. Fluorescence microscopy.* ***Image by Ksena Longrin, University of Edinburgh, United Kingdom***

Physical Sciences



Composite. *Cross-section of an interface in a composite of Ti-6Al-4V and graphite. Ti-6Al-4V is an alpha-beta titanium alloy with high specific strength and excellent corrosion resistance. Polarized light microscopy.*
Image by Lukasz Boron, Krakow Institute of Technology, Krakow, Poland

P01 'Nothing is Perfect': Order and Disorder in the Functional Responses of Molecular Materials

ORGANIZERS:
Prashant Kumar, Nanyang Technological University Singapore
Sean Collins, Imperial College London
Andrew Herzing, NIST

- Explore the role of molecular materials, including polymers and liquid crystals, in advanced applications such as sensors, membranes, coatings, and solar cells.
- Highlight advancements in low-dose diffraction and imaging for probing the structure-function relationships of soft matter systems.
- Investigate nanoscale phases, including semi-crystalline, nematic, and amorphous structures, and their impact on material functionality.
- Discuss cutting-edge electron microscopy techniques for characterizing order, symmetry, and defects in versatile molecular materials.
- Present integrated modeling and experimental approaches to link structural insights with optical, electronic, and mechanical properties.

P02 Advanced and In Situ Electron Microscopy in Ferroelectrics and their Dynamics

ORGANIZERS:
Leopoldo Molina-Luna, TU Darmstadt
Shiqing Deng, University of Science and Technology Beijing

- Quantitative electric and magnetic field mapping related to phase transitions
- Novel instrumentation and techniques for in situ observations during phase changes
- Atomic-scale imaging and spectroscopy of materials during phase transitions
- Novel materials exhibiting unique phase behaviors
- Dynamic switching behaviors and their relationship to phase transitions in various materials

P03 Advanced TEM Analysis for Semiconductors

ORGANIZERS:
Guoda Lian, Texas Instruments inc
Brendan Foran, AeroSpace Corporation
Jinguo Wang, Coherent
Ling Pan, Intel

- Auto-TEM prep, analysis, and/or data processing
- New techniques used for CMOS, memories devices, III-V compound structures
- TEM as metrology for semiconductors

P04 Advances in 4D-STEM and In Situ Electron Microscopy For Quantum Materials

ORGANIZERS:
Shiqing Deng, University of Science and Technology Beijing
Thang Pham, Virginia Tech
Zhen Zhen, Chinese Academy of Sciences
Alexandre Foucher, Oak Ridge National Laboratory

- Advances in 4D-STEM techniques for deep sub-angstrom structural imaging, including the development of computational and data analysis methods for high-dimensional data interpretation.
- Spatially and momentum-resolved investigations of electronic, magnetic, and topological phenomena in quantum materials.
- Development of in situ (S)TEM techniques to study nucleation and growth of nanoscale quantum materials, including 0-D quantum dots, 1-D nanowires, 2- D van der Waals materials and their heterostructures, and 3-D thin films/ freestanding membranes.
- Multimodal in situ electron microscopy combining imaging, spectroscopy, and scattering to unravel physical and chemical phenomena in quantum materials and systems. Multi-stimuli studies involving more than one external probe (heating/cooling, biasing, gas reaction, strain, light etc.) are encouraged.

P05 Advances in Electron Microscopy for Defect and Crystallographic Structure Analysis

ORGANIZERS:

Yan-Ru Lin, Oak Ridge National Laboratory
Kinga Unocic, North Carolina State University
Jane Howe, University of Toronto
Grace Burke, Idaho National Laboratory

- Advanced Microstructural Analysis: Techniques for defect analysis, strain mapping, grain structure and orientation, and atomic configuration (e.g., 4D-STEM ptychography, serial electron diffraction, 3D tomography, and FIB/PFIB applications).
- In-situ and Correlative Microscopy: Real-time observation of microstructural changes under high temperature, irradiation, stress, laser heating, liquid/gas environments, or combined conditions, to understand the mechanisms of microstructure evolution.
- Chemical and Phase Identification: Energy dispersive spectroscopy (EDS), electron energy loss spectroscopy (EELS), and electron diffraction for elemental mapping, chemical quantification, light atom detection, and phase identification.
- Machine Learning and Automation: automated calibration, image/data analysis, microstructure identification, and process automation to enhance productivity (e.g., sample preparation, data acquisition).

