Onsite Program Guide & Exhibitor Information

M&M2023
MICROSCOPY & MICROANALYSIS
Minneapolis, MN • July 23-27
As of July 18, 2023

www.microscopy.org/MandM/2023
Your samples
Your science
Our state-of-the-art customer center

Discover the Power of Possibilities

As researchers, you wield curiosity to create an ever-changing world. On your path to discovery, we are your partner. With an eye on sustainability, we are providing product demonstrations either virtually or in-person via our new ZEISS Microscopy Customer Center. Both provide exactly what you need to know, by testing your samples in real world workflows.

See a preview at M&M 2023, booth #519.

www.zeiss.com/ZMCC-Bay-Area
Table of Contents

Letter from the Presidents .................................. 5
Future Meeting Dates ........................................ 5
Sponsors ......................................................... 6
Registration Information ..................................... 8
Essential Meeting Information ............................... 9
Convention Center Maps .................................... 10-12
Social Events .................................................. 13
Sustaining Members .......................................... 14
Hotel, Travel, & City Information ............................ 16-17
Ancillary Meeting Schedule ................................. 18-19
MSA MegaBooth .............................................. 20
Highlights and Awards ........................................ 21
Week At-A-Glance ............................................. 22-30
Monday, July 24 Sessions .................................... 33-41
Tuesday, July 25 Sessions ................................... 42-66
Wednesday, July 26 Sessions ............................... 67-94
Thursday, July 27 Sessions ................................ 95-117
Exhibitor Directory .......................................... 118-136
Product/Service Directory .................................. 137-146
Exhibitor List with Names/Booths ....................... 147
Exhibit Hall Map ............................................. 148-149
Advertiser Index ............................................. 150
M&M 2023 App Info ........................................ 151

COVER IMAGES, left to right:
Fungus on butterfly wing by Vijayasankar Raman, University of Mississippi, Oxford, MS
Dinosaur bone by Bernardo Cesare, University of Padova, Padova, Italy
Neuromuscular junctions by Akanksha Bhatnagar, Drexel University, Philadelphia, PA
Radiolarian by Elizabeth King, NUANCE Center, Northwestern University, Evanston, IL

QUESTIONS?

TECHNICAL MEETING CONTENT:
2023 Program Chair
Ru-Ching Hsia, Carnegie Institution for Science
MM2023ProgramChair@microscopy.org

EXHIBITS & EXHIBITORS:
Exhibits Manager
doreen@corcexpo.com

SPONSORS & SPONSORSHIPS:
Sponsorship Manager
mary@corcexpo.com

GENERAL:
Meeting Manager
meetingmanager@microscopy.org

ARE YOU A MEMBER?

Join Today and Save on M&M 2023 Registration Fees!

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

Visit http://the-mas.org to find out the benefits of MAS membership.
Preparing APT tips directly from your specimen

Cutting cross-sections within minutes

Delayering hidden structures assisted by circuit layout overlays

MicroPREP™ PRO
High-Speed Sample Preparation

Poster Session
A08.P1
Tuesday 3-5 pm

M & M: Booth # 1212

Tel: +49 371 40043-222
sales@3d-micromac.com

www.microPREP.pro
On behalf of the Microscopy Society of America and the Microanalysis Society, we are pleased to invite you to join us, in-person, July 23-July 27, 2023, for Microscopy & Microanalysis 2023 in Minneapolis, MN. Known for its parks, lakes, and its many cultural landmarks like the Walker Art Center and adjacent Minneapolis Sculpture Garden, Minneapolis also prides itself on a vibrant craft brewery scene and its wide variety of restaurants. Minneapolis has so much to offer and is the perfect place to hold M&M 2023.

The Program Committee, led by Ru-Ching Hsia, James LeBeau, and Anette von der Handt, has developed an exciting group of symposia, spanning advances in instrumentation and techniques development, as well as applications in the analytical, biological, and physical sciences.

The main meeting will be preceded by the ever-popular Sunday Short Courses and five Pre-Meeting Congresses. Students and early-career professionals are especially encouraged to participate in the MSA Student Council’s 7th Annual Pre-Meeting Congress that highlights outstanding work by student and postdoctoral fellow attendees. Join us Sunday evening to officially kick off the meeting at the Opening Welcome Reception and reconnect with colleagues and meet new friends. On Monday morning, the Plenary Session kicks off the scientific program with an exciting set of lectures in Physical and Biological science by Dr. Stefanie Milam, Deputy Project Scientist for Planetary Science, James Webb Space Telescope (JWST), Astrochemistry Laboratory at the NASA Goddard Space Flight Center and Dr. Karin Sauer, Professor and Chair, Department of Biological Sciences, Binghamton University, Co-Director, Binghamton Biofilm Research Center (BBRC), and Co-Director, Microbial Biofilms REU, and the presentation of the M&M meeting awards and awards from the sponsoring societies.

In addition to the strong scientific program, what sets the M&M meeting apart is the Exhibit Hall, the world’s largest annual microscopy exhibition, which showcases the latest instrumentation and accessories. Don’t miss the highly popular vendor tutorials, held Monday through Wednesday after hours in the Exhibit Hall. Other educational opportunities throughout the week include focused biological and physical science tutorials, educational outreach programs, and our Technologists’ Forum special and roundtable sessions.

M&M 2023 is the premier meeting to attend to stay abreast of the latest technologies, hear about new developments in applications across all areas of microscopy and microanalysis, and most importantly, network with colleagues.

We look forward to being Together Again for M&M 2023!

Andrew Minor
University of California, Berkeley
Lawrence Berkeley National Laboratory
President, Microscopy Society of America

Patrick Camus, Retired
President of Microanalysis Society
DiATOME Diamond Knives are the premier knife for biological and materials applications, compatible with all ultramicrotomes. For decades, researchers have relied on DiATOME Diamond Knives' superior quality, reliability, and durability. And with proper use, they require far less resharpening than any other knife, making them economical as well.

Resharpened DiATOME knives undergo the same stringent optical checking and sectioning test as new knives. The same flawless quality is guaranteed. Applications are numerous and include sectioning of hard or soft industrial samples, embedded biological samples, alternating ultrathin/semithin, and frozen hydrated samples. Please see our website for a complete applications guide.

Get them from THE source...

DiATOME U.S.
www.diatomeknives.com
P.O. Box 410 • 1560 Industry Rd.
Hatfield, Pa 19440
Tel: (215) 412-8390
Fax: (215) 412-8450
email: info@diatomeknives.com

DiATOME, the incomparable Diamond Knife for all fields of research...

Please visit us at Booth 1004


ABS, stained with OsO4, sectioned at room temperature with the ultra sonic knife, section thickness 50nm. Note the almost perfect spherical shape of the large rubber particles and the preservation of the inclusions inside. Also the smaller dense rubber particles are well preserved. B.Vastenhout, Dow Benelux N.V. Terneuzen, The Netherlands.

Micro-Optical Sectioning Tomography to Obtain a High-Resolution Atlas of the Mouse Brain Anan Li, Hui Gong, Bin Zhang, Qingdi Wang, Cheng Yan, Jingpeng Wu, Qian Liu, Shaoqun Zeng, Qingming Luo
Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics–Huazhong University of Science and Technology, Wuhan 430074, P. R. China.

CRYO
DiATOME Diamond Knives are the premier knife for biological and materials applications, compatible with all ultramicrotomes.

For decades, researchers have relied on DiATOME Diamond Knives superior quality, reliability, and durability. And with proper use, they require far less resharpening than any other knife, making them economical as well. Resharpened DiATOME knives undergo the same stringent optical checking and sectioning test as new knives. The same flawless quality is guaranteed.

Applications are numerous and include sectioning of hard or soft industrial samples, embedded biological samples, alternating ultrathin/semithin, and frozen hydrated samples. Please see our website for a complete applications guide.

NEUROSCIENCE

Micro-Optical Sectioning Tomography to Obtain a High-Resolution Atlas of the Mouse Brain Anan Li, Hui Gong, Bin Zhang, Qingdi Wang, Cheng Yan, Jingpeng Wu, Qian Liu, Shaqun Zeng, Qingming Luo

Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics—Huazhong University of Science and Technology, Wuhan 430074, P. R. China.

CRYO


MATERIALS

ABS, stained with OsO4, sectioned at room temperature with the ultra sonic knife, section thickness 50nm. Note the almost perfect spherical shape of the large rubber particles and the preservation of the inclusions inside. Also the smaller dense rubber particles are well preserved. B. Vastenhout, Dow Benelux N.V. Terneuzen, The Netherlands.

Get them from THE source...

DiATOME U.S.

P.O. Box 410 • 1560 Industry Rd.
Hatfield, Pa 19440
Tel: (215) 412-8390
Fax: (215) 412-8450
e-mail: info@diatomeknives.com
If you are not a current member of MSA or MAS (i.e., expired member or non-member), your M&M 2023 registration fee will include a membership fee for the society/societies of your choice, unless otherwise noted. Your total registration fee for M&M 2023 will be the base registration rate + your selected membership fee – see charts below. Membership status does not include or affect any additional purchases, such as Short Courses or PMCs.

**Non-Members and Expired Members:** Select one option from CHART A and one option from CHART B to get your total registration rate for 2023.

### CHART A – M&M 2023 Onsite Registration Rates (all rates in USD)

<table>
<thead>
<tr>
<th>Event</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Meeting</td>
<td>$906</td>
</tr>
<tr>
<td>Full Meeting – Student</td>
<td>$240</td>
</tr>
<tr>
<td>Full Meeting – Post-Doctoral Researcher</td>
<td>$384</td>
</tr>
<tr>
<td>Full Meeting – Emeritus Member*</td>
<td>$270</td>
</tr>
<tr>
<td>Partial Meeting – One Day</td>
<td>$468</td>
</tr>
<tr>
<td>Pre-Meeting Congresses* (separate registration required)</td>
<td>$283</td>
</tr>
<tr>
<td>Pre-Meeting Congresses – Student* (separate registration required)</td>
<td>$135</td>
</tr>
<tr>
<td>Sunday Short Course* (separate registration required)</td>
<td>$335</td>
</tr>
<tr>
<td>Sunday Short Course – Student* (separate registration required)</td>
<td>$135</td>
</tr>
</tbody>
</table>

*This registration rate will not include a membership fee.

### CHART B – 2023 Membership Dues Chart (all rates in USD)

<table>
<thead>
<tr>
<th>Membership Type</th>
<th>MSA</th>
<th>MAS</th>
<th>Joint Membership with MSA &amp; MAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Member</td>
<td>$70</td>
<td>$40</td>
<td>$100</td>
</tr>
<tr>
<td>Student Member</td>
<td>$20</td>
<td>$10</td>
<td>$20</td>
</tr>
<tr>
<td>Emeritus Member</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
</tr>
<tr>
<td>Honorary Member</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
</tr>
</tbody>
</table>

For more information on membership with MSA, visit [https://www.microscopy.org/join/](https://www.microscopy.org/join/)
For more information on membership with MAS, visit [https://the-mas.org/membership/members/](https://the-mas.org/membership/members/)

**Cancellation and Refund Policy**

Refund requests will be honored (less $65 processing fee) if received in writing by **June 21, 2023**. No refunds will be given after June 21, 2023. Membership fees will not be included in the refund. Please contact the Registration Department at mmregistration@microscopy.org with any questions.
Accessibility
If you require special accommodation in order to participate fully in the meeting, please ask to speak with the meeting manager, or email MeetingManager@microscopy.org. Requests made after July 1 or onsite at the meeting will be accommodated as much as possible.

Awards
Major Society Awards for MSA, MAS, and IFES, along with M&M student awards, will be presented at the Plenary Session immediately following the first Plenary Talk (Monday morning). For detailed listings of all awards, criteria, and award winners, please visit https://www.microscopy.org/awards/index.cfm.

Cancellation and Refund Policy
Refund requests received prior to July 21, 2023 will be honored less a $65 administrative fee. No refunds will be issued for cancellations (for any reason) received on or after July 21, 2023, and no refunds will be issued on-site in Minneapolis. E-mail: MMRegistration@microscopy.org.

Food for Purchase
Inexpensive, portable breakfast and snack items are available for purchase in the convention center on the exhibit/registration level (7:30 am – 10:30 am). Lunch concessions are available for purchase inside the exhibit hall during lunch hours (11:00 am – 2:00 pm).

Minneapolis & Regional Visitor Information
Stop by the Meet Minneapolis booth located inside the convention center, to pick up local information, including maps, dining guides and tour info, and visitor information on Portland and surrounding areas.

Internet & E-mail
Free wireless internet is available for M&M attendees in the Minneapolis Convention Center. Check your email and surf the web at the Internet Café inside the M&M exhibit hall during exhibit hours (located next to the MSA MegaBooth). For more information on the MegaBooth, go to page 20.

Job & Resume Postings / Placement Office (see MSA MegaBooth info on Page 20)
Post your company’s or department’s job listing, peruse posted resumes for that perfect job candidate, or post your own resume. Take advantage of thousands of microscopists and microscopy companies all gathered in one place! Go to the MSA MegaBooth (Exhibit Hall) for details.

M&M 2024 – Meeting & City Information
Stop by for advance information on the 2024 M&M Meeting in Cleveland, Ohio! The 2024 table is located in the main registration area and has visitor guides, maps, and other important information.

MSA MegaBooth [Booth # 1427]
See complete details on Page 20
Check out all that MSA has to offer its members and M&M attendees: Free Internet Café, book display from scientific publishers, and updated information on the Certification Board. Check out recent editions of Microscopy Today, learn about Project MICRO, and join the Technologists’ Forum.

Awards
Major Society Awards for MSA, MAS, and IFES, along with M&M student awards, will be presented at the Plenary Session immediately following the first Plenary Talk (Monday morning). For detailed listings of all awards, criteria, and award winners, please visit https://www.microscopy.org/awards/index.cfm.

Cancellation and Refund Policy
Refund requests received prior to July 21, 2023 will be honored less a $65 administrative fee. No refunds will be issued for cancellations (for any reason) received on or after July 21, 2023, and no refunds will be issued on-site in Minneapolis. E-mail: MMRegistration@microscopy.org.

Food for Purchase
Inexpensive, portable breakfast and snack items are available for purchase in the convention center on the exhibit/registration level (7:30 am – 10:30 am). Lunch concessions are available for purchase inside the exhibit hall during lunch hours (11:00 am – 2:00 pm).

Minneapolis & Regional Visitor Information
Stop by the Meet Minneapolis booth located inside the convention center, to pick up local information, including maps, dining guides and tour info, and visitor information on Portland and surrounding areas.

Internet & E-mail
Free wireless internet is available for M&M attendees in the Minneapolis Convention Center. Check your email and surf the web at the Internet Café inside the M&M exhibit hall during exhibit hours (located next to the MSA MegaBooth). For more information on the MegaBooth, go to page 20.

Job & Resume Postings / Placement Office (see MSA MegaBooth info on Page 20)
Post your company’s or department’s job listing, peruse posted resumes for that perfect job candidate, or post your own resume. Take advantage of thousands of microscopists and microscopy companies all gathered in one place! Go to the MSA MegaBooth (Exhibit Hall) for details.

M&M 2024 – Meeting & City Information
Stop by for advance information on the 2024 M&M Meeting in Cleveland, Ohio! The 2024 table is located in the main registration area and has visitor guides, maps, and other important information.

MSA MegaBooth [Booth # 1427]
See complete details on Page 20
Check out all that MSA has to offer its members and M&M attendees: Free Internet Café, book display from scientific publishers, and updated information on the Certification Board. Check out recent editions of Microscopy Today, learn about Project MICRO, and join the Technologists’ Forum.

Proceedings
Conference Proceedings will be available in a digital online format only. All Full Meeting registrations include a access to the proceedings online. The proceedings will be linked on the meeting platform an included in and email sent to all paid registrants.

MAS Booth
MAS has a membership and information booth located in the main registration foyer. Sign up for membership, get information on Society events at or after the M&M Meeting, and talk with MAS members and stakeholders to learn how to get involved!

Smoking Policy:
M&M 2023 is a smoke-free meeting. If you wish to smoke, you will need to go outside (street level).

Tote Bags
All non-Exhibitor Meeting Registrants are entitled to a meeting tote bag. Bags are distributed in the registration area.

Volunteer Room
The volunteer & student bursary office is in Room M101C on the mezzanine level. Check in here for volunteer assignments and sign-outs.
Venue Maps

Minneapolis Convention Center — LEVEL 1
Social Events

M&M 2023 Sunday Evening Welcome Reception
Hilton Minneapolis – Grand Ballroom ABC (3rd Level)
Sunday, July 23, 2023
6:30 PM - 8:30 PM
Drink tickets are included in all full meeting, non-exhibitor registrations. Be sure to pick up your drink ticket at the Tote Bag room located in the registration area in the Minneapolis Convention Center.

Additional tickets: $50 each for adults; $25 each for children 12 and under.

Enjoy Midwest inspired bites and local brews while catching up with friends and colleagues. After the reception, grab some old and new friends and head out to one of Minneapolis’ numerous pubs, microbreweries, or wine bars to continue the fun!

MAS Social Event – for MAS Members Only!

Wednesday, July 26, 2023
6:30 PM - 9:00 PM
Stop by the MAS booth in the lobby to check your membership status and pick up your ticket for the MAS social event on Wednesday evening, July 26 – immediately following the MAS Business Meeting.

Student Poster Awards
(Immediately following daily Poster Presentations & Happy Hours!)

Poster presentations are an excellent format for all participants to engage in intensive discussion with other researchers in the field. MSA provides cash awards to the most outstanding student posters (first author) each day (up to two in each of three categories). Student poster awards will be presented immediately following each day’s poster session, in the Exhibit Hall.
Thank You to Our Sustaining Members
(As of July 18, 2023)

Advanced Microscopy Techniques
Applied Physics Technologies
Boeckeler Instruments, Inc.
Bruker Nano Analytics
Carl Zeiss Microscopy, LLC
CEOS GmbH
CryoElectron Microscopy Research Center
Dectris Ltd.
Diatome US
Direct Electron LP
Double Helix Optics
Duniway Stockroom Corp.
EDAX
Electron Microscopy Sciences
EMIS GmbH
EXpressLO LLC
Gatan
Hitachi High-Tech America, Inc.
HREM Research Inc.
Hummingbird Scientific
ibss Group, Inc.
International Centre for Diffraction Data
JEOL USA, Inc.
Kleindiek Inc.
Ladd Research
Micron, Inc.
Microscopy Innovations LLC
NanoSpective
Nion Co.
Oxford Instruments
Protochips, Inc.
Quantum Design
Scientific Instrumentation Services, Inc.
SEMTech Solutions, Inc.
Ted Pella Inc.
TESCAN
Thermo Fisher Scientific
Tousimis
XEI Scientific, Inc.
New Capabilities!

Atomic Resolution
SE and 4D Imaging

Sub-3 meV Resolution
Vibrational EELS

Zero loss peak: Nion HERMES at 20 kV with Nion IRIS EELS, 1000 spectra of 3 ms, aligned.

Visit us at booth 1104 to learn more!

MoS₂ monolayer with defects: Nion HERMES at 60 kV with DECTRIS ARINA detector.
Hotel, Travel, and City Information

Getting To & Around Minneapolis
Voted “Best Airport in America,” the (MSP) Minneapolis–St. Paul International Airport is a centrally located travel hub revered for its ease of check-in, security, and amenities.

The Minneapolis-St Paul International Airport (MSP) is the country’s 17th busiest travel hub with 34 million passengers passing through each year and 12th busiest for aircraft operations. Compared to other metro areas, only one other U.S. city serves more nonstop markets per capita. The recent arrival of Southwest Airlines offers greater affordability, and MSP’s central location offers a speedy trip (15–30 minutes) to the city.

Ground Transportation
Metro Transit offers fast, frequent service to both downtowns, Mall of America and hundreds of other popular attractions. One-way fare from the airport to downtown Minneapolis is $2.50.

Minneapolis SKYWAY System:
The Minneapolis Skyway System is the largest contiguous system of enclosed, second-level bridges in the world—composed of 9.5 miles of pathways connecting 80 city blocks. Both official M&M 2023 Hotels are connected to the Minneapolis Convention Center via the Skyway.

Imaging plagued by non-conductive polymerized Hydrocarbons?
Chiaro applications include:
- Samples cleaned in the Chiaro prevent hydrocarbon buildup in SEM chambers
- QuickSwitch™ source provides fast SEM cleaning to maintain detector sensitivity
- Plasma converts hydrophobic surfaces hydrophilic while cleaning
- Plasma clean TEM samples
- Plasma clean TEM liquid/gas sample cells after checking for cell leaking

ibss Group, inc. T: 1.415.513.1488 | W: ibssgroup.com

M&M 2023 booth #419
MORE MINNEAPOLIS TRAVEL INFO:

For detailed attraction, tour, dining and travel information for visitors, please go to the Meet Minneapolis website at https://www.minneapolis.org

Maps showing details about neighborhoods, downtown, and other areas of the city, including the map above, are available on the Meet Minneapolis website and are downloadable from: https://www.minneapolis.org/map-transportation/maps/
## Ancillary Meeting Schedule

All events held at Minneapolis Convention Center unless otherwise noted.

### Saturday, July 22, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 5:30 PM</td>
<td>MSA Council</td>
<td>HILTON MINNEAPOLIS</td>
</tr>
</tbody>
</table>

### Sunday, July 23, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 PM – 8:00 PM</td>
<td>Symposium Organizers’ Reception</td>
<td>OFFSITE</td>
</tr>
</tbody>
</table>

### Monday, July 24, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Technologists’ Forum Board</td>
<td>L100D</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Travel Awards Committee</td>
<td>L100C</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Awards + Fellowship Committees</td>
<td>L100E</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>MAS Meal with a Mentor</td>
<td>L100AB</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>International Committee</td>
<td>L100H</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: PHARMACEUTICAL</td>
<td>L100F</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: DIAGNOSTIC &amp; BIOLOGICAL MICROSCOPY</td>
<td>L100G</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>FIG: FOCUSED ION BEAM</td>
<td>L100D</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>FIG: ATOM PROBE FIELD ION MICROSCOPY</td>
<td>L100C</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>MT Editors Meeting</td>
<td>L100F</td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td>FIG: 3D EM in the Biological Sciences</td>
<td>L100E</td>
</tr>
<tr>
<td>3:30 PM – 5:00 PM</td>
<td>Technologists’ Forum Business Meeting</td>
<td>L100C</td>
</tr>
<tr>
<td>4:30 PM – 6:00 PM</td>
<td>MSA Book Elements</td>
<td>L100G</td>
</tr>
<tr>
<td>5:30 PM – 7:00 PM</td>
<td>Student Mixer &amp; MSA Student Member Meeting</td>
<td>SEASONS, 2ND FLOOR</td>
</tr>
<tr>
<td>5:45 PM – 6:45 PM</td>
<td>Vendor Tutorials (Sign up at Vendor Booths)</td>
<td>EXHIBIT HALL</td>
</tr>
</tbody>
</table>

### Tuesday, July 25, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Local Affiliated Societies &amp; MAS Affiliated Regional Societies Breakfast</td>
<td>L100D</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td><em>Microscopy Today</em> Editorial Board Meeting</td>
<td>L100F</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>FIG: Electron Microscopy in Liquids and Gases</td>
<td>L100C</td>
</tr>
<tr>
<td>10:00 AM – 12:00 PM</td>
<td>M&amp;M 2024 – Program Planning Meeting</td>
<td>M100C</td>
</tr>
</tbody>
</table>
### Ancillary Meeting Schedule cont.

All events held at Minneapolis Convention Center unless otherwise noted.

#### Tuesday, July 25, 2023 cont.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: FOM FIG Lunch Meeting</td>
<td>L100AB</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Cryo-Preparation</td>
<td>L100F</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Electron Crystallography</td>
<td>L100D</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: MicroAnalytical Standards</td>
<td>L100E</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>MSA Standards Committee Meeting</td>
<td>L100G</td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td>MSA Education Committee Meeting</td>
<td>L100F</td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td>FIG Business Meeting</td>
<td>L100C</td>
</tr>
<tr>
<td>3:30 PM – 7:00 PM</td>
<td>Post-Doc Reception</td>
<td>L100AB</td>
</tr>
<tr>
<td>5:45 PM – 6:45 PM</td>
<td>Vendor Tutorials <em>(Sign up at Vendor Booths)</em></td>
<td>EXHIBIT HALL</td>
</tr>
<tr>
<td>6:30 PM – 8:30 PM</td>
<td>Presidents’ Reception <em>(Invitation Only)</em></td>
<td>OFFSITE</td>
</tr>
</tbody>
</table>

#### Wednesday, July 26, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Certification Board</td>
<td>L100E</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MaM Editorial Board</td>
<td>L100C</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Membership Committee</td>
<td>L100D</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: EM Tech (formerly Abberation)</td>
<td>L100C</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>MSA Members’ Meeting</td>
<td>M100J</td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td>Diversity and Inclusion Mixer</td>
<td>SEASONS, 2ND FLOOR</td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td>MAS Business Meeting</td>
<td>M100D</td>
</tr>
<tr>
<td>6:30 PM – 8:30 PM</td>
<td>MAS Members Social</td>
<td>OFFSITE</td>
</tr>
<tr>
<td>6:30 PM</td>
<td>Vendor Tutorials <em>(Sign up at Vendor Booths)</em></td>
<td>EXHIBIT HALL</td>
</tr>
</tbody>
</table>

#### Thursday, July 27, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 9:30 AM</td>
<td>M&amp;M Sustaining Members Meeting</td>
<td>L100AB</td>
</tr>
<tr>
<td>4:30 PM – 5:30 PM</td>
<td>M&amp;M 2023 Wrap-Up &amp; Debrief</td>
<td>L100AB</td>
</tr>
</tbody>
</table>
Check out the **BOOK DISPLAY** – publisher-donated books, divided into biological/physical topics. Several new titles added every year! Come and browse the newest titles.

**CERTIFICATION BOARD** – Find out about MSA’s certification program for Electron Microscopy Technologists and how being certified can help you in your next job search!

**MICROSCOPY TODAY** and **MICROSCOPY and MICROANALYSIS** are the society’s two publications – one a magazine format, the other a peer-reviewed scientific journal. Information for authors and advertisers is available here.

**EDUCATIONAL OUTREACH** – Browse the materials and find out how to start an outreach program in your local area. Get details on the special programming at the M&M meeting for educators and kids of all ages.

Visit the updated **Project MICRO** display to learn about this organization's education and outreach goals.
Plenary Session

Monday, July 24, 2023 | Minneapolis Convention Center—Auditorium

Plenary session begins at 8:30 AM and will feature special awards presentations from the joining societies.

Karin Sauer, PhD
Professor and Chair, Department of Biological Sciences, Binghamton University
Co-Director, Binghamton Biofilm Research Center (BBRC)
Co-Director, Microbial Biofilms REU
Editor-in-Chief, FEMS Microbiology Reviews

Biofilms – Life upon First Contact and Beyond

Stefanie Milam, PhD
Deputy Project Scientist for Planetary Science, James Webb Space Telescope (JWST)
Astrochemistry Laboratory
NASA Goddard Space Flight Center

Revealing the Big and the Small with the James Webb Space Telescope: A Macroscopic Approach to Studying the Solar System

MSA Major Society Award Winners

BURTON MEDAL – PHYSICAL SCIENCES
Joe Patterson, University of California, Irvine

CHUCK FIORI AWARD FOR OUTSTANDING TECHNOLOGIST, PHYSICAL SCIENCES
Matthew Michael Schneider, Los Alamos National Laboratory

HILDEGARD H. CROWLEY AWARD FOR OUTSTANDING TECHNOLOGIST, BIOLOGICAL SCIENCES
Patricia L. Jansma, University of Arizona RII Imaging Core-Optical

MORTON D. MASER DISTINGUISHED SERVICE AWARD
Gail J. Celio, University of Minnesota

MAS Major Society Award Winners

PRESIDENTIAL SCIENCE AWARD
Masashi Watanabe, Lehigh University

PRESIDENTIAL SERVICE AWARD
Thomas Kelly, STEAM Instruments, Inc.

PETER DUNCUMB AWARD FOR EXCELLENCE IN MICROANALYSIS
Niklas Dellby, NION Co.

KURT F.J. HEINRICH AWARD
Anette von der Handt, University of British Columbia

BIRKS – BEST CONTRIBUTED PAPER
Emma Bullock, Carnegie Institution for Science

CASTAING – BEST STUDENT PAPER
Edwin Supple, Colorado School of Mines

COSLETT – BEST INVITED PAPER
Scott Eckley

MACRES – BEST INSTRUMENTATION/SOFTWARE PAPER
Tina R. Hill, Bruker AXS, Inc.

MSA Distinguished Scientist Award

DISTINGUISHED SCIENTIST – PHYSICAL SCIENCES
John Andrew Panitz, University of New Mexico (Emeritus)
4D STEM at

120K

FPS

With High Dynamic Range and Sensitivity

DECTRIS Ltd.
Taefernweg 1
5405 Baden-Daettwil
Switzerland

Contact info
sales@dectris.com
www.dectris.com

Find us at M&M 2023
Dr. Luca Piazza
Dr. Daniel Stroppa
Dr. Hervé Remigy

dectris.com/arina
Saturday, July 22

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 5:30 PM</td>
<td>MSA Council</td>
<td>Hilton Minneapolis Hotel</td>
</tr>
<tr>
<td>8:15 AM – 5:00 PM</td>
<td>Pre-Meeting Congress</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X60</strong> Annual Pre-Meeting Congress for Students, Post-Docs, and Early-Career Professionals in Microscopy &amp; Microanalysis <em>(Organized by the MSA Student Council)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X61</strong> Advances in Focused Ion Beam Technologies</td>
<td></td>
</tr>
</tbody>
</table>

Sunday, July 23

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 5:00 PM</td>
<td>Sunday Short Courses</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X10</strong> High Resolution Structure Determination by Cryo-EM</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X11</strong> Guidelines for Performing 4-D STEM Characterization from the Atomic to &gt;Micrometer Scales: Experimental Considerations, Data Analysis and Simulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X12</strong> Biological EM Sample Processing – Part 2 <em>(Part 1 offered in 2022 – not a prerequisite)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X13</strong> Cryo-EM for Materials Sciences: Hardware, Applications, and Data Acquisition</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X14</strong> Transmission Electron Microscopy and Spectroscopy from First Principles</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X15</strong> Large-Area Hyperspectral Mapping, EBSD/EDS/TKD/STEM, Machine Learning Data Analysis, Oh My!</td>
<td></td>
</tr>
<tr>
<td>6:30 PM</td>
<td>M&amp;M 2023 Welcome Reception</td>
<td>Hilton Minneapolis Hotel</td>
</tr>
<tr>
<td>8:00 PM</td>
<td>Symposium Organizers’ Reception</td>
<td>Offsite (by invitation only)</td>
</tr>
</tbody>
</table>

Monday, July 24

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Awards + Fellowship Committees</td>
<td></td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Technologists’ Forum Board</td>
<td></td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>Travel Awards Committee</td>
<td></td>
</tr>
<tr>
<td>8:30 AM – 12:00 PM</td>
<td>M&amp;M 2023 Plenary Sessions</td>
<td>Auditorium at the MCC</td>
</tr>
<tr>
<td></td>
<td>Opening Welcome</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Plenary Talk #1:</strong> Karin Sauer, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Professor and Chair, Department of Biological Sciences, Binghamton University</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Co-Director, Binghamton Biofilm Research Center (BBRC)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Co-Director, Microbial Biofilms REU</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Editor-in-Chief, FEMS Microbiology Reviews</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Biofilms – Life upon First Contact and Beyond</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAS Awards Presentation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MSA Awards Presentation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M&amp;M Meeting Awards Presentation</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Plenary Talk #2:</strong> Stefanie Milam, PhD</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Deputy Project Scientist for Planetary Science</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>James Webb Space Telescope (JWST)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Astrochemistry Laboratory</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>NASA Goddard Space Flight Center</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Revealing the Big and the Small with the James Webb Space Telescope: A Macroscopic Approach to Studying the Solar System</strong></td>
<td></td>
</tr>
</tbody>
</table>

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.
### Monday, July 24 (Cont’d.)

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>Lunch Break in the Exhibit Hall</td>
</tr>
<tr>
<td>12:00 PM – 5:30 PM</td>
<td>Exhibit Hall Open</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>MAS Meal with a Mentor</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>MSA International Committee</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Pharmaceutical</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Diagnostic &amp; Biological Microscopy</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Focused Ion Beam</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: Atom Probe Field Ion Microscopy</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td>FIG: FOM Roundtable</td>
</tr>
</tbody>
</table>

#### 1:30 PM – 3:00 PM

**P.M. Symposia & Sessions**

- **A01.1** Microscopic Approach of Materials for Agri-Food Process
- **A02.1** Microscopy and Microanalysis for Real World Problem Solving
- **A04.1** The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials
- **A06.1** Learning from Failure: Negative and Null Results in Microscopy
- **A07.1** In Memoriam of David Joy: Scanning Electron and Ion Microscopy
- **A08.1** Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences
- **A11.1** Nanoscale Infrared Spectroscopy with Electrons and Photons
- **A14.1** Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens
- **A15.1** Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

#### 3:00 PM – 5:00 PM

**Monday Poster Presentations**

*Post-Deadline Posters will be presented on this day.*

- **A02.P1** Microscopy and Microanalysis for Real World Problem Solving
- **A04.P1** The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials
- **A06.P1** Learning from Failure: Negative and Null Results in Microscopy
- **A07.P1** In Memoriam of David Joy: Scanning Electron and Ion Microscopy
- **A11.P1** Nanoscale Infrared Spectroscopy with Electrons and Photons
- **A15.P1** Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials
- **B01.P1** Imaging Approaches for Plant Cell Biology, Agriculture, Ecology and Environment-Related Research
- **B04.P1** Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging
- **B09.P1** Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling
- **P03.P1** Theory and Applications of Advanced Electron Tomography
- **P06.P1** Imaging and Micro/Nano Analysis of Materials for Nuclear Applications
- **P07.P1** Prof. Wilbur C Bigelow Centenary Symposium-In situ Heating and Gas-Reaction Studies in Materials Sciences
- **P10.P1** Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces
### Monday, July 24 (Cont’d.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td><em>Microscopy Today</em> Editors’ Meeting</td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td>FIG: 3D EM in the Biological Sciences</td>
</tr>
<tr>
<td>3:30 PM – 5:00 PM</td>
<td>Technologists’ Forum Business Meeting</td>
</tr>
<tr>
<td>4:30 PM – 6:00 PM</td>
<td>MSA Book Elements</td>
</tr>
<tr>
<td>5:00 PM – 5:30 PM</td>
<td>Student Poster Awards</td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td>Student Mixer</td>
</tr>
<tr>
<td>5:45 PM – 6:45 PM</td>
<td>Vendor Tutorials (Sign up at individual exhibitors’ booths)</td>
</tr>
</tbody>
</table>

### Tuesday, July 25

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>MSA Local Affiliated Societies &amp; MAS Affiliated Regional Societies</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td><em>Microscopy Today</em> Editorial Board Meeting</td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td>FIG: Electron Microscopy in Liquids &amp; Gases</td>
</tr>
<tr>
<td>8:30 AM – 10:00 AM</td>
<td>A.M. Symposia &amp; Sessions</td>
</tr>
<tr>
<td></td>
<td>X90.1 Outreach: Microscopy in the Classroom</td>
</tr>
<tr>
<td></td>
<td>A01.2 Microscopic Approach of Materials for Agri-Food Proces</td>
</tr>
<tr>
<td></td>
<td>A02.2 Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td></td>
<td>A04.2 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td></td>
<td>A06.2 Learning from Failure: Negative and Null Results in Microscopy</td>
</tr>
<tr>
<td></td>
<td>A07.2 In Memoriam of David Joy: Scanning Electron and Ion Microscopy</td>
</tr>
<tr>
<td></td>
<td>A08.2 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences</td>
</tr>
<tr>
<td></td>
<td>A11.2 Nanoscale Infrared Spectroscopy with Electrons and Photons</td>
</tr>
<tr>
<td></td>
<td>A14.2 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td></td>
<td>A15.2 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials</td>
</tr>
<tr>
<td></td>
<td>B02.1 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td></td>
<td>B04.2 Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging</td>
</tr>
<tr>
<td></td>
<td>B09.2 Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling</td>
</tr>
<tr>
<td></td>
<td>C05.1 Vendor Symposium</td>
</tr>
<tr>
<td></td>
<td>P03.2 Theory and Applications of Advanced Electron Tomography</td>
</tr>
<tr>
<td></td>
<td>P06.2 Imaging and Micro/Nano Analysis of Materials for Nuclear Applications</td>
</tr>
<tr>
<td></td>
<td>P07.2 Prof. Wilbur C Bigelow Centenary Symposium-In situ Heating and Gas-Reaction Studies in Materials Sciences</td>
</tr>
<tr>
<td></td>
<td>P10.2 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
<tr>
<td>10:00 AM – 10:30 AM</td>
<td>Coffee Break in the Exhibit Hall</td>
</tr>
<tr>
<td>10:00 AM – 5:30 PM</td>
<td>Exhibit Hall Open</td>
</tr>
<tr>
<td>10:00 AM – 12:00 PM</td>
<td>M&amp;M 2024 Symposium Organizers’ Planning Meeting</td>
</tr>
</tbody>
</table>
Tuesday, July 25 (Cont’d.)