P06 Technical and Application Advances in Liquid and Gas Phase TEM

ORGANIZERS:

Stephen House, Sandia National Laboratories, United States
Meng Li, Brookhaven National Laboratory
Dan Zhou, Leibniz Institute for Crystal Growth, Berlin, Germany
Beata Layna Mehdi, University of Liverpool, United Kingdom

Sponsored by the Electron Microscopy in Liquids and Gases Focused Interest Group

- Advanced applications of in-situ liquid and gas phase TEM in functional materials
- Advances in the design of holders and/or MEMS chips for operando applications
- Workflow development and automation for in-situ liquid and gas phase electron microscopy
- New approaches for applying multiple stimuli to specimens, such as cooling, heating, biasing, photons, mechanical stresses, or ion irradiation in environmental operando TEM or probing the same system with different techniques
- Integration of machine learning and artificial intelligence with EM data involving different modalities: e.g., time-resolved data, scanning diffraction methods, hyperspectral imaging with energy-dispersive X-ray and electron energy-loss spectroscopy, cathodoluminescence, mass spectrometry, temperature control, and electrochemistry
- Electron beam dose management and mitigation strategies

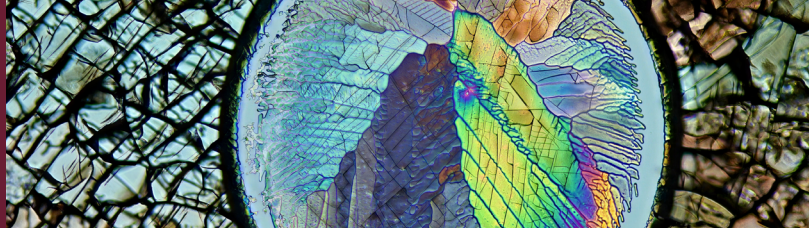
P07 High-Resolution Microscopy and Microanalysis of Materials Subjected to Extreme Environments

ORGANIZERS:

Timothy Lach, Oak Ridge National Laboratory
Mukesh Bachhav, Idaho National Laboratory
Elizabeth Kautz, North Carolina State University
Daniel Schreiber, Pacific Northwest National Laboratory

- Fission and fusion energy materials, accelerator materials, and space materials: metals and alloys, ceramics, composites, polymers, semiconductors, nuclear waste materials, etc.
- Materials subjected to one or more extreme conditions: high radiation dose with varying dose rates, high stress, high strain rates, oxidation and corrosion, transmutation, very high or very low temperatures, etc.
- Damage phenomena: dislocation loops, segregation and precipitation, phase transformations, bubbles and void nucleation, oxidation, dealloying, etc.
- Analytical microscopy via scanning electron microscopy (SEM), transmission electron microscopy (TEM), aberration-correction, scanning probe, in-situ microscopy, etc.
- Microanalysis via microprobe, atom probe tomography (APT), mass spectrometry, etc.
- Modeling and machine learning approaches that automate or aid in interpretation of microscopy data of these phenomena

Physical Sciences



Caffeine. *Crystals of caffeine inside an air bubble under heat and pressure. Melted caffeine at 245˚C and pressing down on the cover glass creates bubbles with crystals forming inside. Polarized LM.* ***Image by Tian Olivier, independent microscopist, Boksburg, South Africa***

P08 Probing Emergent Phenomena in Functional and Quantum Materials with Advanced Electron Microscopy Methods

ORGANIZERS:

Yu-Tsun Shao, University of Southern California
Eren Suyolcu, Max Planck Institute for Solid State Research
Sandhya Susarla, Arizona State University
Demie Kepaptsoglou, University of York / SuperSTEM, UK

- Application of advanced S/TEM techniques such as 4D-STEM, phase-sensitive imaging, multi-modal spectroscopy for characterizing quantum materials, including topological materials, multiferroics, 2D materials, and superconductors.
- In situ S/TEM capabilities to study phase transitions in functional materials (heating, biasing, cooling, magnetic fields, mechanical testing).
- New development in imaging methods, instruments, and computational approaches (e.g. machine learning) for extracting functionality mapping in quantum and functional materials.