<table>
<thead>
<tr>
<th>A.M. Symposia &amp; Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>X90.2 Outreach: Microscopy in the Classroom</td>
</tr>
<tr>
<td>A01.3 Microscopic Approach of Materials for Agri-Food Process</td>
</tr>
<tr>
<td>A02.3 Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td>A04.3 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td>A06.3 Learning from Failure: Negative and Null Results in Microscopy</td>
</tr>
<tr>
<td>A07.3 In Memoriam of David Joy: Scanning Electron and Ion Microscopy</td>
</tr>
<tr>
<td>A08.3 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences</td>
</tr>
<tr>
<td>A11.3 Nanoscale Infrared Spectroscopy with Electrons and Photons</td>
</tr>
<tr>
<td>A14.3 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td>A15.3 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials</td>
</tr>
<tr>
<td>B02.3 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td>B06.1 Innovations in Light Microscopy: Revealing the Inner Workings of Life From Single Molecule to Whole Organisms</td>
</tr>
<tr>
<td>B09.3 Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling</td>
</tr>
<tr>
<td>C03.1 Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td>C05.2 Vendor Symposium</td>
</tr>
<tr>
<td>P03.3 Theory and Applications of Advanced Electron Tomography</td>
</tr>
<tr>
<td>P06.3 Imaging and Micro/Nano Analysis of Materials for Nuclear Applications</td>
</tr>
<tr>
<td>P07.3 Prof. Wilbur C Bigelow Centenary Symposium-In situ Heating and Gas-Reaction Studies in Materials Sciences</td>
</tr>
<tr>
<td>P10.3 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lunch Break in the Exhibit Hall</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>12:00 PM – 1:30 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:15 PM – 1:15 PM</td>
</tr>
<tr>
<td>MSA Distinguished Scientist Awardee Lecture</td>
</tr>
<tr>
<td>Microscopy Today Editorial Board</td>
</tr>
<tr>
<td>FIG: FOM FIG Lunch Meeting</td>
</tr>
<tr>
<td>FIG: Cryo-Preparation</td>
</tr>
<tr>
<td>FIG: Electron Crystallography</td>
</tr>
<tr>
<td>FIG: MicroAnalytical Standards</td>
</tr>
<tr>
<td>MSA Standards Committee</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P.M. Symposia &amp; Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A02.4 Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td>A04.4 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td>A07.4 In Memoriam of David Joy: Scanning Electron and Ion Microscopy</td>
</tr>
<tr>
<td>A08.4 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences</td>
</tr>
<tr>
<td>A11.4 Nanoscale Infrared Spectroscopy with Electrons and Photons</td>
</tr>
<tr>
<td>A14.4 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td>A15.4 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials</td>
</tr>
<tr>
<td>B02.3 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td>B06.2 Innovations in Light Microscopy: Revealing the Inner Workings of Life from Single Molecule to Whole Organisms</td>
</tr>
<tr>
<td>B09.4 Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling</td>
</tr>
</tbody>
</table>

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.
### Tuesday, July 25 (Cont’d.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM – 3:00 PM</td>
<td><strong>P.M. Symposia &amp; Sessions (Cont’d.)</strong></td>
</tr>
<tr>
<td></td>
<td>C03.2 Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td></td>
<td>C05.3 Vendor Symposium</td>
</tr>
<tr>
<td></td>
<td>P07.4 Prof. Wilbur C Bigelow Centenary Symposium-In situ Heating and Gas-Reaction Studies in Materials Sciences</td>
</tr>
<tr>
<td></td>
<td>P10.4 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td><strong>Tuesday Poster Presentations</strong></td>
</tr>
<tr>
<td></td>
<td>X90.P1 Outreach—Microscopy in the Classroom</td>
</tr>
<tr>
<td></td>
<td>A01.P1 Microscopic Approach of Materials for Agri-Food Process</td>
</tr>
<tr>
<td></td>
<td>A02.P2 Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td></td>
<td>A04.P2 The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td></td>
<td>A08.P1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences</td>
</tr>
<tr>
<td></td>
<td>A14.P1 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td></td>
<td>B02.P2 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td></td>
<td>B04.P1 Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging</td>
</tr>
<tr>
<td></td>
<td>B06.P1 Innovations in Light Microscopy: Revealing the Inner Workings of Life from Single Molecule to Whole Organisms</td>
</tr>
<tr>
<td></td>
<td>B09.P1 Volume Electron Microscopy in Biological Research—Instrumentation, Sample Preparation and Data Handling</td>
</tr>
<tr>
<td></td>
<td>P07.P1 Prof. Wilbur C Bigelow Centenary Symposium-In situ Heating and Gas-Reaction Studies in Materials Sciences</td>
</tr>
<tr>
<td></td>
<td>P10.P2 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td><strong>FIG Business Meeting</strong></td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td><strong>MSA Education Committee</strong></td>
</tr>
<tr>
<td>5:00 PM – 5:30 PM</td>
<td><strong>Student Poster Awards</strong></td>
</tr>
<tr>
<td>5:30 PM – 7:00 PM</td>
<td><strong>Post-Doctoral Researchers’ Reception</strong>               (all post-doctoral fellows &amp; researchers welcome!)</td>
</tr>
<tr>
<td>5:45 PM – 6:45 PM</td>
<td><strong>Vendor Tutorials</strong>                                   (Sign up at exhibitors’ booths)</td>
</tr>
<tr>
<td>6:30 PM</td>
<td><strong>Presidents’ Reception</strong>                              (Invitation Only)</td>
</tr>
</tbody>
</table>

### Wednesday, July 26

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td><strong>MaM Editorial Board</strong></td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td><strong>MSA Certification Board</strong></td>
</tr>
<tr>
<td>7:15 AM – 8:15 AM</td>
<td><strong>MSA Membership Committee</strong></td>
</tr>
<tr>
<td>8:30 AM – 10:00 AM</td>
<td><strong>A.M. Symposia &amp; Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>X30 Technologists’ Forum Symposia: Methods in Tissue Clearing and Expansion to Achieve Improved Resolution</td>
</tr>
<tr>
<td></td>
<td>X40 Cross-Cut Physical-Biological Tutorial: Need for Speed: Imaging Biological Samples with the 64-Beams FAST-EM</td>
</tr>
<tr>
<td></td>
<td>A02.5 Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td></td>
<td>A04.5 The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td></td>
<td>A07.5 In Memoriam of David Joy: Scanning Electron and Ion Microscopy</td>
</tr>
<tr>
<td></td>
<td>A11.5 Nanoscale Infrared Spectroscopy with Electrons and Photons</td>
</tr>
<tr>
<td></td>
<td>A13.1 Computational Advances in Electron Microscopy</td>
</tr>
</tbody>
</table>
**Wednesday, July 26 (Cont’d.)**  
For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 10:00 AM</td>
<td><strong>A.M. Symposia &amp; Sessions</strong></td>
</tr>
<tr>
<td></td>
<td><strong>A14.5</strong> Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td></td>
<td><strong>B02.4</strong> 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td></td>
<td><strong>B03.1</strong> Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network</td>
</tr>
<tr>
<td></td>
<td><strong>B08.1</strong> Biological Soft X-ray Tomography</td>
</tr>
<tr>
<td></td>
<td><strong>C02.1</strong> Extracting Information from Data: Applications of Artificial Intelligence in Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>C03.3</strong> Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td></td>
<td><strong>P01.1</strong> Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td></td>
<td><strong>P04.1</strong> Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing</td>
</tr>
<tr>
<td></td>
<td><strong>P06.1</strong> Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td></td>
<td><strong>P10.5</strong> Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
<tr>
<td>10:00 AM – 10:30 AM</td>
<td>Coffee Break in the Exhibit Hall</td>
</tr>
<tr>
<td>10:00 AM – 5:30 PM</td>
<td>Exhibit Hall Open</td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td><strong>A.M. Symposia &amp; Sessions (Cont’d.)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>X32</strong> Tech Forum: 4D STEM Tips and Techniques [Partnering with A04]</td>
</tr>
<tr>
<td></td>
<td><strong>X41</strong> Physical Tutorial: Specimen Preparation for in-situ Transmission Electron Microscopy Experiments</td>
</tr>
<tr>
<td></td>
<td><strong>A02.6</strong> Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td></td>
<td><strong>A03.1</strong> Standards and Reference Materials and their Applications in Quantitative Microanalysis</td>
</tr>
<tr>
<td></td>
<td><strong>A05.1</strong> Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td></td>
<td><strong>A13.2</strong> Computational Advances in Electron Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>A14.6</strong> Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
<tr>
<td></td>
<td><strong>B02.5</strong> 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)</td>
</tr>
<tr>
<td></td>
<td><strong>B03.2</strong> Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network</td>
</tr>
<tr>
<td></td>
<td><strong>B08.2</strong> Biological Soft X-ray Tomography</td>
</tr>
<tr>
<td></td>
<td><strong>C02.2</strong> Extracting Information from Data: Applications of Artificial Intelligence in Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>C03.4</strong> Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td></td>
<td><strong>P01.2</strong> Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td></td>
<td><strong>P04.2</strong> Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing</td>
</tr>
<tr>
<td></td>
<td><strong>P06.2</strong> Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td></td>
<td><strong>P08.1</strong> Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td></td>
<td><strong>P10.6</strong> Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>Lunch Break in the Exhibit Hall</td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td><strong>FIG: Aberration-Corrected Microscopy</strong></td>
</tr>
<tr>
<td>12:15 PM – 1:15 PM</td>
<td><strong>MSA Members’ Meeting</strong></td>
</tr>
<tr>
<td>1:30 PM – 3:00 PM</td>
<td><strong>P.M. Symposia &amp; Sessions</strong></td>
</tr>
<tr>
<td></td>
<td><strong>X31</strong> Tech Forum: Tech Forum: New and Developing Technologies in Light Microscopy [Partnering with A06]</td>
</tr>
<tr>
<td></td>
<td><strong>X42</strong> Biological Tutorial: CryoAPEX: Inception, Growth and Evolution of the Method</td>
</tr>
<tr>
<td></td>
<td><strong>X91</strong> Microscopy Explorations (Outreach)</td>
</tr>
<tr>
<td></td>
<td><strong>A02.7</strong> Microscopy and Microanalysis for Real World Problem Solving</td>
</tr>
<tr>
<td></td>
<td><strong>A03.2</strong> Standards and Reference Materials and their Applications in Quantitative Microanalysis</td>
</tr>
<tr>
<td></td>
<td><strong>A04.6</strong> The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td></td>
<td><strong>A05.2</strong> Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td></td>
<td><strong>A13.3</strong> Computational Advances in Electron Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>A14.7</strong> Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens</td>
</tr>
</tbody>
</table>
### Week At-A-Glance

#### Wednesday, July 26 (Cont’d.)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM – 3:00 PM</td>
<td><strong>P.M. Symposia &amp; Sessions (Cont’d.)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>B05.1</strong> Technical Advances in cryoEM</td>
</tr>
<tr>
<td></td>
<td><strong>B07.1</strong> Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants</td>
</tr>
<tr>
<td></td>
<td><strong>B08.3</strong> Biological Soft X-ray Tomography</td>
</tr>
<tr>
<td></td>
<td><strong>C02.3</strong> Extracting Information from Data: Applications of Artificial Intelligence in Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>C03.5</strong> Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td></td>
<td><strong>P01.3</strong> Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td></td>
<td><strong>P04.3</strong> Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing</td>
</tr>
<tr>
<td></td>
<td><strong>P05.3</strong> Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td></td>
<td><strong>P08.2</strong> Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td></td>
<td><strong>P09.1</strong> Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td><strong>Wednesday Poster Presentations</strong></td>
</tr>
<tr>
<td></td>
<td>Post-Deadline Posters will be presented on this day</td>
</tr>
<tr>
<td></td>
<td><strong>A03.P1</strong> Standards and Reference Materials and their Applications in Quantitative Microanalysis</td>
</tr>
<tr>
<td></td>
<td><strong>A05.P1</strong> Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td></td>
<td><strong>B03.P1</strong> Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network</td>
</tr>
<tr>
<td></td>
<td><strong>B05.P1</strong> Technical Advances in cryoEM</td>
</tr>
<tr>
<td></td>
<td><strong>B08.P1</strong> Biological Soft X-ray Tomography</td>
</tr>
<tr>
<td></td>
<td><strong>C02.P1</strong> Extracting Information from Data: Applications of Artificial Intelligence in Microscopy</td>
</tr>
<tr>
<td></td>
<td><strong>C03.P1</strong> Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td></td>
<td><strong>C04.P1</strong> Lens on Diversity in the M&amp;M Community</td>
</tr>
<tr>
<td></td>
<td><strong>P01.P1</strong> Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td></td>
<td><strong>P04.P1</strong> Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing</td>
</tr>
<tr>
<td></td>
<td><strong>P05.P1</strong> Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td></td>
<td><strong>P10.P3</strong> Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces</td>
</tr>
<tr>
<td>5:00 PM</td>
<td><strong>Student Poster Awards</strong></td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td><strong>MAS Business Meeting</strong></td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td><strong>Diversity and Inclusion Mixer</strong></td>
</tr>
<tr>
<td>5:45 PM – 6:45 PM</td>
<td><strong>Vendor Tutorials</strong> (Sign up at exhibitors’ booths)</td>
</tr>
<tr>
<td></td>
<td><strong>MAS Members’ Social</strong></td>
</tr>
<tr>
<td></td>
<td>(See MAS Booth for Details—Offsite)</td>
</tr>
</tbody>
</table>
### Thursday, July 27

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.

<table>
<thead>
<tr>
<th>8:30 AM – 9:30 AM</th>
<th><strong>M&amp;M Sustaining Members Meeting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.M. Symposia &amp; Sessions</strong></td>
<td></td>
</tr>
<tr>
<td>A04.7</td>
<td>The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials</td>
</tr>
<tr>
<td>A05.3</td>
<td>Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td>A09.1</td>
<td>Analytical Scanning Probe Microscopy</td>
</tr>
<tr>
<td>A10.1</td>
<td>The Road to Atomic Scale Tomography</td>
</tr>
<tr>
<td>A12.1</td>
<td>New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-liquid Interfaces</td>
</tr>
<tr>
<td>A13.4</td>
<td>Computational Advances in Electron Microscopy</td>
</tr>
<tr>
<td>B05.2</td>
<td>Technical Advances in cryoEM</td>
</tr>
<tr>
<td>B07.2</td>
<td>Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants</td>
</tr>
<tr>
<td>B10.1</td>
<td>Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter</td>
</tr>
<tr>
<td>C01.1</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
</tr>
<tr>
<td>C03.6</td>
<td>Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td>P01.4</td>
<td>Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td>P02.1</td>
<td>Electron Beam Manipulation of Covalently Bound Materials</td>
</tr>
<tr>
<td>P05.4</td>
<td>Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td>P08.3</td>
<td>Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td>P09.2</td>
<td>Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10:00 AM – 12:00 PM</th>
<th><strong>Coffee Break and Poster Session in the Exhibit Hall</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exhibit Hall Open</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Thursday Poster Presentations</strong></td>
<td></td>
</tr>
<tr>
<td>A09.P1</td>
<td>Analytical Scanning Probe Microscopy</td>
</tr>
<tr>
<td>A10.P1</td>
<td>The Road to Atomic Scale Tomography</td>
</tr>
<tr>
<td>A12.P1</td>
<td>New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-liquid Interfaces</td>
</tr>
<tr>
<td>A13.P1</td>
<td>Computational Advances in Electron Microscopy</td>
</tr>
<tr>
<td>B05.P2</td>
<td>Technical Advances in cryoEM</td>
</tr>
<tr>
<td>B07.P1</td>
<td>Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants</td>
</tr>
<tr>
<td>B10.P1</td>
<td>Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter</td>
</tr>
<tr>
<td>C01.P1</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
</tr>
<tr>
<td>C03.P2</td>
<td>Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td>P02.P1</td>
<td>Electron Beam Manipulation of Covalently Bound Materials</td>
</tr>
<tr>
<td>P05.P2</td>
<td>Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td>P08.P1</td>
<td>Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td>P09.P1</td>
<td>Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:00 PM</th>
<th><strong>Student Poster Awards</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td><strong>Lunch Break in the Exhibit Hall</strong></td>
</tr>
</tbody>
</table>

---

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.
### Thursday, July 27 (Cont’d.)

#### 1:30 PM – 3:00 PM

**P.M. Symposia & Sessions**

<table>
<thead>
<tr>
<th>Session Code</th>
<th>Session Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>A05.4</td>
<td>Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td>A09.2</td>
<td>Analytical Scanning Probe Microscopy</td>
</tr>
<tr>
<td>A10.2</td>
<td>The Road to Atomic Scale Tomography</td>
</tr>
<tr>
<td>A12.2</td>
<td>New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-liquid Interfaces</td>
</tr>
<tr>
<td>A13.5</td>
<td>Computational Advances in Electron Microscopy</td>
</tr>
<tr>
<td>B05.3</td>
<td>Technical Advances in cryoEM</td>
</tr>
<tr>
<td>B07.3</td>
<td>Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants</td>
</tr>
<tr>
<td>B10.2</td>
<td>Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter</td>
</tr>
<tr>
<td>C01.2</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
</tr>
<tr>
<td>C03.7</td>
<td>Correlative and Multimodal Microscopy and Analysis</td>
</tr>
<tr>
<td>P01.5</td>
<td>Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td>P02.2</td>
<td>Electron Beam Manipulation of Covalently Bound Materials</td>
</tr>
<tr>
<td>P05.5</td>
<td>Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td>P08.4</td>
<td>Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td>P09.3</td>
<td>Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials</td>
</tr>
</tbody>
</table>

#### 3:00 PM – 3:30 PM

**Coffee Break**

#### 3:30 PM – 5:30 PM

**Late P.M. Symposia & Sessions**

<table>
<thead>
<tr>
<th>Session Code</th>
<th>Session Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>A05.5</td>
<td>Advanced Measurement Techniques in (S)TEM-EELS</td>
</tr>
<tr>
<td>A09.3</td>
<td>Analytical Scanning Probe Microscopy</td>
</tr>
<tr>
<td>A10.3</td>
<td>The Road to Atomic Scale Tomography</td>
</tr>
<tr>
<td>A12.3</td>
<td>New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-liquid Interfaces</td>
</tr>
<tr>
<td>B05.4</td>
<td>Technical Advances in cryoEM</td>
</tr>
<tr>
<td>B07.4</td>
<td>Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants</td>
</tr>
<tr>
<td>B10.3</td>
<td>Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter</td>
</tr>
<tr>
<td>C01.3</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
</tr>
<tr>
<td>P01.6</td>
<td>Revealing the Working Morphology of Energy Materials and Its Impact on Performance</td>
</tr>
<tr>
<td>P02.3</td>
<td>Electron Beam Manipulation of Covalently Bound Materials</td>
</tr>
<tr>
<td>P05.6</td>
<td>Microscopy and Microanalysis of Materials under Multiple Environmental Extremes</td>
</tr>
<tr>
<td>P08.5</td>
<td>Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena</td>
</tr>
<tr>
<td>P09.4</td>
<td>Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials</td>
</tr>
</tbody>
</table>

#### 4:30 PM – 5:30 PM

**M&M 2023 Wrap-Up & Debrief** *(Invitation only)*

For an up-to-date schedule and meeting room location, please check the meeting website or mobile app.
Making Imaging Elementary

Introducing Unity, the world’s first combined Backscattered Electron and X-ray (BEX) imaging detector.

Accelerate your journey to scientific discovery with instant microstructural and chemical images, acquired simultaneously with the Unity detector.

Find out how we’re making sophisticated sample analyses simpler and faster than ever before.

Visit us at booth 620 or on nano.oxinst.com
Scientific Program

Monday, July 24

2:15 PM 36 Use of Spectrum Simulation to Acquire Reliable Scans With a Wavelength Dispersive Spectrometer; Philippe Pinard, Rosie Jones, Lucia Spasevski, Simon Burgess, Peter Statham

2:30 PM 47 A Comprehensive Examination of Aluminum Oxide (Al2O3) Using Extreme and Near Ultraviolet Laser-Assisted Atom Probe Tomography; Jacob Garcia, Benjamin Caplins, Ann Chiaramonti, Luis Mijia-Avila, Norman Sanford

2:45 PM 62 Towards On-the-Fly Feedback Loops for Direct Energy Deposition Systems; Matthew Olzsta, Lance Hubbard, Nicole Overman, Floyd Hilty, Ankit Roy, Shawn Riechers

A04.1 The Praxis of 4D-STEM—Extraction of Information from Biological and Functional Materials

Monday 1:30 PM Room 200-B

1:30 PM 5 Extending 4D-STEM to Defect and Short-Range Ordering Analysis: Principles, Methodology and Applications; (Invited) Jian-Min Zuo, Haw-Wen Hsiao, Kaijun Yin, Hsu-Chih Ni, Haoyang Ni, Renliang Yuan, Jiong Zhang, Robert Busch Busch

2:00 PM 22 Deformation Defects Characterization in Short-Range Ordered CrCoNi using Fast Electron Detectors and 4D-STEM; Kaijun Yin, Haw-Wen Hsiao, Rui Feng, Peter K. Liaw, Jian-Min Zuo

2:15 PM 37 In-situ and Multi-modal 4D-STEM of Co@Shell Nanoparticles Interdiffusion; Chuqiao Shi, Zhihua Cheng, Matthew Jones, Yimo Han

2:30 PM 48 Disentangling Tilt and Polarization Measurements in 4D-STEM Measurements of a Multilayer By Inversion of a Stacked Bloch Wave Model; Steven Zeitmann, Shang-Lin Hsu, Hamish Brown, Sandhya Susarla, Andrew M Minor, Colin Ophus

2:45 PM 358 Imaging crystal domains and orientation in block copolymer electrolytes with 4D-STEM; Min Chen, Karen Bustillo, Vivaan Patel, Benjamin Savitzky, Jacqueline Maslyn, Colin Ophus, Xi Jiang, Nitash Balsara, Andrew Balsara

A06.1 Learning from Failure: Negative and Null Results in Microscopy

Monday 1:30 PM Room M-100-I


2:00 PM 23 Can We Analyze the Solution Behavior of My Particles with Your cryo-FIB?: Adventures and Lessons Learned; Jamie Ford

2:15 PM 38 Failure to Fail: Recreating Real-life Nanoparticle Degradation in Model Environments; Haoran Yu, Michael Zachman, David Cullen

2:30 PM 49 Mistakes and Pitfalls in In Situ TEM Studies; Myung-Geun Han, Yimei Zhu

http://microscopy.org/MandM/2023 | 33
Scientific Program

### Analytical/Instrumentation Sciences

#### A07.1 In Memoriam of David Joy: Scanning Electron and Ion Microscopy

**Monday 1:30 PM**  
Room 200-D

- **2:00 PM 24** Atomic-Scale Secondary-Electron Imaging in the STEM and SEM; *(Invited)* Ray Egerton, Sooyeon Hwang, Yimei Zhu
- **2:30 PM 50** Electron Probe Phase using Defocus in Scanning Electron Microscopy; Surya Kamal, Richard Hailstone

#### A08.1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

**Monday 1:30 PM**  
Room 200-F

- **1:30 PM 8** FIB Milling with Alternative Beams for Microscopy and Microanalysis; *(Invited)* Frances Allen
- **2:00 PM 25** Optimizing Protection for Specimen Preparation on Complex 3D Nanostructures; Aleksander Mosberg, Abinaya Sankaran, Kevin Ryan, Antonius T. J. van Helvoort, Quentin Ramasse
- **2:15 PM 39** Large Scale Xe PFIB/SEM Analysis of Shale: Nanometer Resolution Across Millimeters of Rock... What is Still Possible?; Annalena Wolff, Christoph Schrank, Michael Jones
- **2:30 PM 51** A Protocol for FIB-Based TEM Specimen Preparation for Nanoscale Microstructural Characterization of Ceramics; Sarshad Rommel, Jessica Maita, Jacob Davis, James Wollmershauser, Boris Feygelson, Seok-Woo Lee, Mark Aindow
- **2:45 PM 63** TEM Sample Preparation and Microstructural Characterization of Air Sensitive, µm-scale, Infiltrated MOF-Based Particles; Joshua Sugar, Suzy Vitale, Mohana Shivanna, Vitalie Stavila

#### A11.1 Nanoscale Infrared Spectroscopy with Electrons and Photons

**Monday 1:30 PM**  
Room M-100-H

- **1:30 PM 9** Single-Atom Vibrational Spectroscopy with Chemical Bonding Sensitivity; *(Invited)* Wu Zhou, Mingquan Xu, De-Liang Bao, Aowen Li, Shixuan Du, Gang Su, Stephen J. Pennycook, Sokrates Pantelides, Patrick Hopkins, Jordan Hachtel Hachtel
- **2:00 PM 26** Atomic Resolution Mapping of Localized Phonon Modes in Silicon Grain Boundaries; Benedikt Haas, Tara Boland, Christian Elsässer, Arunima Singh, Katia March, Juri Barthel, Christoph Koch, Peter Rez Rez

#### A14.1 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

**Monday 1:30 PM**  
Room 200-C

- **2:00 PM 27** Fundamentals and Applications of Secondary Ion Mass Spectrometry; *(Invited)* Jerry Hunter

#### A15.1 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

**Monday 1:30 PM**  
Room 200-E

- **1:30 PM 11** Klaus Keil: Meteorites, Microprobes, and Memories; *(Invited)* Timothy McCoy
- **2:00 PM 28** 60Fe-60Ni Systematics of Chondrules from Primitive Chondritic Meteorites; *(Invited)* Myriam Telus, Jasmeet Dhilliwal, Tyler Wickland
- **2:30 PM 54** Phosphates – The Role of Aqueous Fluids in the Evolution of Ordinary Chondrite Parent Asteroids; *(Invited)* Elena Dobrica, Alexander Krot, Adrian Brearley
Monday, July 24

**B01.1 Imaging Approaches for Plant Cell Biology, Agriculture, Ecology and Environment-Related Research**

*Monday 1:30 PM Room M-100-D*

- **1:30 PM 12** Dissecting Cell Plate Development During Plant Cytokinesis; *(Invited)* Georgia Drakakaki, Rosalie Sinclair, Jesse Aaron, Eric Wait, Daniel Cox, John Heddleston, Thomas Wilkop
- **2:00 PM 29** Utilization of Imaging Approaches to Understand Chenopodium Quinoa, A Model Plant To Study Salt Stress; *(Invited)* Lucia Acosta-Gamboa, Kirk Czymmek, Anastasiya Klebanovych, Samuel Kenney, Jared Gordon, Malia Gehan
- **2:30 PM 55** The Use of Correlative Micro-CT and XRM to Locate and Identify Dense Structures in Plant Material; *(Invited)* Richard Wuhrer, Laurel George, Karen Catunda, Daniel Fanna, Ken Moran, Ben Moore
- **2:45 PM 64** Lab-based X-ray Microscopy for in situ 3D Visualization of Mycorrhizal Fungal Structures Associated with Roots; *(Invited)* Keith Duncan, Clara Lebow, Melette DeVore, Dierdra Daniels, Daniela Foss, Armando Bravo, Christopher Topp

**B04.1 Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging**

*Monday 1:30 PM Room M-100-F*

- **1:30 PM 13** A Structurally Homogeneous Polymer for High-Isotropy Expansion and Nanoscale Imaging of Biological Ultrastructure; *(Invited)* Ruixuan Gao
- **2:00 PM 30** Scalable Analysis Pipeline for Mapping Brain Cells in Big Microscopy Data; *(Invited)* Iaroslavna Vasylieva, Megan Smith, Melaina Jacoby, Jesse Scarlet, Eshan Aravind, Alexander Ropelewski, William Klimstra, Ryan Logan, Zachary Logan, Alan Watson
- **2:30 PM 56** A New Expansion Microscopy Method Optimized for Microbiology; *(Invited)* Zhangyu Cheng, Yongxin Zhao

**B09.1 Volume Electron Microscopy in Biological Research—Instrumentation, Sample Preparation and Data Handling**

*Monday 1:30 PM Room M-100-E*

- **1:30 PM 14** Enabling volumeEM: Building a Global Community and Resources; *(Invited)* Kirk Czymmek, Michele Darrow, Paul Verkade
- **2:00 PM 31** Comparison of Heavy Metal Distribution in Mouse Soft Tissue Samples Prepared for Serial Block Face SEM Using Different Protocols; *Jana Nebesářová*, Eva Ďurinová, František Kitzberger, Radim Skoupy, Jiří Týč
- **2:30 PM 57** Enhanced FIB-SEM Sample Preparation Methods and Pipeline for Comparative Biology; *(Invited)* Song Pang
Scientific Program

Physical Sciences Symposia – Monday Afternoon

P03.1 Theory and Applications of Advanced Electron Tomography

Monday 1:30 PM Room 200-I

1:30 PM 15 Single-Atom Level Determination of 3-Dimensional Surface/Interface Atomic Structures via Deep Learning-Assisted Atomic Electron Tomography; (Invited) Yongsoo Yang, Juhyeok Lee, Chaehwa Jeong, Taegu Lee, Seunghwa Ryu

2:00 PM 32 Reducing Artifacts in BF and HAADF-STEM Images of Pt/C Fuel Cells using MBIR-ARAR; Amir Ziabari, Obaidullah Rahman, Haoran Yu, Jose D Arregui-Mena, Singananallur Venkatakrishnan, David Cullen

2:15 PM 42 High-Fidelity 3D Imaging Achieved Through Multislice Electron Tomography Using 4D-STEM; Juhyeok Lee, Moosung Lee, YongKeun Park, Colin Ophus, Yongsoo Yang

2:30 PM 58 Atomic Resolution Tomography on Simulated Amorphous Silicon Nanoparticles; Robert Busch, Peter Rez, Michael Treacy, Jian-Min Zuo

P06.1 Imaging and Micro/Nano Analysis of Materials for Nuclear Applications

Monday 1:30 PM Room 200-H

1:30 PM 16 Multimodal Characterization of Porosity in Advanced Manufactured and Welded Nuclear Structural Alloys; (Invited) Janelle Wharry, Grayson Nemets, Elliot Marrero Jackson, Jamalyn Emerson, Nate Gehmlich, Maria Okuniewski, Caleb Clement, Keyou Mao Mao

2:00 PM 33 Multimodal Characterization of Stored Energy and Gas-Filled Cavities in FCC Alloys Irradiated with Spallation Neutrons and High-Energy Protons; Timothy Lach, Maxim N. Gussev, Kinga Unocic, David McClintock

2:15 PM 43 In-situ Evaluation of Helium Bubble Migration and Coalescence in Tungsten Heavy Alloys; Eric Lang, Schuyler Tyler, William Streit Cunningham, David Srorouster, Jason Trelewicz, Ian McCue, Khalid Hattar

2:30 PM 59 STEM Analysis of High Burnup Structure in LWR Fuels; Chad Parish, Jesse Werden, Tyler Gerczak, Jason Harp, Casey McKinney, Nathan Capps

2:45 PM 66 How Can Data Science Enhance Multiscale Analysis of Materials under Radiation Damage?; Mitra Taheri

P07.1 Prof. Wilbur C. Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences

Monday 1:30 PM Room 200-G

1:30 PM 17 Professor Wilbur C. Bigelow: A Centenary Celebration; Lawrence Allard, Kinga Unocic, Abhaya Datye, John Mansfield

1:45 PM 19 Fundamental Atomic-scale Dynamics of the Initial Stages of Cu Oxidation: Correlating in situ Environmental Transmission Electron Microscopy with Multi-scale Simulations; (Invited) Judith Yang, Meng Li, Matthew Curnan, Stephen House, Wissam Saidi

2:15 PM 44 In-Depth Investigations of Graphene Oxide Reduction via in situ TEM Measurements; Raul Arenal, Mario Pelayo-Fernandez, Simon Hettler, Ana Benito, Wolfgang Maser

2:30 PM 60 Atomistic Understanding of CO and H2 Influence on Pt Sintering in Pt/CoOx; Peter Tieu, Wenjie Zang, Jaeha Lee, Xingyu Yan, Phillip Christopher, Xiaoping Pan

2:45 PM 66 Quantification of Gas-Based Charge Compensation by Off-axis Electron Holography in Open-cell Environmental TEM; Makoto Schreiber, Cathal Cassidy

P10.1 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

Monday 1:30 PM Room 200-J

1:30 PM 18 Cryo STEM EDS Tomography Probing of Solid Electrolyte Interphase in Rechargeable Batteries; (Invited) Chongmin Wang, Yang He, Lin Jiang, Yaxuan Xu

2:00 PM 34 Low Voltage (10 to 30 keV) CRYO-STEM-EELS: Another Step Toward a Damage-Free Mapping of Li in Beam Sensitive Materials; Nicolas Dumaresq, Nicolas Brodusch, Michel Trudeau, Raynald Gauvin

2:15 PM 45 The Structural Evolution of Polypeptoid Nanofibers Revealed by 3-D Cryo-TEM; Xi Jiang, Tianyi Yu, Xuobo Luo, David Prendergast, Glenn Butterfoss, Behzad Rad, Nafis Balsara, Ronald Zuckerman, Zuckermann

2:30 PM 61 Imagining Nitrogen Fixation at Lithium Interphases Via Cryo-EM; (Invited) Yuzhang Li
Analytical Sciences Poster Sessions – Monday Afternoon

3:00 PM – 5:00 PM  EXHIBIT HALL

A02.P1 Microscopy and Microanalysis for Real World Problem Solving

POSTER # 1

POSTER # 2
67 Characterization of Reverse Osmosis Membranes Under Compaction Utilizing 3D X-ray and 3D FIB Correlative Microscopy; Yara Suleiman, Jishan Wu, Eric Hoek, Sina Shahbazmohamadi

POSTER # 3
68 Controlled Formation of Honey Carbon Nanotube Thin Films by Tailoring the Ratio of Admixture Concentration and Annealing Time; Kaleb Hood, Md Meheedi Tanim, Zoe Templin, Annie Dao, Feng Zhao, Jun Jiao

POSTER # 4
70 Detecting and Correcting Piezoelectric-tube Actuator Drift Induced Distortion in Atomic-Resolution Scanning Tunneling Microscope Images from Crystal Surfaces; Peter Moecck, Tyler Bertol, Arthur Baddorf, Rama Vasudevan

POSTER # 5
71 Evaluation by SEM-EDS of the presence of manufacturing residual materials on Non-Invasive Ventilation (NIV) Masks; Guillerminda González-Mancera, Nicolas Mervich-Sigal, Brenda A. Paz-Michel, Joaquin Morales-García

POSTER # 6
72 Examination of Dealloying in a Domestic Water Fitting using Light Optical/Scanning Electron Microscopy and Raman Spectroscopy; Stephen French, Gary Johnson, Heather May

POSTER # 7
73 How to improve soil anti-adhesion by studying the micro relief of the cuticle surface of digging beetles: exploring the Sulcophanaeus Batesi pronotum using translucent replicas; Lorena Setten, Victoria Sanchez, Noelia Guillen

POSTER # 8
74 Influence and Comparison of the Properties of Three Cobalt-Chromium Dental Alloys; Cristina Jimenez-Marcos, Julia Mirza-Rosca, Anca Fratila, Adriana Saceleanu

POSTER # 10
76 Introduction of Hyperspectral mapping function with a WDS on an EPMA; Koki Kato, Masaru Takakura, Takanori Murano, Shigeru Honda, Vern Robertson, Peter McSwiggen

POSTER # 11
77 Long-term In-situ X-ray Diffraction Studies on Ordinary Portland Cement Hydration with Correlative X-Ray Mapping; Richard Wuhrer, Daniel Fanna, Qingtao Huang, Laurel George, Zhong Co-Author, Moran

POSTER # 12
78 Microscopy Methods for Analysis of Silicones; Jeremy Beebe

POSTER # 13
79 Nanograined zinc alloys with improved mechanical properties prepared by powder metallurgy; David Nečas, Ilona Vaňková, Jan Pinc, Drahomir Dvorský, Jiří Kubásek

POSTER # 14
80 Nanoindentation tests for characterization of hydroxyapatite thin films; Tomas De la Mora Ramirez, Christopher René Torres San Miguel, Dulce Viridiana Melo Maximo, Noé López Perrusquia, Marco Antonio Doflu Ruiz, Ernesto D. Garcia Bustos, Elvis Coutinho Moreno

POSTER # 15
81 Particle Orientation Adjustment inside Scanning Electron Microscope: Side View Approach; Chunfei Li, Joshua Craig

POSTER # 16

POSTER # 17
83 Quantitative analysis of transition metal oxides at low accelerating voltage with the Soft X-ray Emission Spectrometer; Masaru Takakura, Takanori Murano, Shogo Koshiya, Peter McSwiggen, Vern Robertson

POSTER # 18
84 Responsivity improvement of IR photodetector by using P3HT:PbS-QDs nanocomposite; Atef Zekri, Brahim Aïssa, Said Mansour

POSTER # 19
85 Structural and Optical Characterization of Green Synthesized β-Bi2O3/SiO2-Ag Nanostructures for Photocatalytic Application; Roel González-Montes De Oca, Maria Guadalupe Yañez-Cruz, Maricela Villanueva-Ibañez, Rocío Álvarez- García, Maria de los Ángeles Hernández-Pérez, Marco Antonio Flores- González

POSTER # 20
86 X-ray maps in WDS and EDS: comparing low voltage and low overvoltage techniques on intermetallic phases; John Williard, Joe Boro
Scientific Program

Analytical Sciences Poster Sessions – Monday Afternoon cont.

3:00 PM – 5:00 PM  EXHIBIT HALL

A04.P1  The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials

POSTER # 21  87 4D-STEM Characterization of Microstructural Transformations in Conductive Polymers Used for Li-ion Battery Anodes; Hadas Sternlicht, Tianyu Zhu, Benjamin Savitzky, Colin Ophus, Gao Liu, Andrew Minor

POSTER # 22  88 4D-STEM on Epitaxial Grown 2D Vertical Heterostructures of twisted WS2; Oliver Massmeyer, Jurgen Belz, Samane Ojaghi, Robin Guninkel, Johannes Glowatzki, Max Bergmann, Simonas Krotkus, Michael Heuken, Andreas Beyer, Kerstin Volz

POSTER # 23  89 Acquisition and Processing of Magnetic Data from LN2 Cooled Perovskite Thin Films Using STEM-DPC; Sivert Dagenborg, Yu Liu, Ingrid Hallsteinsen, Gregory Nordahl, Magnus Nord

POSTER # 24  90 Adding another Dimension to 4D-STEM with EDX-assisted Crystal Orientation and Phase Mapping; Tomáš Morávek, Robert Hooley, Eduardo Serralta, Narendraraj Chandran, Jing Lu, Raman Narayan

POSTER # 25  91 Atomic Insights of Interface Polarity in NdNiO2/SrTiO3 Superlattices; Chao Yang, Roberto Ortiz, Yi Wang, Wilfried Sigle, Hongguang Wang, Eva Benckiser, Bernhard Keimer, Peter A. van Aken

POSTER # 26  92 Effect of Multiple Scattering on Intensity of Central Diffraction Disk in Lorentz 4D-STEM; Lijun Wu, Myung-Geun Han, Yimei Zhu

POSTER # 27  93 Evaluation of Lattice-Spacing of SiGe/Si by NBD using Two Condenser-lens TEM, Experimental Study about the Effect of Convergence Angle; Junji Yamanaka, Joji Furuya, Kosuke Hara, Keisuke Arimoto

POSTER # 28  94 Powder Nano-Beam Diffraction in Scanning Electron Microscopy: Possibilities and Limitations for Applications; Vladislav Krzyzanek, Miroslav Slouf, Radim Skoupy, Ewa Pavlova, Kamila Hrubanova

POSTER # 29  95 Quantification of Potential Drops Across Semiconductor Heterointerfaces Using 4D-STEM; Kerstin Volz, Varun Chejarla, Shamail Ahmed, Andreas Beyer

POSTER # 30  96 Unveiling Nanoscale Coherent Precipitates and their Strain Fields in NiTiHf-based Shape Memory Alloys Using 4D-STEM; Eitan Hershkovitz, Yang Yang, Timothy Yoo, Flavia Da Cruz Gallo, Michele Manuel, Honggyu Kim

A06.P1  Learning from Failure: Negative and Null Results in Microscopy

POSTER # 31  97 Behavior of Ti-doped CoCrFeMoNi High Entropy Alloy; Santiago Brito-Garcia, Cristina Jimenez-Marcos, Julia Mirza-Rosca, Ionelia Voiculescu

POSTER # 32  98 High Yield Stress Obtained from the Fabrication of a Composite Material, Ti-MWNTs/Al; C. Carreño-Gallardo, Claudia López, José Ernesto Ledezma, D. Lardizabal-Gutiérrez, José Herrera-Ramirez

POSTER # 33  99 Influence of Ti Additions on Ni-based Laser Cladded Coatings for Fuel Cells; Julia Mirza-Rosca, Diana Nicoleta Avram, Cornelli Mircea Davidescu, Iosif Hulka, Elena Manuela Stanciu

A07.P1  In Memoriam of David Joy: Scanning Electron and Ion Microscopy

POSTER # 34  100 Characterization of the Performance of a Thin Si-based Timepix3 Detector at 10-30 keV Electron Energies; Tianbi Zhang, Ben Britton, Kirsty Paton

POSTER # 35  101 Comparison of Electrochemical Reduction of GO with LiCl and KOH by Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS); Luis David Arellano Gutierrez, E.Armando Zaragoza Contreras, Ivan Alziri Estrada Moreno

POSTER # 36  102 Electron Vortex Beam and Probe Phase in Scanning Electron Microscopy; Surya Kamal, Richard Hailstone

POSTER # 37  103 NanoMi: Progress on an Open-Source Electron Microscope; Makoto Schreiber, Marek Malac, Mark Salomons, Darren Homeniuk, Sam Ruttiman, Xuanhao Wang, Olivier Adkin-Kaya, Mohammad Kamal, Jesus Alejandro Marin-Calzada, Patrick Price