P09 Spatiotemporal Optical Response Using Electron Spectroscopies for Nano-Optics

ORGANIZERS:

Steffi Y. Woo, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN, USA
Luiz H. G. Tizei, Laboratoire de Physique des Solides, CNRS/Université Paris-Saclay, Orsay, France
Sean M. Collins, Imperial College London
Armin Feist, Max Planck Institute for Multidisciplinary Sciences, University of Göttingen, Göttingen, Germany

- Ultrafast and time-correlation electron spectroscopy of dynamics in optical materials
- Effects of nanometer and atomic-scale structure and chemistry on emission and absorption behavior
- Electron beam approaches to low-energy excitations, including plasmons, excitons, phonons, and interband transitions
- Mode-selective optical excitation and linewidth-limited nanoscale spectroscopy
- Applications of event-based detector for synchronized spectroscopies

P10 Quantitative Microanalysis of Terrestrial and Planetary Samples by Electrons, X-rays, Ions, and Lasers

ORGANIZERS:

Heather Lowers, United States Geological Survey
Jay Thompson, United States Geological Survey
John Konopka, Retired
Stephen Seddio, Thermo Fisher

P11 Unveiling Quantum Order: Cryo-EELS, 4D STEM, and Ptychography at the Nanoscale

ORGANIZERS:

Juan Carlos Idrobo, University of Washington
Robert F. Klie, University of Illinois at Chicago
Elizabeth Tiukalova, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

- Unveiling Quantum Order: Cryo-EELS, 4D STEM, and Ptychography at the Nanoscale
- Advances in cryogenic and monochromated EELS: resolving low-energy excitations and collective modes below 10 meV.
- 4D STEM for mapping symmetry breaking, strain fields, and nanoscale order parameters.
- Ptychography as a route to phase-sensitive imaging with sub-ångström precision.
- Integration of cryogenic sample environments with advanced detectors and spectrometers.

Outreach Sessions & Technologists Forum

X93 Cultivating STEM Networks – A Workshop for Local Leaders, Students, and Educators

Monday, July 29 | 8:00 am – 3:00 pm

ORGANIZERS:
Josh Silverstein, Pacific Northwest National Laboratory
Abinash Kumar, Nanospective Inc.

X93 is a two-day initiative leveraging the M&M hosting city to establish a National Microscopy Education Alliance. It brings together local STEM leaders, students, and educators for immersive experiences in advanced microscopy techniques on Day 1. On Day 2, participants dive into the M&M National Conference to connect with professionals and explore research projects. X93 is your opportunity to build local STEM networks and contribute to a national alliance, shaping the future of STEM education and outreach, all within the dynamic atmosphere of the hosting city. Join us to make a lasting impact in the world of microscopy education.

Technologists Forum Session for Microscopy & Microanalysis 2026

X30 Tech Forum Roundtable – Career Paths in Microscopy

Description: Join a roundtable discussion with technologists from diverse backgrounds as they share their unique journeys in the field of microscopy. Panelists from both academia and industry—and in different career stages—will talk about how they discovered microscopy, why they chose it over other career options, and how their paths have evolved over the years. This interactive session is designed for both newcomers and seasoned technologists: bring your questions, insights, and experiences to the table, and be part of the conversation!

PRIMARY ORGANIZER: Austin Worden, University of South Carolina

X31 Tech Forum Symposium – Professional Development Opportunities for Microscopy Lab Technologists

Description: The field of microscopy continues to expand, with many career paths to choose from. One of these paths is the lab technologist who provides the foundation of the workforce within academic core facilities or large research labs. This rapidly developing field requires routine training to remain competitive in the research community. National microscopy society meetings are a popular option for opportunities for continued training in advanced instrumentation, research, as well as skill and protocol development. Unfortunately, professional meetings, seminars, and conferences at a national level can be expensive and unattainable due to high costs which are not covered by most businesses that provide limited travel support for technical employees. This session will highlight various training opportunities, like those available at National meetings, that are available locally.

- Training Opportunities: Bring educational opportunities generally provided through professional society conferences to your local community through Local Affiliate Society events.
- Customizable: Themes and topics can be chosen by the target audience.
- Affordable: Local meetings and professional expertise can be used to lower the cost of attending.

PRIMARY ORGANIZER: Page Baluch, Arizona State University (page.baluch@asu.edu)
CO-ORGANIZER: Austin Worden, University of South Carolina (Austin.Worden@uscmed.sc.edu)

X32 Tech Forum Roundtable – A Technologists' Guide to Communication and Funding Skills

Description: From bench to budget to byline—technologists juggle funding pursuits, manuscript prep, and high-stakes presentations. This roundtable distills the shared playbook across all three: know your audience, plan with intent, craft a crisp message, and pressure-test it before it goes live. We'll cover choosing the right journal or mechanism, building figures and slides that actually persuade, and following instructions to the letter in grants. You'll leave with practical insights and a tighter story for your next proposal, paper, or talk!

PRIMARY ORGANIZER: Tracy Lovsey, UES
CO-ORGANIZER: Austin Worden, University of South Carolina