POSTER # 38  104 Need for Wavefront Sensing in Scanning Electron Microscopy; Surya Kamal, Richard Hailstone

POSTER # 39  105 Stability Evaluation of Superconducting X-ray Detectors for SEM-EDS Analyzer; Go Fujii

POSTER # 40  106 Synthesis by AACVD and Characterization of YSZ-Cr2O3 Nanocomposite Particles for Their Potential Application in Reinforcing Structures; Maximiliano Ruelas-Montoya, Patricia Amézaga-Madrid, C. Carreño-Gallardo

POSTER # 41  107 Synthesis of Mesoporous Zirconia and Mesoporous Zirconia doped with Yttria by Using Pluronic F-127; Salomón Borjas, Pablo Martínez Torres, Ariosto Medina Flores, Gerardo Rosas Trejo, Sheila Vélez Navarete, Gonzalo Virmontes Gamboa
Monday, July 24
Scientific Program

POSTER # 42
108 Ultra-Low Voltage SEM Imaging for Battery Materials; Yoichiro Hashimoto, Yutaka Nagaoka, Shuichi Takeuchi, Shuhei Yabu, Masahiro Sasajima

POSTER # 43
A11.P1 Nanoscale Infrared Spectroscopy with Electrons and Photons

POSTER # 44
109 Defect and Disorder Induced Phonon Softening in Boron Arsenide Using STEM-EELS; Han-Hsuan Wu, Hongbin Yang, Chaitanya Gadhre, Xingxu Yan, Toshiiro Aoki, Bolin Liao, Zhifeng Ren, Xiaoqing Pan

POSTER # 45
110 Exploring the Effect of Diffraction Conditions on Off-Axis Phonon EELS; Yifan Wang, Shize Yang, Alec Fischer, Timothy Grotjohn, Fernando Ponce, Peter Craizer

POSTER # 46
111 Recent Advances in Multimodal Optical-Photothermal Infrared Imaging and Spectroscopy; Samuel Tenney, Sabine Neal

A15.P1 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

POSTER # 47
112 A Heideite Clast in the CH3 Chondrite Acfer 182; Ryan Ogliore, Kainen Utt, Paul Carpenter, Alian Wang, Mike Krawczynski

POSTER # 48
113 Microanalysis of Iron Disproportionation Reaction Products in the Environment of Earth’s Lower Mantle; Dongyuan Zhou, Lingfeng Zhou, Bin Chen, Lumin Wang

POSTER # 49
114 On the Importance of Including all Elements in the EPMA Matrix Correction; Aurélien Moy, John Fournelle, William Nachlas, Michael Dungan, Andrew Locock, Emma Bullock, John Donovan, Henrietta Cathey, Julien Allaz, Anette von der Handt

POSTER # 50
115 The Presence and Composition of Mn-Rich Chondrule Rims in CO3 Chondrites; Jillian Kirk, Pranvera Hyseni, Fatima Jorge-Chavez, Vanessa Mendoza, Dale Burns, Steven Simon, Myriam Telus

POSTER # 51
116 Toward the Quantification of Calcium in Mineral Samples by EDS X-ray Microanalysis using the Ca L-Lines; Stephen Seddio

POSTER # 51
117 X-ray Spectroscopy of Nitrogen in Jarosite, Ammoniojarosite, and other NH4-Bearing Sulfate Minerals; William Nachlas, Simon Bushmaker, Eatai Sasson
Scientific Program

**Monday, July 24**

**B01.P1 Imaging Approaches for Plant Cell Biology, Agriculture, Ecology and Environment-Related Research**

- **POSTER # 52**
  - **118** Different Imaging Techniques for the 2 and 3D Characterization of Plant Cell Ultrastructure in the SEM and TEM; Bernd Zechmann

- **POSTER # 53**
  - **119** Elemental Physical and Chemical Analysis of PM10 by TEM-EDS; Roberto Ramirez-Leal, Martin Cruz-Campas, Glendy Jezabel Leon-Garcia

- **POSTER # 54**
  - **120** Elimination of Human Error in Critical Point Drying Process in Plant Tissue Preparation for Electron Microscopy; Anna Walkiewicz

- **POSTER # 55**
  - **121** Low-voltage SEM Imaging of Lignocellulosic Biomass using a Low-cost Methanesulfonate Ionic Liquid; Dian Yu, Patrick Woo, Keryn Lian, Jane Howe

- **POSTER # 56**
  - **122** Morphological Study of PHA Producing Bacteria; Kamila Hrubanova, Pavlina Sikorova, Katelina Mrázová, Jana Nebesářová, Stanislav Obruča, Vladislav Krzyzanek

- **POSTER # 57**
  - **123** Obtention of Phycobiliprotein Nanoparticles from Spirulina (Arthrospira maxima) and its Characterization by FTIR and Microscopic Techniques; José Jorge Chanaona-Pérez, Candelaria Galvan Colorado, Benjamin Arredondo-Tamayo, Susana Diane Gallegos-Cerda, Lizbeth Gonzalez Victoriano, Juan Vicente Méndez Méndez, German Chamorro Cevallos, Jose M Cristobal Luna, Rosa V Garcia Rodriguez,

---

**B02.P1 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)**

- **POSTER # 59**
  - **125** Exploring the Limits of 2D Template Matching for Detecting Targets in Cellular Cryo-EM Images; Kexin Zhang, Bronwyn Lucas, Nikolaus Grigorieff

- **POSTER # 60**
  - **126** HDPE/Cherry Tree Fiber Composites: Size Particle Effect in the Flexural Mechanical Properties; M.E. Mendoza-Duarte, A. Vega Rios, E.Armando Zaragoza Contreras, Ivan Alzir Estrada Moreno

- **POSTER # 61**
  - **127** Helical Reconstruction of the Giant Bacteriophage AR9 Tail at Subnanometer Resolution; Olga Sokolova, Ilia Sirotkin, Andrey Moiseenko, Daria Antonova, Fuxing Wang, Maria Yakunina, Zheng Liu

- **POSTER # 62**
  - **128** Molecular Structure of a Nodaviral Crown Complex; Roma Broadberry, Hong Zhan, Timothy Grant, Andrea Rebollo-Viveros, Johan den Boon, Paul Ahlquist

- **POSTER # 63**
  - **129** New Morphologies of Hib Adhesion Pili; Esther Bullitt, Siriratt Thairatana, Mathew Doran, Ravi Sonani, Edward Egelman

- **POSTER # 64**
  - **130** Structure of the Streptococcus Pneumoniae 70S Ribosome at 2.9 Å Resolution using Cryo-EM; Mohamed Nasef, Laura Parker, James Kizziah, Terje Dokland

- **POSTER # 65**
  - **131** The Ebola NP0VP35 Complex Phase Separates into Inclusion Body-like Structures, the Disruption of Which Restricts Viral Infection; Chao Wu

- **POSTER # 66**
  - **132** Understanding the Roles of tcdE and tcdL during Toxin Secretion in Clostridioides difficile; Shannon Kordus, Ruben Cano Rodriguez, Evan Krystofiak, Natalie Loveridge, Kevin Childress, D. Borden Lacy

- **POSTER # 67**
  - **133** Workflow for High-resolution Sub-volume Averaging from Heterogenous Viral and Virus-like Assemblies; Bryan Sibert, Joseph Kim, Jae Yang, Adam Hannon-Hatfield, Zunlong Ke, David Garfinkel, Elizabeth Wright
Monday, July 24

**Scientific Program**

**3:00 PM – 5:00 PM  EXHIBIT HALL**

**P03.P1**  
**Theory and Applications of Advanced Electron Tomography**

**POSTER # 68**  
134 An Atlas of Fourier Transforms; Miti Shah, Suk Hyun Sung, Robert Hovden

**POSTER # 69**  
135 Composition and Oxidation State Changes of NCM Materials over Cycling via Simultaneous EDS-EELS 3D Tomography; Jaewhan Oh, Sunggu Kim, Hye Ryung Byron, Yongsoo Yang

**POSTER # 70**  
136 Performance of Deep Learning-Based Image Denoising in Image Reconstruction for Various Acquisition Conditions: a Simulated Phantom Study; Parisa Asadi, Andriy Andreyev, Matthew Andrew

**P06.P1**  
**Imaging and Micro/Nano Analysis of Materials for Nuclear Applications**

**POSTER # 71**  
137 Microstructural Characterization of Ion Irradiated ODS MA956 Alloy; Yu Lu, Ramprashad Prabhakaran, Yaqiao Wu, Megha Dubey, Lin Shao

**POSTER # 72**  
138 Visualization of Three-Dimensional Helium Cavity Distribution in an Ion-Irradiated Tungsten Heavy Alloy for Nuclear Fusion Materials; James Haag, Matthew Olsztyn, Danny Edwards, Weilin Jiang, Wahyu Setyawan

**POSTER # 73**  
65 Characterization of High-DPA Neutron Irradiated Stainless Steel using Microtensile Testing; Brandon Bohanon, Assel Aitkalyeva

**P10.P1**  
**Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces**

**POSTER # 74**  
140 Characterization of High Entropy Oxide Thin Film by High-Resolution STEM-EELS; Sai Venkata Gayathri Ayyagari, Leixin Miao, Matthew Webb, John Heron, Nasim Alem

**POSTER # 75**  
141 Direct Imaging of Co-CUK-1 Framework with H2O Guests; Dong-Hwan Yang, Minjeong Kim, Jinyoung Ko, Hyung Gyu Park, Yousung Jung, Jinhwhan Kim, Si-Young Choi

**POSTER # 76**  
142 Electron-beam Induced Effects on Supported Metal Atoms and Clusters; Jingyue Liu, Timothy Delazzer, Yiwei Yu, Courtney Christensen

**POSTER # 77**  
143 Exploring Electron Energy-Loss Spectroscopy for the Characterization and Mapping of Structured Fluids; Brittany Ford, David McComb
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>A01.2</td>
<td><strong>Microscopic Approach of Materials for Agri-Food Process</strong></td>
<td><strong>A01.2</strong></td>
<td>Room M-100-J</td>
</tr>
<tr>
<td>8:30 AM</td>
<td></td>
<td>Nanomaterials as a Replacement for Traditional Agrochemicals: Strategies Towards Sustainable Agriculture; (Invited) Dhirendra Kumar Tiwari</td>
<td><strong>A01.2</strong></td>
<td>Room M-100-J</td>
</tr>
<tr>
<td>9:00 AM</td>
<td></td>
<td>Synthetic Multi-Walled Carbon Nanotubes affects Arabidopsis thaliana growth through Blocking the TOR Signaling Pathway; Gladys Juárez Cisneros, Rogelio Ochoa-Barragán, Dhirendra Kumar Tiwari, Juan Manuel Sánchez-Yáñez, Javier Villegas-Moreno</td>
<td><strong>A01.2</strong></td>
<td>Room M-100-J</td>
</tr>
<tr>
<td>9:15 AM</td>
<td></td>
<td>Structural Characterization of Mexican Zeolite Doped with Silver Nanoparticles Obtained by Green Routes; Daniel Larrañaga Ordaz, Álvaro de Jesús Ruiz-Baltazar, Simón Yobanny Reyes López, Harald Norbert Böhnel, José Antonio Cervantes Chávez, Marco Antonio Zamora Antuñano</td>
<td><strong>A01.2</strong></td>
<td>Room M-100-J</td>
</tr>
<tr>
<td>9:30 AM</td>
<td></td>
<td>Engineering Materials at the Atomic Scale for Energy, Environment, and Healthcare Applications; (Invited) Chandra Tiwary</td>
<td><strong>A01.2</strong></td>
<td>Room M-100-J</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>A02.2</td>
<td><strong>Microscopy and Microanalysis for Real World Problem Solving</strong></td>
<td><strong>A02.2</strong></td>
<td>Room 200-A</td>
</tr>
<tr>
<td>8:30 AM</td>
<td></td>
<td>From Archeology to the Malaria Parasite, the Exciting Quests of Microscopy; (Invited) David Bell, Hao-Yu Greg Lin, Austin Akey, Stephan Kraemer, Jeffery Borenstein, Jeffery Dvorin, Angela Chang</td>
<td><strong>A02.2</strong></td>
<td>Room 200-A</td>
</tr>
<tr>
<td>9:00 AM</td>
<td></td>
<td>Electron Microscopy Characterization of Bursera cuneata Schltdl Residues for its Application as Solid Biofuel; Octavio-Alejandro Castillo-Tera, Mario Morales-Máximo, Luis Bernardo López-Sosa, José Herrera-Ramirez</td>
<td><strong>A02.2</strong></td>
<td>Room 200-A</td>
</tr>
<tr>
<td>9:15 AM</td>
<td></td>
<td>Electron Microscopy Characterization of Stubble Residues (Zea Mays) as a Solid Biofuel; Cindy Morales, Mario Morales-Máximo, Luis Bernardo López-Sosa, Armando López-Miranda</td>
<td><strong>A02.2</strong></td>
<td>Room 200-A</td>
</tr>
<tr>
<td>9:30 AM</td>
<td></td>
<td>Optimal Diverse Biological Sample Preparation Methods for 2D and 3D Electron Microscopy Imaging; (Invited) Feng-Xia Liang</td>
<td><strong>A02.2</strong></td>
<td>Room 200-A</td>
</tr>
<tr>
<td>8:30 AM</td>
<td>A04.2</td>
<td><strong>The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials</strong></td>
<td><strong>A04.2</strong></td>
<td>Room 200-B</td>
</tr>
<tr>
<td>8:30 AM</td>
<td></td>
<td>Interferometric 4D-STEM Imaging of Rotational and Dilational Reconstruction in Moiré Superlattices; (Invited) Madeline Van Winkle, Isaac Craig, Nathanael Kazmierczak, Stephen Carr, Medha Dandu, Colin Ophus, Karen Bustillo, Jim Ciston, Archana Ciston, D. Kwabena Bediako</td>
<td><strong>A04.2</strong></td>
<td>Room 200-B</td>
</tr>
</tbody>
</table>
A08.2 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

Tuesday 8:30 AM Room 200-F
9:00 AM 179 A Multi-Scale Understanding of the Three-Dimensional Microstructure of the Cornea Using Oxygen Plasma Focused Ion Beam, Scanning Transmission Electron Microscopy and Micro-CT Techniques; Valerie Brogden, Molly Scanagatta-Long, Hiro Uehara, Angela Lin
9:15 AM 195 Keeping Cool During Lift-Out — An Elegant Solution for Preparing Samples in Cryo-FIB; Andrew Smith, Lorenz Lechner, Stefan Strähle, Stephan Kleindiek
9:30 AM 209 Cryo-FIB and Synchrotron SAXS/WAXS Studies of Confined Crystallization of PDMS in Tubular Network Block Copolymer Morphologies; Vivek Subramanian, Ken Wu, Xueyan Feng, Esther H. R. Tsai, Ruipeng Li, Guillaume Freychet, Mikhail Zhernenkov, Anindito Sen, Avery Sen, Edwin Thomas
9:45 AM 223 Compressive Cryo FIB-SEM Tomography; Daniel Nichols, Jack Wells, Alex Robinson, Amirafshar Moshtaghpor, Maryna Kobylinska, Roland Fleck, Professor Kirkland, B. Layla Mehdi, Nigel Mehdi

A11.2 Nanoscale Infrared Spectroscopy with Electrons and Photons

Tuesday 8:30 AM Room M-100-H
8:30 AM 162 Recent Advances in Spatially-Resolved Spectroscopy Combining Photon and Monochromated Electron Beams in a STEM; [invited] Odile Stéphan, Yves Auad, Steffi Woo, Marcel Tencé, Jean-Denis Blazit, XIAoyan Li, Alberto Zobelli, Michael Walls, Luiz Walls, Mathieu Kociaik
9:00 AM 180 Infrared Correlative Nanoscopy with Unprecedented Spectral Coverage; Artem Danilov, Tobias Gokus, Paul Suman, Andreas Huber
9:15 AM 196 Ultra-High Resolution EELS Analysis and STEM Imaging at 20 keV; Tracy Lovejoy, Niklas Dellby, Steven Quillin, Ondrej Krivanek, Petr Hrncirik, Andreas Mittelberger, Benjamin Plotkin-Swing

A14.2 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

Tuesday 8:30 AM Room 200-C
8:30 AM 163 Solar Energy from a Big Picture Perspective to Nanoscale Insights via TOF-SIMS; [invited] Steven Harvey, Steve Johnston, John Mosely, Andrew Norman, Brian Gorman, Kai Zhu, Joe berry, Joey Luther, Mowafak Luther
9:00 AM 181 O2 vs. Ar Gas Cluster Ion Beam Sources for ToF-SIMS Depth Profiling of Thick Polymer and Metal Film Samples; [invited] Christine Mahoney, Christine Mahoney, Kaveh Adib, Ruchi Yongsunthorn
9:30 AM 211 Influence of 0.5wt%Graphene Addition on Mechanical Performance of Alumina-Graphene Nanocomposite; Solomon Hanson Duntu, Ifikhar Ahmad, Mohammad Islam, Solomon Boakye-Yiadom
224 Imaging of Light Elements at the Nanometer Scale using fibTOF; Lex Pilatsch, Valentine Riedo-Grimaudo, James Whitby, Menglong Liu, Peter Broekmann

A15.2 Iasus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

Tuesday 8:30 AM Room 200-E
8:30 AM 164 Vapor Phase Metasomatism on the Aubrite Parent Body Evidenced by the Volatile-Bearing Sulfide Djerfisherite; [invited] Zoë Wilbur, Timothy McCoy, Corrigan Cari, Jessica Barns
9:00 AM 182 Results of the Preliminary Analyses of Asteroid Ryugu Regolith Samples Returned by the Hayabusa2 Mission; [invited] Michael Zolensky
9:30 AM 212 Discovery of Keilite (Fe,Mg-sulfide) in Type 3 Enstatite Chondrites – Influence of Metamorphic Temperature on Formation; Emma Bullock, Timothy McCoy, Corrigan Cari
9:45 AM 225 Hyperspectral Cathodoluminescence and Quantitative EPMA Mapping of Angrite Northwest Africa 15507; Heather Lowers, Jay Thompson, Paul Carpenter, Zoë Wilbur, Anthony Irving
### Tuesday, July 25

#### Scientific Program

**B02.1** 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)

- **Tuesday 8:30 AM** Room M-100-D
- **8:30 AM** 165 Cryo-EM Structure of Human Tumor Suppressor Protein Pdcd4 bound to the Ribosome; *(Invited)* Jailson Brito Querido, Masaaki Sokabe, Irene Díaz-López, Yuliya Gordiynko, Philipp Zuber, Yifei Du, Lucas Albacete-Albacete, Christopher S. Fraser, V. S. Fraser
- **9:00 AM** 183 A 3.2 Å Structure of the PriA/PriB/Replication Fork Complex Reveals Mechanistic Insight into Bacterial DNA Replication Restart; Peter Ducos, Alexander Duckworth, Kenneth Satyshur, James Keck, Timothy Grant
- **9:15 AM** 197 Structural Analysis of Cancer-Relevant TCR-CD3 and Peptide-MHC Complexes by CryoEM; Kei Saotome, Drew Dudgeon, Kiersten Colotti, Michael Moore, Jennifer Jones, Yi Zhou, Ashique Rafique, John Lin, William Lin, Matthew Franklin
- **9:30 AM** 213 Capturing Snapshots of Ribonucleotide Reductase Using Cryo-Electron Microscopy; *(Invited)* Catherine Drennan, Gisele Andree, Patricia Feliciano, Gyunghoon Kang, Talya Levitz, Kelsey Miller, Dana Westmoreland

**B04.2** Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging

- **Tuesday 8:30 AM** Room M-100-F
- **8:30 AM** 166 An Optimized Optical Clearing Pipeline for Intact 3D Plant Imaging and Visualization of Fluorescent Probes; *(Invited)* Mark Sanders, Clay Carter, Nadia Kane, Patrick Willey, Erik Solhaug, Rahul Roy
- **9:00 AM** 184 Autonomous Multiscale Axially Swept Light-Sheet Microscopy; *(Invited)* Kevin Dean, Zach Marin, Xiaodong Wang, Jinlong Lin, Hazel Borges, Dax Collison
- **9:30 AM** 214 Cloud Pipelines for Large Scale Lightsheet Image Processing; *(Invited)* Sharmishta Seshamani, Camilo Laiton, Gabor Kovacs, Cameron Arshadi, Anna Grim, Nicholas Lusk, David Feng

**B09.2** Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling

- **Tuesday 8:30 AM** Room M-100-E
- **8:30 AM** 167 Correlative Live-cell – Volume Electron Microscopy: Bridging Cellular Dynamics to 3D-ultrastructure; *(Invited)* Nalan Liv
- **9:00 AM** 185 Sam50 is Associated with Fragmentation and Alterations in Metabolism in Human and Murine Myotubes; Andrea Marshall, Edgar Garza-Lopez, Zer Vue, Larry Vang, Antentor Hinton
- **9:15 AM** 198 Correlative Light and Electron Microscopic Study on 3D Reconstruction of Lateral Habenula Single Co-releasing GABA-Glutamate Axon Terminals Establishing Converging Synapses for Glutamate or GABA Release; Shiliang Zhang, Alexey Shevelkin, Kevin Yu, Huiling Wang, Marisela Morales
## Vendor Symposia

**Tuesday 8:30 AM**  
Room M-100-G

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td><strong>168</strong> Next Generation Automated Programmable Electron Microscopy Preparation; <strong>Steven Goodman</strong>, Jeffrey Percival</td>
</tr>
<tr>
<td>8:45 AM</td>
<td><strong>173</strong> Atomic Resolution SE Imaging in a 30–200 keV Aberration-Corrected UHV STEM; <strong>Ondrej Krivanek</strong>, Michael Hotz, Joel Martis, Tomas Radlicka, Neil Bacon, Niklas Dellby, Harold Hwang, Tracy Lovejoy, Steven Lovejoy, Prastuti Singh</td>
</tr>
<tr>
<td>9:15 AM</td>
<td><strong>199</strong> Two-Factor, Three-Level Factorial Experiments for Optimizing Size of Thiol stabilized Gold Nanoparticles (AuNPs); <strong>Vishwas Joshi</strong></td>
</tr>
<tr>
<td>9:30 AM</td>
<td><strong>216</strong> Dynamic CT Imaging in the Laboratory: Characterization of Pore Filling Events in Geological Materials; <strong>Jan Dewanckele</strong>, Marijn Boone, Wesley De Boever</td>
</tr>
<tr>
<td>9:45 AM</td>
<td><strong>226</strong> Development of a TEM Optical System for the Atomic-Resolution Magnetic-Field-Free Electron Microscope; <strong>Tatsuhiro Maekawa</strong>, Yuji Kohno, Shigeyuki Morishita, Kazuto Arakawa</td>
</tr>
</tbody>
</table>
Scientific Program

P03.2 Theory and Applications of Advanced Electron Tomography
Tuesday 8:30 AM Room 200-I

8:30 AM 169 Nanoscale Three-Dimensional Charge Density and Electric Field Mapping by Electron Holographic Tomography; [Invited] Rafal Dunin-Borkowski, Fengshan Zheng, Vadim Mignonov, Jan Caron, Hongchu Du, Giulio Pozzi

9:00 AM 187 Measuring 3D Chemistry at 1 nm Resolution with Fused Multi-Modal Electron Tomography; Jonathan Schwartz, Zichao Wendy Di, Yi Jiang, Yiwen Qian, Junsi Gu, Steve Rozeveld, Peter Ercius, Jeffrey A. Fessler, Ting Fessler, Mary Scott


9:30 AM 217 Imaging and Understanding 3D Nanoscale Magnetic Structures; [Invited] Amanda Petford Long, Vuk Brajuskovic, Yue Li, Arthur McCray, Charudatta Phatak

P06.2 Imaging and Micro/Nano Analysis of Materials for Nuclear Applications
Tuesday 8:30 AM Room 200-H

8:30 AM 170 Application of Atom Probe Tomography to Study Corrosion of Nuclear Materials; [Invited] Daniel Schreiber, Matthew Olszta, Karen Kruska

9:00 AM 188 A High Resolution Electron Backscatter Diffraction Study of Stress Fields around Hydrides in Zircaloy-4; Ben Britton, Ruth Birch, James Douglas

9:15 AM 201 Using Laboratory-Based X-ray Tomography for Metalegical Measurements of Inertial Confinement Fusion Targets; Nikolaus Cordes, Steven Young, Tanu Morrow, Thomas Day, Derek Schmidt, Brian Patterson


P07.2 Prof. Wilbur C Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences
Tuesday 8:30 AM Room 200-G

8:30 AM 171 In-situ TEM Investigation on Redox Mechanisms of Transition Metal Oxides In-situ TEM Investigation on Redox Mechanisms of Transition Metal Oxides; [Invited] Dong Su, Xiaozhi Liu, Yue Pan, Dan Zhou

9:00 AM 189 In situ (S)TEM Study of Thermal Reduction Synthesis Pathway for Sulfur Containing Titanium MAX Phase to MXene Phase; Joseph John Burman, Mounib Bahri, Ioannis Siachos, Volker Presser, B. Layla Mehdi


9:30 AM 219 Native Intercalant Order in TaS2 Achieved Through In-situ Thermal Heating; Nishkarsh Agarwal, Suk Hyun Sung, Jonathan Schwartz, Noah Schnitzer, JuHung Hung, Ismail El Baggari, Lena Kourkoutis, Liang Qi, Anton Qi, Robert Hovden

9:45 AM 227 In situ Testing of Ultrathin Diffusion Barriers using Complex Multishell Nanowires; Lilian Vogl, Peter Schweizer, Xavier Maeder, Ivo Utke, Andrew M Minor, Johann Michler

P10.2 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces
Tuesday 8:30 AM Room 200-J

8:30 AM 172 Interface Induced Emerging Behavior in Ultrathin Ruthenate Heterostructures; [Invited] Yimei Zhu, Zhen Wang, Zeeshan Ali, Mohammad Saghayezhian, Andrew O’Hara, Sokrates Pantelides, Jiandi Zhang

9:00 AM 190 Revealing the Short and Long-range Structural Distortions at Nb-doped KToO3; Salva Salmani-Rezaie, Tobias Schweigert, Sankalpa Hazra, Venkatraman Gopalan, Darrell Schlom, Kaveh Ahadi, David Muller


9:30 AM 220 Revealing Possible Coherence Limiting Sources in Superconducting Qubit with Advanced Electron Microscopy; [Invited] Lin Zhou, Lin Zhou, Tea-Hoon Kim, Xiaotian Fang, Matt Kramer, Cameron Kopas, Mark Field, Hilal Cansizoglu, Joshua Cansizoglou
A01.3 Microscopic Approach of Materials for Agri-Food Process

**Tuesday 10:30 AM**

**Room M-100-J**

- **10:30 AM 228** Water Absorption Kinetics of Zea Mays Seedling using MWCNT as a Growth Promoter; Dhirendra Kumar Tiwari
- **10:45 AM 246** Effect of Multi-Walled Carbon Nanotubes and Manganese and Zinc Doped Ferrites on the Development Of Capscium Annum; Gladys Juárez Cisneros, Juan Manuel Sánchez-Yáñez, Javier Villegas-Moreno, Dhirendra Kumar Tiwari
- **11:00 AM 249** Elemental Microanalysis of Capscium chinesin Plants Treated with Magesium Doped Iron Ferrite Nanopriming; Ana Coria Téllez, Dhirendra Kumar Tiwari, Carolina Ayala, Carlos Arias, Martha Rodríguez
- **11:15 AM 267** Characterization of Rincus communis and Aloe vera extracts using AccuTOF™ DART® Direct Analysis in Real Time Time-of-Flight Mass Spectrometer; Dhirendra Kumar Tiwari, Mayra Guadalupe Plancarte
- **11:30 AM 282** Effect of Zinc Oxide Nanoparticles on Biomass and Photosynthetic pigments in Avena Sativa; [Invited] Neftali Rangel-garcia, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Gladys Juárez Cisneros, Salomón Borjas

A02.3 Microscopy and Microanalysis for Real World Problem Solving

**Tuesday 10:30 AM**

**Room 200-A**

- **10:30 AM 229** Single-Molecule Optical Microscopy Reveals New Polymer Insights at the Nanoscale; [Invited] Muzhou Wang
- **11:00 AM 250** Prototype Robotic System for Multimodal Forensics and Failure Analysis; Marek Kotrlý, Jana Bohačová, Josef Uher, Ivana Turkova
- **11:15 AM 268** Local Stress Measurements in Polycrystalline Metallic Tensile Specimens Using High Resolution EBSD; Tim Ruggles, Will Gilliland, Philip Noell, Robert Craig, Kaitlynn Fitzgerald, Jay Carroll
- **11:30 AM 283** Tribological Evaluation of Boride Layers Formed on an AISI M2 Steel Substrate by the Powder Packing Method; Leopoldo García Vanegas, Milton Elias Espinosa, Marco Antonio Doñu Ruiz, Noé López Herrusquia, Aline Hernández García
- **11:45 AM 299** Fruitful TEM Analysis of Hot-dip Galvanized Industrial Steels with Low and High Si Content: Challenges and Solutions; Alexey Minenkov, Martin Arndt, Thomas Morttbaier, Günter Hesser, Gerhard Angeli, Heiko Groiss

A04.3 The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials

**Tuesday 10:30 AM**

**Room 200-B**

- **10:30 AM 230** Imaging Ghosts with 4D-STEM: From Vacancies to Vanishing Dislocations; [Invited] Andrew Minor, Sean Mills, Yang Yang
- **11:00 AM 251** Continuous 4D STEM Recording and Visualization for In-Situ Experiments; Benjamin Miller, Bernhard Schaffer, Cory Czarnik
- **11:15 AM 269** 5D-STEM of Real- and Reciprocal-space Resolved Dynamics in a Metallic Liquid; Shuoyuan Huang, Paul Voyles
- **11:30 AM 284** Understanding Nucleation of Mesophase Pitch Tactoids using 4D-STEM; Robert Colby, Kazem Edmond, Daniella Mendez, Stuart Smith

A06.3 Learning from Failure: Negative and Null Results in Microscopy

**Tuesday 10:30 AM**

**Room M-100-I**

- **10:30 AM 231** Confessions of a Ptychopath: Detection, Dimensions, Damage and Despair; [Invited] Colum O’Leary, Dillan Chang, Peter Eruci, Peter Nellist, Angus Kirkland, Jianwei Miao
- **11:00 AM 252** Barriers to AI-Driven Defect Detection of Microscopy Images in Industrial Nanoelectronics Manufacturing; Matthew Hauwiller, Kurt Loken, TJ Klein, Karen Terry
- **11:15 AM 270** Artifact Elimination in Ultrafast Electron Microscopy; Spencer Reisbick, Yimei Zhu
- **11:30 AM 285** Diffuse Electron Diffraction Intensities in Concentrated Solid Solutions do not Necessarily Come from Short-Range Order; Mingwei Zhang, Flynn Walsh, Mark Asta, Robert Ritchie, Andrew Minor

A07.3 In Memoriam of David Joy: Scanning Electron and Ion Microscopy

**Tuesday 10:30 AM**

**Room 200-D**

- **10:30 AM 232** How Did Low Voltage in the SEM Become the Preferred Route to High Resolution Imaging?; [Invited] John Mansfield
- **11:00 AM 253** Limits of Resolutions in the Scanning Electron Microscope; [Invited] Andras Vladar, Kerim Arat
- **11:30 AM 286** High-performance Compact Lens-type Energy Analyzer for an Energy Distribution Measurement of a Schottky Electron Source; Inyong Park, Ha Rim Lee, Junhyeok Hwang, Takashi Ogawa, Haewon Jung, Daljae Yun, Jisoo Kim, Sangsun Lee
- **11:45 AM 300** Subsampling Methods for Fast Electron Backscattered Diffraction Analysis for SEM; Zoé Broad, Daniel Nicholls, Jack Wells, Amirafshar Moshtaghpour, Alex Robinson, Robert Masters, Louise Hughes, Nigel Browning Browning
A08.3 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

Tuesday 10:30 AM | Room 200-F

10:30 AM 233 Application of FIB-ToF-SIMS to the Search for and Characterisation of Enriched Uranium Particles; (invited) William Rickard, Xia Sun, Matvei Aleshin, Laure Martin, Masturina Kracica, Daniel Oldfield, Denis Fougerousse, Steven Reddy, David Reddy

11:00 AM 254 SD-TOF-STIM Imaging with a Low-Energy He+ Focused Ion Beam; Michael Mousley, Dustin Andersen, Tom Wirtz, Santhana Esvara

11:15 AM 271 Focused Beams for use in EBSD and TKD; Bartlomiej Winiarski

11:30 AM 287 Focused Ion Beam Nanothermometry; Julia Deitz, Tim Ruggles, Samantha Rosenberg, Mila Lam, Luis Jauregui, John Williard, Daniel Perry, Joe Boro, Wyatt Boro

11:45 AM 301 GaBiLi - A Novel Focused Ion Beam (FIB) source for Ion Microscopy and Related Workflows for 3D Tomography with a Top-Down FIB from Liquid Metal Alloy Ion Sources (LMAIS); Torsten Richter, Achim Nadzeyka, Fabian Meyer, Paul Mazarov

A11.3 Nanoscale Infrared Spectroscopy with Electrons and Photons

Tuesday 10:30 AM | Room M-100-H

10:30 AM 234 The “Other” Nanoscale Spectroscopy – Tip Enhanced Raman Scattering; (invited) Volker Deckert, Tanveer Shaik, Tanja Deckert-Gaudig

11:00 AM 255 Observation of Gas Adsorbates with Time-Resolved Vibrational EELS; Yifan Wang, Peter Crozier

11:15 AM 272 Vibrational EELS for Solid State Li-ion Batteries: Mapping Li Distributions and Beyond; Chaitanya Gadre, Tom Lee, Ji Qi, Shuye Ping Ong, Xiaohui Qu

11:30 AM 288 Theory on the Trail of Vibrational STEM/EELS; (invited) Sokrates Pantelides

A14.3 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

Tuesday 10:30 AM | Room 200-C

10:30 AM 235 Complementary Use of Sensitive Nanoscale and Bulk Techniques to Probe Surface and Subsurface Defects in High Volume Manufacturing; (invited) Carol Johnson, Indra Subedi, Stephen Exarhos, Joseph Roth, Mike Kautzky, Karen Terry

11:00 AM 256 Mechanisms for Chemical Vapor Deposition Carbon Nanotube Growth by Surface Modification of 316L Stainless Steel; Joshua Hancock, Richard Vanfleet, Felipe Rivera, Brian Jensen

Scientific Program

11:15 AM 273 STEM Study on the Native Amorphous Surface Oxides of Tantalum Film for a Superconducting Qubit; Junsik Mun, Chengu Zhou, Peter Sushko, Emma Brass, Xiaohui Qu, Mingzhao Liu, Yimei Zhu

11:30 AM 289 Secondary Electron Imaging on Aberration-Corrected STEM for Characterizing Catalyst Materials; SooYeon Hwang


A15.3 Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

Tuesday 10:30 AM | Room 200-E

10:30 AM 236 Preparing for Artemis with ANGSA: The Dissection and Characterization of Previously Unopened and Sealed Double Drive Tube 73001/2; (invited) Juliane Gross, Andrea Mosie, Ryan Zeigler, Francis McCubbin, Charles Shearer

11:00 AM 257 Next-Generation Analysis of Very Low-Ti Basalts and Volcanic Glasses in Apollo 17 Double Drive Tube 73001/73002; (invited) Chris Yen, Paul Carpenter, Bradley Jolliff, Ryan Ogliore, Jeremy Kent, Ryan Zeigler, Juliane Gross, Scott Eckley, Charles Eckley

11:30 AM 290 Quantitative Microanalysis Explorer: Next-Generation Analytical Tool for Study of Apollo 17 Core 73002.6015-6018; Paul Carpenter, Ryan Ogliore, Angelina Minocha, Chris Yen, Bradley Jolliff

11:45 AM 303 Comparing Different Approaches to Determining the Bulk Composition and Phase Proportions of Exsolved Oxides; Anette von der Handt, Ian Goan, James Scoates, Nichole Moerhuis
B02.2
3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)

Tuesday 10:30 AM
Room M-100-D


11:00 AM 258 Structural Analysis of COPI Pathway in Chlamydomonas reinhardtii; Grigory Tagiltsev, Ron Kelley, Xianjun Zhang, Sagar Khavnekar, Abhay Kotecha, Jürgen Plitzko, John Birggs

11:15 AM 274 Quantitating Storage Granule Size, Accumulation, And Localization In Rhodobacter Sphaeroides Using Cryo-Electron Tomography And Light Microscopy; Daniel Parrell, Rachelle Lemke, Joseph Olson, Timothy Donohue, Elizabeth Wright

11:30 AM 291 Toward Plasma Membrane Visual Proteomics: Developing a Correlative Cryo-Electron Tomography Pipeline for Isolated Plasma Membranes; Kem Sochacki, Willy Sun, Dennis Michalak, Prasanthi Kunamaneni, Jenny Hinshaw, Justin Taraska

B06.1
Innovations in Light Microscopy: Revealing the Inner Workings of Life from Single Molecule to Whole Organisms

Tuesday 10:30 AM
Room M-100-F

10:30 AM 238 A Statistical Resolution Measure of Fluorescence Microscopy With Finite Photons; Yilun Li, Fang Huang

10:45 AM 247 Multi-pass Imaging Flow Cytometry; Joshua Reynolds, Yonatan Israel, Mark Kasevich

11:00 AM 259 Identifying the Mechanism of Glioblastoma Cell Migration in Mouse Brain Slices; (Invited) David Odde, Sarah Anderson

11:30 AM 292 Elucidating Vaccine Trafficking Mechanisms using Multimodal Imaging; (Invited) Brittany Hartwell

B09.3
Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling

Tuesday 10:30 AM
Room M-100-E

10:30 AM 239 Ultrastructural Visualization of Resin-embedded Primary Cilia by Serial Section Electron Tomography; (Invited) Haixun Sui, Shufeng Sun

11:00 AM 260 Decrease in Mouse Skeletal Muscle during Aging is due to Altered Mitochondrial Networks and the MICOS complex; Zeer Yue, Edgar Garza-Lopez, Kit Neikirk, Larry Yang, Antentor Hinton

11:15 AM 275 Integrative Microscopy Approaches Reveal Specialized Signaling Filopodia Promote Morphogen Gradient Formation During Mammalian Development; (Invited) Eric Hall, Elizabeth Cleverdon, Miriam Dillard, Yan Zhang, Daniel Stewart, Randall Wakefield, Shondra Pruett-Miller, Khaled Khairy, Camenzind Khairy, Stacey Ogden

11:45 AM 293 Hydra Plasma FIB DualBeam for High-Resolution Cryo Auto Slice & View and Reliable Cryo lamella Preparation for Cellular and Tissue Samples; Ron Kelley, Daniela Siamkova, Xianjun Zhang, Abhay Kotecha
### C03.1 Correlative and Multimodal Microscopy and Analysis

**Tuesday 10:30 AM**  
**Room L-100-J**

10:30 AM **240**  
Development of Cryogenic Techniques for Characterizing Energy Storage Materials in Electrochemical Process; **(Invited)** Minghao Zhang

11:00 AM **261**  
A Cryo-/Liquid Phase Correlative Light Electron Microscopy Workflow to Visualize Crystallization Processes in Graphene Liquid Cells; **Luca Rutten**, Mari de Beer, Rona Roverts, Elena Macías Sanchez, Nico Sommerdijk

11:15 AM **276**  
Towards Temporal Resolution in Correlative Cryo-Electron Tomography; **Johann Brenner**, Sven Klumpe, Jurgen Piltzko, Florian Willfing

11:30 AM **294**  
Correlative low-Dose Cryogenic Electron Microscopy and Small Angle Neutron Scattering Studies Reveal Morphological Differences in Fluorinated vs Non-Fluorinated Fire Suppressant Foams; **Alexis Williams**, Rezawana Islam, Gergely Nagy

11:45 AM **304**  
Advanced Cryogenic Light Microscopy Stage to Enable 3D Super-Resolved Cryogenic Correlative Light and Electron Microscopy; **Davis Perez**, Peter Dahlberg, William Moerner

---

### C05.2 Vendor Symposia

**Tuesday 10:30 AM**  
**Room M-100-G**

10:30 AM **241**  
Elucidating Surface Properties by Correlative TEM and APT Studies of Ideal Mg Specimens Prepared under Controlled Environments; **Cecile Bonifacio**, Daniel Perea, Pawel Nowakowski, Mary Ray, Paul Fischione

10:45 AM **248**  
Developments in Broad Ion Beam Milling Sample Preparation Instrumentation for Microscopy and Microanalysis Applications; **Pawel Nowakowski**, Cecile Bonifacio, Mary Ray, Paul Fischione

11:00 AM **262**  
Ultra-Short Pulse Laser Ablation for Cross-Section of Auto Body Paints; **chengge Jiao**, Yuri Rikers, Remco Geurts

11:15 AM **277**  
Expanding the Role of Atom Probe Tomography in Semiconductor Manufacturing and R&D – The Initiation of a Project Between Cameca Instruments Inc. and Imec; **Robert Ulfig**, David Reinhard, David Larson, Peter Clifton, Olivier Dulac, Claudia Fielischmann, Paul van der Heide

11:30 AM **295**  
Arctis WebUI – A Novel Software Concept for Automating Cryo-Lamellae Production; **Radovan Spurny**, Zuzana Patáková, Matej Dolinek, Radim Kríž, John Mitchels, Alexander Rigort, Miloš Hovorka
### Scientific Program

**P03.3 Theory and Applications of Advanced Electron Tomography**

**Tuesday 10:30 AM Room 200-I**

- **10:30 AM** 242 Biological Electron Cryotomography – Progress and Potential as Illustrated by the Dot/Icm Type IV Secretion System; **(Invited) Grant Jensen**
- **11:00 AM** 263 Electron Tomography in Liquids: Characterizing Nanoparticle Self-Assemblies in a Relevant Environment; **Sara Bals**, Da Wang, Daniel Arenas Esteban, Ajinkya Kadu, Ana Sánchez-Iglesias, Alejandro Gomez-Perez, Jesús González Casablanca, Stavros Nicolopoulos, Luis M. Nicolopoulos
- **11:15 AM** 278 The Structures of Small (< 3 nm), Solubilized Platinum Nanocrystals are Composed of an Ordered Core Surrounded by Mobile Surface Atoms; **(Invited) Hans Eimlund**, Henry Wietfeldt, Chiara Machello, Cong T.S. Van, Cyril Reboul, Junyoung Heo, Byung Hyo Kim, Sungin Kim, Peter Kim, Jungwon Park

**P06.3 Imaging and Micro/Nano Analysis of Materials for Nuclear Applications**

**Tuesday 10:30 AM Room 200-H**

- **10:30 AM** 243 Data Driven in situ TEM: A Path Towards Accurate Characterization of Radiation Damage in Structural Materials; **(Invited) Kory Burns**, Nan Li, Caitlin Taylor, Mary Scott, Khalid Hattar
- **11:00 AM** 264 Irradiation Effect on Noble Metal Particles in Water Using In situ Liquid Cell STEM Observation; **Jaeyoung Heo**, Bruce McNamara, Dongsheng Li, Edgar Buck
- **11:15 AM** 279 Deep Learning for Automated Quantification of Irradiation Defects in TEM Data: Relating Pixel-level Errors to Defect Properties; **Rajat Sainju**, Graham Roberts, Brian Hutchinson, Weiyang Chen, Qian Yang, Caixia Ding, Meimei Li, Yuanyuan Zhu Zhu
- **11:30 AM** 296 In-Situ Transmission Electron Microscopy Study of the Evolution of Extended Defects in Oxide Nuclear Fuels; **(Invited) Kaustubh Bawane**, Lingfeng He, Boopathi Kombaiah, J. Matthew mann, Lin Shao, Marat Khafizov, David H. Hurley

**P07.3 Prof. Wilbur C. Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences**

**Tuesday 10:30 AM Room 200-G**

- **10:30 AM** 244 Towards the Renaissance Era in In-Situ Electron Microscopy: From Ultrathin (UT) Membrane Fluidic-Cell to Adaptive Sampling and Data Analytics; **(Invited) Vinayak Dravid**
- **11:00 AM** 265 In-situ TEM Study: Deactivation Mechanism and Encapsulation Behavior of Metal Nanocatalysts Deposited on Zinc Oxide Nanowires; **Zhehan Ying**, Jiayang Diao, Shi Wang, Xiangbin Cai, Hongyang Liu, Ning Wang
- **11:15 AM** 280 Atmospheric Gas and Heating Transmission Electron Microscopy with Water Vapor Control; **Hector Hugo Perez Garza**, Dan Zhou, Ronald Spruit, Eva Bladt, Chenyang Lu, Xi Liu, James Carter, Graham Hutchings, Wei Hutchings
- **11:30 AM** 297 Bridging the Pressure Gap: Gas-Phase Operando Transmission Electron Microscopy; **(Invited) Patricia Kooyman**

**P10.3 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces**

**Tuesday 10:30 AM Room 200-J**

- **10:30 AM** 245 Revealing Topological Properties of Materials: The New Characterization Frontier in Electron Microscopy; **(Invited) Juan Idrobo**
- **11:00 AM** 266 Thickness-Dependent Layer Stacking Disorder in Low and High Temperature Phase of MoTe2 via STEM Imaging; **Lopa Bhatt**, James Hart, Elisabeth Bianco, Judy Cha, Lena Kourkoutis
- **11:30 AM** 298 Probing Local Phonon Polariton Signals at Edges of Folded Boron Nitride Sheets; **(Invited) Xingxu Yan**, Jie Li, Chaitanya Gadre, Lei Gu, Ruqian Wu, Xiaoqing Pan
### Tuesday, July 25

#### Scientific Program

**A02.4 Microscopy and Microanalysis for Real World Problem Solving**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>200-A</td>
<td>Review of Practical Problem Solving for Advanced Semiconductor Industry; <em>(Invited)</em> Yougui Liao, Che-chi Lee</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td></td>
<td>Artifact-Free Preparation of Plan View TEM Specimens and its Application to MRAM Devices; Cecile Bonifacio, Richard Li, Pawel Nowakowski, Mary Ray, Paul Fischione</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td></td>
<td>Accurate Elemental Mapping of Semiconductor Devices Using EDS – Deconvolving Overlapping Peaks; Shangshang Mu, David Stowe</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td></td>
<td>SEM Grain Characterization of Metals for Nanoelectronics; Matthew Hauwiller, Charlie Mann, Peter Mach, Karen Terry, Mike Kautzky</td>
<td></td>
</tr>
</tbody>
</table>

**A04.4 The Praxis of 4D-STEM—Extracting Information from Biological and Functional Material**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>200-B</td>
<td>Robust Imaging of Three-Dimensional Polar Textures using 4D-STEM Diffraction Imaging and Multislice Electron Ptychography; <em>(Invited)</em> Yu-Tsun Shao, Zhen Chen, Chenyu Zhang, Harikrishnan K. P., David Muller</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td></td>
<td>Quantitative Measurements of Intrinsic Parameters of Spin Textures using 4D- Lorentz STEM; Zhen Chen</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td></td>
<td>Simultaneous Electrostatic and Magnetic Vector Potential Phase Retrieval Using Electron Ptychography; Georgios Varnavides, Stephanie Ribet, Reed Yalisse, Joel Moore, Colin Ophus, Mary Scott</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td></td>
<td>Quantitative Electrostatic Potential Mapping in Dense Polycrystalline Functional Materials and Devices; Daniel Durham, Khandker Akif Aabrar, Prasanna Venkat Ravindran, Nester zaluzec, Lilana Stan, Asif Islam Khan, Suman Datta, Supratik Guha, Charudatta Guha</td>
<td></td>
</tr>
<tr>
<td>2:45 PM</td>
<td></td>
<td>Electron Ptychography Simulations for Atomic-Resolution Magnetic Imaging; Jeffrey Huang, Kisung Kang, André Schleife, Pinshane Huang</td>
<td></td>
</tr>
</tbody>
</table>

**A08.4 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>200-F</td>
<td>Three-dimensional Imaging and Interface Analysis of Battery Materials via Plasma FIB-SEM; <em>(Invited)</em> Minghao Zhang</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td></td>
<td>3D Chemical Mapping via P-FIB Tomography and Machine Learning; Paul Kotula, Andrew Polonsky, Daniel Perry, Damion Cummings, Julia Deitz, Joe Boro, Dustin Ellis</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td></td>
<td>Control of Extended Defect Growth in Perovskite Oxide Thin Films using Nanoscale Patterning; Supriya Ghosh, Fengdeng Liu, Bharat Jalan, K. Andre Mkhoyan</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td></td>
<td>Generating Nanometer-sized Polymer Wires with SEM/FIB Instrumentation; Daewon Kim, A. Getachew, Yimo Han</td>
<td></td>
</tr>
<tr>
<td>2:45 PM</td>
<td></td>
<td>Towards an Accurate 3D Reconstruction of Nanoporous Structures using FIB Tomography and Monte Carlo Simulations with Machine Learning; Martin Ritter, Trushal Sardhara, Alexander Shkurmanov, Roland Aydin, Christian Cyron</td>
<td></td>
</tr>
</tbody>
</table>

**A11.4 Nanoscale Infrared Spectroscopy with Electrons and Photons**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>M100-H</td>
<td>Strong Coupling and Extreme Anisotropy in Infrared Polaritonic Media; <em>(Invited)</em> Joshua Caldwell</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td></td>
<td>Analyzing Three-dimensional Tip Near-field Scattering of Infrared Polaritons through Peak Force Scattering-type Near-field Optical Microscopy; Xiaoji Xu</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td></td>
<td>Nanorod vs Nanotriangle: Which is Better for Infrared Plasmonic Applications? Vishal Kumar, Andrew Rossi, Zachary Lawson, Robert Neal, Jordan Hachtel, Svetlana Neretina, David Masiello, Jon Camden Camden</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td></td>
<td>Free Electrons for Infrared Nanophotonics; <em>(Invited)</em> F. Javier Garcia de Abajo</td>
<td></td>
</tr>
</tbody>
</table>

**A07.4 In Memoriam of David Joy: Scanning Electron and Ion Microscopy**

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>200-D</td>
<td>Contributions and Legacy of David C. Joy to Monte Carlo Simulations in Electron and Ion Microscopy; <em>(Invited)</em> Hendrix Demers</td>
<td></td>
</tr>
</tbody>
</table>
A14.4  Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>Analysis of Thin Films and Buried Interfaces by Soft and Hard X-ray Photoemission; <em>(Invited)</em> Kateryna Artyushkova, Jennifer Mann, Sarah Zaccarine</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Unveiling Interplay Between Pt Single-atoms and Well-defined Anatase TiO2 Under Redox Conditions; Wenjie Zang, Jaeha Lee, Peter Tieu, Xingxu Yan, Phillip Christopher, Xiaqing Pan</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Surface Sensitive Chemical Imaging of Lithium Materials for Battery Applications by Auger Electron Spectroscopy; Ashley Maloney, Mashahiro Terashima, Kazutoshi Mamiya, Shin-Ichi Iida</td>
</tr>
</tbody>
</table>

A15.4  Klaus Keil Memorial Symposium: Quantitative Microanalysis of Planetary Materials

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>WDS-SD: Next Generation of Wavelength Dispersive Spectrometers (WDS) with a Silicon Drift Detector (SDD) – What Can it Do, Where are We Now and Where is it Going?; Richard Wuhrer, Ken Moran, Michael Matthews</td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Can Digital Pulse Processing Really Be 50 Years Old? A Retrospective of EDS Detector/Processor Co-Evolution Over 5 Decades; Richard Mott</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Klaus Keil Video Presentation &amp; Discussion</td>
</tr>
</tbody>
</table>
### B02.3  3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>312</td>
<td>Studying the Molecular Mechanisms of Ebola Virus with In Situ Structural Biology; <em>(Invited)</em> William Wan</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>327</td>
<td>The in situ Structural Approach to Reveal the Filovirus Budding Mechanism; Reika Watanabe, Erica Saphire</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td>339</td>
<td>Structures, Distributions, and Conformations of SARS-CoV-2 Spike Proteins on Intact Virions by Cryo-EM and Cryo-ET; Zunlong Ke, Joaquin Oton, Kun Qu, Sjors Scheres, John Birggs</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>351</td>
<td>Single Particle Cryo-EM and Cryo-Tomography Resolve Nodavirus RNA Replication Crown Assembly; Hong Zhan, Nuruddin Unchwaniwala, Andrea Rebollo-Viveros, Janice Pennington, Mark Horswill, Roma Broadberry, Jonathan Myers, Johan den Boon, Timothy den Boon, Paul Ahlquist</td>
<td></td>
</tr>
<tr>
<td>2:45 PM</td>
<td>361</td>
<td>Diversity in Q-Beta Virus-like Particle Cage Assembly via Coat Protein Monomers and AYGG-linked Dimers; Thomas Newton, Liangjun Zhao, M.G. Finn, Misha Kopylov</td>
<td></td>
</tr>
</tbody>
</table>

### B06.2  Innovations in Light Microscopy: Revealing the Inner Workings of Life from Single Molecule to Whole Organisms

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>313</td>
<td>Highly Multiplexed Imaging with Speed and Fluorogenic DNA-PAINT; <em>(Invited)</em> Florian Schueder, Joerg Bewersdorf</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>328</td>
<td>Watching Bacterial Cell Division One Molecule at a Time in Vertical Cells; <em>(Invited)</em> Kevin Whitley, James Grimshaw, Seamus Holden</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>352</td>
<td>Developing an Image Based Deep Learning Approach to Immune Cell Quantification in a Mouse Asthma Model; <em>(Invited)</em> Jonathan Boyd, Nathalie Fuentes, Christine Tkaczuk</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>441</td>
<td>Hot on the Trail of Kinesin-1 with MINFLUX; Jessica Matthias, Jan O. Wolff, Lukas Scheiderer, Tobias Engelhardt, Johann Engelhardt, Stefan Hell</td>
<td></td>
</tr>
</tbody>
</table>

### B09.4  Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>314</td>
<td>Three-Dimensional Mitochondria Reconstructions of Murine Cardiac Muscle Changes in Size Across Aging; <em>(Invited)</em> Antentor Hinton, Zer Vue, Andrea Marshall</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>329</td>
<td>Potential Large-area Imaging of Butterfly Wing Scales with Transmission Electron Microscopy; Deepan Balakrishnan, Anupama Prakash, Benedikt Daurer, Justin Ong Jun Kiat, Yong Zi Tan, Antonia Monteiro, N. Duane Loh</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td>340</td>
<td>Volume Electron Microscopy Workflows for the study of Large-Scale Neural Connectomics; Richard Schalek, Xiaotang Lu, Jonathan Boulanger-Weill, Naha Karupia, Yuelong Wu, Shouhong Wang, Nagaraju Dhanyasi, Jeff Lichtman Lichtman</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>353</td>
<td>Developing a Cost-Effective User-Friendly Pipeline for Super-Resolution Volume CLEM; <em>(Invited)</em> Lucy Collinson</td>
<td></td>
</tr>
</tbody>
</table>
Scientific Program

Cross-Cut/Interdisciplinary Sciences Symposia – Tuesday Afternoon

C03.2 Correlative and Multimodal Microscopy and Analysis

Tuesday 1:30 PM  Room L-100-J

1:30 PM  **315**  Hybrid Electron Microscope for Multimodal In Situ Measurements; (Invited) Renu Sharma, Wei-Chang David Yang

2:00 PM  **330**  A New Correlative Microscopy Platform Integrating AFM with in-situ SEM; Kerim Arat, Stefano Spagna, Hamed Alemansour, Andreas Aman, Luis Montes, Jeffrey Gardiner, Christian Schwab, Lukas Stühn, Marion Stühn, Sebastian Siebert

2:15 PM  **341**  Application of Spectral Cathodoluminescence to Multi-Modal Research at the Nano-Scale: Case Studies from the UNSW Electron Microscope Unit; Karen Privat, Shery Chang, Toney Fernandez, Jianjun Li, Jiali Liang Huang, Xiaoqing Hao

2:30 PM  **354**  Multimodal Imaging of Light Isotope Distributions in Irradiated Materials; Xiao-Ying Yu, Jiyoung Son, Tanguy Terlier, Shawn Riechers, Shalini Tripathi, Gary Sevigny

2:45 PM  **362**  Multimodal Imaging of Hydrogen Distributions in Mg2Ni Hydrogen Storage Thin Films; Dustin Andersen, Tom Wirtz, Santhana Eswara

C05.3 Vendor Symposium

Tuesday 1:30 PM  Room M-100-G

1:30 PM  **316**  Characterization of Electrode-based BackScatter Electron Detector for in-situ SEM; Grigore Moldovan, Florian Schumann, Wolfgang Joachimi, Marc Willinger

1:45 PM  **320**  High Temperature EDS and EBSD Analysis - Enabling in-situ Heating for Direct Observation of Phase Transformations in the SEM; Haithem Mansour, Simon Burgess, Pat Trimby, Kim Larsen, Jack Donoghue, Jiaqi Xu, Albert Smith

2:00 PM  **331**  Latest Improvements on Silicon Drift Detectors for Fast, High Resolution EDX Spectroscopy in Electron Microscopy; Adrian Niculae, Stefan Aschauer, Markus Bornschlegl, Kathrin Hermenau, Klaus Heinzing, Heike Soltau, Lothar Strueder

2:15 PM  **342**  Robotic Preparation of Tissue Specimens for TEM and Volume EM; Thomas Strader, Benjamin August, Ru-Ching Hsia
Tuesday, July 25

**Physical Sciences Symposia – Tuesday Afternoon**

**P07.4 Prof. Wilbur C. Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences**

**Tuesday 1:30 PM Room 200-G**

1:30 PM 317 The Impact of Artificial Intelligence on In Situ Electron Microscopy; \*(Invited) Peter Crozier*, Adria Marcos-Morales, Matan Leibovich, Sreyas Mohan, Piyush Haluai, Mai Tan, Advait Gilankar, Joshua Vincent, Yifan Vincent, Carlos Fernandez-Granda

2:00 PM 332 Analytical in situ Gas Transmission Electron Microscopy Enabled with Ultrathin Silicon Nitride Membranes; *Kunmo Koo*, Paul Smeets, Xiaobing Hu, Vinayak Dravid

2:15 PM 343 Formation of Pt-Pd ‘Janus’ Biphasic Particles During High Temperature Aging of Diesel Oxidation Catalysts; *Stephen Porter*, Chih Han Liu, Hien Pham, Andrew DeLaRiva, Eric Peterson, Stephen House, John Watt, Eleni Kyriakidou, Abhaya Kyriakidou


**P10.4 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces**

**Tuesday 1:30 PM Room 200-J**

1:30 PM 318 Tracking Lithiation with Advanced Transmission Electron Microscopy; \*(Invited) Dong Su*, Xincheng Lei, Jiyi Wang, Xuefeng Wang, Lin Gu


2:15 PM 344 Direct Observation of Carbon Dioxide Adsorption in Sorbents Consisting of Porous Silicas; *Wei-Chang David Yang*, Marcus Carter, Renu Sharma

2:30 PM 356 Revealing the Formation Mechanisms of Covalent Organic Framework Onion Structure; *Qi Zheng*, Chongqing Yang, Daewon Li, Karen Bustillo, Haimei Zheng

2:45 PM 363 Revealing Local Ordering in PbSr2S3 Thin Films and its Effect on Optical Properties Utilizing 4DSTEM and EELS Techniques; *Patricia Meza*, Mercouri Kanatzidis, Roberto dos Reis, Vinayak Dravid
Analytical Sciences Poster Sessions – Tuesday Afternoon

3:00 PM – 5:00 PM

A01.P1 Microscopic Approach of Materials for Agri-Food Process

POSTER # 91
364 Carbon Nanotubes Produced After Forest Fire Oxidized and Functionalized with Fluorescein Isothiocyanate Improve Development of Avena sativa; Marco Alemán, Javier Villegas-Moreno, Gladys Juárez Cisneros, Dhirendra Kumar Tiwari, Jesus Campos Garcia

POSTER # 92
365 Effect of Multi-Walled Carbon Nanotubes Functionalized With Indol-3-Butyric Acid on the Development of Avena sativa; Daniela Fernández Gómez, Gladys Juárez Cisneros, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Jesus Campos Garcia

POSTER # 93
366 Effect of Multi-Walled Carbon Nanotubes Functionalized With Kinetin on the Development of Avena sativa; Daniela Fernández Gómez, Gladys Juárez Cisneros, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Mariela Gómez Romero

POSTER # 94
367 Effect of Natural Carbon Nanotubes Biotransformed by Trichoderma sp on the Development of Zea mays; Nestor Munoz, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Gladys Juárez Cisneros, Salomón Borjas

POSTER # 95
368 Effect of Synthetic Carbon Nanotubes Biotransformed by Trichoderma sp on the Development of Avena sativa; Nestor Munoz, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Gladys Juárez Cisneros, Salomón Borjas

POSTER # 96
369 Evaluation of Genotoxicity and Compositional Study of Plants Developed with Nanomaterials; Ana Coria-Tellez, Eduardo Zamora Martinez

POSTER # 97
370 Evaluation of Shrinkage Cellular in Slices Potatoes during its Convective Drying Using SEM and Image Analysis; José Jorge Chanona-Perez, Stephan Montserrat Gutierrez Martinez, Josué Hernández-Varela, Susana Dianaey Gallegos-Cerda, Juan Vicente Méndez Méndez

POSTER # 98
371 Impact of Climate Change on Crop Yield Due to Pests and Crop Diseases: Future Projection; Karuna Singh, Bharti Kaushik, Dhirendra Kumar Tiwari

POSTER # 99
372 Nanomaterials an Overview & Green Synthesis of Zn and Mg Oxide Nanomaterials for Agri-food Production; Dhirendra Kumar Tiwari

POSTER # 100
373 Nanotechnological Products in Crops of Economic Interest: Evaluation Against Fungal Affectivity; Maria Del Carmen Perez Sanchez

POSTER # 101
374 Nanotechnology and Their impact in High Yield Production; Mercedes Montserrat Martinez, Leslie Ireri Rangel Vázquez

POSTER # 102
375 Rapid Analysis of Chemical Compounds in Curcuma Longa using AccuTOF™ DART® Direct Analysis in Real Time, Time-of-Flight Mass Spectrometer; Dhirendra Kumar Tiwari

POSTER # 103
376 Technological Tools for the Quick Analysis of Experimental Data Obtained in The Agri-Food Process; Leslie A. Sanchez Ramirez, Leslie Rangel

POSTER # 104
377 The Oxidation and Functionalization of Multi-walled Carbon Nanotubes with Fluorescein-isothiocyanate Improve Germination and Early Development of Avena sativa; Marco Alemán, Javier Villegas-Moreno, Gladys Juárez Cisneros, Dhirendra Kumar Tiwari, Nicolás Zamudio Durán

POSTER # 105
378 Vertical Plant Factory; Jorge Mendoza, Rubi Pérez González

POSTER # 106
379 Zinc Oxide Nanoparticles: An Environmentally Friendly Alternative to Improve Early Germination of Zea Mays; Neftali Rangel-Garcia, Javier Villegas-Moreno, Dhirendra Kumar Tiwari, Gladys Juárez Cisneros, Salomón Borjas

A02.P2 Microscopy and Microanalysis for Real World Problem Solving

POSTER # 107
380 Analysis of Aluminum-Based Metal Matrix Composite Reinforced with SiC Particles Studied by Scanning Electron Microscopy; Johnattan Vargas, Yamile Cardona-Maya, Andrés E. Zapata, José Ernesto Ledeza, Juan Meza, José Herrera-Ramirez, Cesar Isaza

POSTER # 108
381 Arsenic Fixation by Aged Ferrihydrite Nanoparticle; Erico Freitas, Taiane Souza, Virginia Ciminelli

POSTER # 109
382 Detecting Pu in U-bearing Particles by SEM-EDS for Nuclear Safeguards Applications; Kimberly Wurth, Travis Tenner, Benjamin Naes

POSTER # 110
383 Determining Morphology and Size Distribution of Nanoscale Features in Conductive Ink for use in Aerosol Jet Printing; Janet Gbur, Sylvie Crowell, Mitchell Melander
POSTER # 111  
**384** Evaluation of New Titanium Alloys as Potential Materials for Medical Devices; **Cristina Jimenez-Marcos**, Julia Mirza-Rosca, Madalina-Simona Baltatu, Petrica Vizureanu

POSTER # 112  

POSTER # 113  
**386** Microstructural Origin of Hardness in Thermite Welded Rails; **Heshmat Aglan**, Rifaat Bin Zakir, Demario Broderick

POSTER # 114  
**387** Microstructure of CeO2 Nanoparticles Loaded with Different Amounts of Ag and Their Antimicrobial Activity; **Limny Perez-Jimenez**, Erik Morales, Francisco Paraguay-Delgado, Lalita Muñoz-Castellanos, Lizeth Rojas-Blanco

POSTER # 115  
**388** Phase Transformations and Microstructural Study of Bismuth Ferrite Ceramics Obtained by Solid-State Reaction; **Javier Hernández Paredes**, Juan José López-Rodríguez, Ofelia Hernández-Negrete, Hilda Esparza-Ponce, Felipe Barfusson Dominguez, Victor E Alvarez Montaño, Francisco Brown Bojórquez

POSTER # 116  
**389** Quantitative Imaging using an Automated in-operando micro-CT Workflow: Tracking the Drying and Related Shape-changes of Silica Aerogels; **Julien Gonthier**, Tilman Rilling, Ernesto Scoppola, Fabian Zemke, Aleksander Gurlo, Peter Fratzl, Wolfgang Wagermaier

POSTER # 117  
**390** Structure Evolution in Nature Quasicrystal Formed by Electrical Discharge; **Guangming Cheng**, Dingxin Fan, Nan Yao

POSTER # 118  
**391** The Wormholes Within: A Study of 1, 3, 5-Trimino-2, 4, 6-Trinitrobenzene Crystal Morphology by Micro and Nano-Scale X-Ray Computed Tomography; **Brian Patterson**, Lindsey Kuettner, Kevin Henderson, John Yeager, Larry Hill

POSTER # 119  
**392** Throwing the Kitchen Sink: Various Methods to Quantify Trace Carbon in Steel using an Electron Probe Microanalyzer (EPMA); **Christian Harris**, Joe Boro, Erin Barnick

POSTER # 120  
**393** Visible Light Photocatalysts: Studying Dopant Heterogeneity in Rhodium Doped Strontium Titanate; **Blake Dorame**, Pyush Haluvi, Peter Crozier

---

**A04.P2** **The Praxis of 4D-STEM—Extracting Information from Biological and Functional Materials**

POSTER # 121  
**394** 4D STEM Simulation of Defects in Palladium Nanoparticles; **David Robinson**, Joshua Sugar, Xiaowang Zhou

POSTER # 122  
**395** An Electron Computational Ghost Imaging Setup for High Resolution Imaging; **Vincenzo Grillo**, Paolo Rosi, Lorenzo Viani, Enzo Rotunno, Amir Tavabi, Rafal Dunin-Borkowski, Stefano Frabboni

POSTER # 123  
**396** Architecture, Development Cycle, and Governance Considerations in Co-Created Research Software: The Example of py4DSTEM and Analysis of 4D-STEM Data; **Benjamin Savitzky**, Alexander M Rakowski, Alexandre Bruecho, Stephanie Ribet, Georgios Varnavides, Steven Zeltmann, Tara Mishra, Mary Scott, Andrew Minor, Colin Ophus

POSTER # 124  
**397** Characterization of Quantum Emitters and Extended Defects in ZnSe via Multislice Electron Ptychography; **Xi Chen**, Colin Gilgenbach, James LeBeau

POSTER # 125  
**398** Exploring Low-dose and Fast Electron Ptychography using l_0 Regularisation of Extended Ptychographical Iterative Engine; **Amirafshar Moshtaghpour**, Abner Velazco-Torrejon, Alex Robinson, Professor Kirkland, Nigel Browning

POSTER # 126  
**399** MerinEM, Hybrid Pixel Array Counting Detector for Transmission Electron Microscopy; **Adriana Klyszejko**, Matus Kraøjnak

POSTER # 127  
**400** Quickly Switchable Angular and Spatially Resolved Cs-corrected STEM; **Toshihiro Aoki**, Hidetaka Sawada, Chaojie Du, Xiaqing Pan

POSTER # 128  
**401** Resolving the Octahedral Tilting Modulation in Incommensurate Tetragonal Tungsten Bronze by DPC STEM; **Stephen Funni**, Peter Ercius, Elizabeth Dickey
A08.P1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

POSTER # 129
402 10 years of LaserFIB: The Latest Developments in a Dual Chamber, 3 Beam FIB-SEM for Large Volume Material Removal and Semi-Automated FIB Integration; Benjamin Tordoff, Cheryl Hartfield, Sebastian Krauss, Lamya Abdellaoui, Stephen Kelly, Hirshikesh Bale

POSTER # 130
403 Cryo-FIB-SEM Microstructure Characterisation of Lithium-Ion Batteries (LIB) to support carbon neutrality; Mark Taylor

POSTER # 131
404 Getting The Best Spatial Resolution By Using Low kV EDS in FIB Workflows; Daniel Haspel, Michael Hjelmstad, Simon Burgess, Hailthem Mansour

POSTER # 132
405 Influence of the Laser and Scanner Regimes for Preparing Cross-Sections with Ultra-Short-Pulsed Laser; Boris Rottwinkel, Mónica Navarro López, Thomas Gester

POSTER # 133
406 Semi-Automated EXLO for Ambient and Cryogenic TEM Specimen Manipulation; Ahmed Darwish, Thomas Dougherty, Brandon Heck, Michael Colletta, Yue Yu, Lena Kourkoutis, Kyle Beggs, Alain Kassab, Alice Dohnalkova, Lucille Giannuzzi

POSTER # 134
407 TEM in-situ Deformation Study of Magnesium Reinforced with Carbon Nanotubes by Bending Test; C. Carreño-Gallardo, Cesar Isaza, Yamile Cardona-Maya, Juan Ruda, Juan Meza, José Herrera-Ramirez

POSTER # 135
408 Three-in-one Plan-view TEM Sample Preparation for 3D NAND Abstract; Drew Goettler, Ming Zhang

POSTER # 136
409 ToF-SIMS on a Xe Plasma FIB: Dos and Don’ts; Jamie Ford

POSTER # 137
410 Towards an Understanding of Poisoning of Steam Cracking Steels by Alkalı Metals; Matthew Thorsen, Paul Vlasak, Mark Davis

POSTER # 138
411 Using Combination of X-Ray 3D Tomography and FEG-SEM to Perform 3D-FIB Reconstruction in Identified Area to Investigate Effect of Mining Contamination on Scallop Shell Growth; Lise Guichaoua, Stéphanie Bessette, Natalie Reznikov, Raynald Gauvin, Roland Kroger, Bryce Stewart

A14.P1 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

POSTER # 139
412 Al-Graphite Nanostructures Composites Fabricated by High-Frequency Induction Sintering Method; A. Santos-Beltrán, Veronica Gallegos, mRIAM Santos-Beltran, Hansel Medrano, Iza Ronquillo-Ornelas, roberto Martinez Sanchez

POSTER # 140
413 Characteristic core shell structures with composition x = 0.01 (BaTi1-5xNb4xO3) prepared by the barium titanate route and the solid-state route; Angel Morales-Robles, Oscar Armando Gomez, Martin Ortiz-Dominguez, Arturo Cruz-Avilia, Edith Flores, Martha Ofelia Nieto, Teresita de Jesús Cruz, Edgar Cardoso

POSTER # 141
414 Characterizing Facets on Spherical Particles of Al65Cu25Fe15 Alloy by using Scanning Electron Microscope; Joshua Craig, Chunfei Li

POSTER # 142
415 Coupling Quantitative Microstructural Measurements to Mechanical Properties Using Correlative Mechanical Microscopy; Pat Trimby, Simon Muntywler, Roman Mougnot

POSTER # 143
416 Cross-Correlative Microscopy Study of Five-Fold Twinning at the Surface of Ni-based Films; Illas Birkmukhametov, Gregory Thompson

POSTER # 144
417 EDS Chemical Mapping by Unmixing of Spectral Imaging Data; Yuka Otake, Atsushi Fuji, Hiroki Kato, Nbuaki Tanabe, Ichiro Ohnishi

POSTER # 145
418 Microscopy and Microanalysis of Electrochemical Assay of Titanium Metallic Foam; Abraham Mejia, Claudio Aguilar, Jose Solis, Isemli Alfonso, Victor Castellanos, Georgina Carbajal

POSTER # 146
419 SEM and EDS Analysis of Ti-13Ta-1Cu Alloy Obtained by Mechanical Alloying; Lizbeth Sandoval, Ariosto Medina Flores, Claudio Aguilar, Salomón Borjas

POSTER # 147
420 Structural Analysis Enabled by the Invizo 6000® Large Field-of-View Atom Probe; Yimeng Chen, Isabelle Martin, Ty Prusa, Robert Uffig, Katherine Rice, David Larson, David Reinhard, Dan Lenz, Nick Brewer, Joysurya Basu

POSTER # 148
421 Superhydrophobic Coatings from Eggshell Waste Micro and Nanoparticles, Surface Characterization Using Image Texture Analysis, Light, and Confocal Microscopy; José Jorge Chanona-Pérez, Lizbeth Gonzalez Victoriano, Benjamin Arredondo-Tamayo, Susana Diana Gallegos-Cerda, Josué Hernández-Varela, Candelaria Galvan Colorado

www.microscopy.org/MandM/2023 for up-to-date meeting information
POSTER # 149

**422** Terahertz Readable Laser Tags for Information Storage and Traceability; Pouria Hoveida, Adrian Phoulady, Hongbin Choi, Nicholas May, Sina Shahbazmohamadi, Pouya Tavousi

POSTER # 150


POSTER # 151

**424** Transmission Electron Microscopy Study on the Process of Gold Nanoporous Film Formation on AAO Substrate by Thermal Treatment; Oscar Cigarroa-Mayorga, Patricia Talamás-Rohana, Salvador Gallardo-Hernández
Scientific Program

**B02.P2**  **3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)**

**POSTER # 152**
425 Annular Dark Field Imaging with variable angle for improving STEM tomography of Biological Samples; **Wing Shun Li**

**POSTER # 153**
426 Assessing and Maximizing the Quality of 3DEM Structure Data at the Worldwide Protein Data Bank; **Justin Flatt**, Brian Hudson, Irina Persikova, Yuhe Liang, Chenhua Shao, Ezra Peisach, Jasmine Young, Stephen Burley

**POSTER # 154**
427 Beauty Is in the Ai of the Beholder; **Lambertus Alink**, Robert Gheorghita, Kashyap Maruthi, Edward Eng

**POSTER # 155**
428 Highlights from the University of Virginia Molecular Electron Microscopy Core; **Michael Purdy**, Kelly Dryden

**POSTER # 156**
429 Image Processing Pipeline for In Situ Structural Characterization of Filaments; **Matthew Chang**, Amanda Erwin, Shyamal Mosalaganti

**POSTER # 157**
430 Modern Tools for In-situ Tomography; **Misha Kopylov**, Daija Bobe, Reza Paraan, Jake Johnston

**POSTER # 158**
431 Morphological Comparison of Primary Neurons Cryo-Preserved Under Varied Conditions; **Joseph Kim**, Jae Yang, Josephine Mitchell, Lauren English, Jill Wildonger, Erik Dent, Elizabeth Wright

**POSTER # 159**
432 Optimizing the Protein Stability in Thick Filament Cryo-Em Sample Preparation using a PEGylation Technique; **Hosna Rastegarpouyan**, Fatemeh Abbasi Veganeh, Alimohammad Hojjatian, Kenneth Taylor

**POSTER # 160**
433 STEM Tomography of Biological Samples Using Integrated Differential Phase Contrast Imaging Method; **Xiaoqing He**, Min Su

**POSTER # 161**
434 Towards the Visual Proteomics of C. reinhardtii using High-throughput Collaborative in situ Cryo-ET; **Sagar Khavnekar**, Ron Kelley, Florent Waltz, Xianjun Zhang, Martin Obr, Grigory Tagiltsev, John Birggs, Ben Engel, Jürgen Plitzko, Abhay Kotecha

**B04.P1**  **Development, Challenges and Biomedical Applications of Tissue Clearing, Super-resolution Microscopy and Tissue Imaging**

**POSTER # 162**
435 11-fold Expansion Microscopy with Universal Molecular Retention Using Magnify; **Aleksandra Klimas**, Brendan Gallagher, Emma DiBernardo, Zhangyu Cheng, Yongxin Zhao

**POSTER # 163**
436 Clearing and Whole Mount Immunohistochemistry for Smooth Muscle Actin Visualization during Regeneration; **Luke Bollinger**, Chauncey Liffiton, Madison Gamble

**POSTER # 164**
437 Optimizing Scanning Bessel Beam Light Sheet Microscopy with Custom-Designed Lens Cap for Expansion Microscopy; **Chia-Ming Lee**, Xuejiao Tian, Min-Ju Tsai, Bi-Chang Chen

**POSTER # 165**
438 Tissue Clearing of Whole-mount Alcian Blue and Eosin Stained Tissue to Investigate Cells Implicated in Regenerative Patterning; **Luke Bollinger**, Joshua Wilmer

**B06.P1**  **Innovations in Light Microscopy: Revealing the Inner Workings of Life from Single Molecule to Whole Organisms**

**POSTER # 166**
439 Age and Hormonal Stimulation Affect Tyramine Enrichment and Smooth Muscle Modulation within the Male Mouse Reproductive System; **Solange Steadman**, Debra Page Baluch

**POSTER # 167**
440 Click Chemistry for Visualization of Newly Synthesized RNA and Antibody Labeling on Ultrathin Tissue Sections; **Janeth Perez Garza**, Jairo Orea, Linneaa Ostroff
**Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling**

**POSTER # 169**

**POSTER # 170**

**POSTER # 171**

**POSTER # 172**

**B09.P1**

**Volume Electron Microscopy in Biological Research – Instrumentation, Sample Preparation and Data Handling**

**POSTER # 169**

**442** An Integrated Solution for the Complete Serial Block-Face Scanning Electron Microscopy Workflow: From Image Acquisition to Data Processing; **Martin Koban**, Markéta Macháliková, Jakub Javůrek

**POSTER # 170**

**443** Array Tomography of MM-Sized Biosamples: Impact of Resin Formulations on Sample Fidelity and Image Quality; **Christopher Dell**, Melissa Mikolaj, Kedar Narayan

**POSTER # 171**


**POSTER # 172**

**445** What Should I Do with My Serial Block-Face Data? Suggestions for Preparing, Analyzing, and Presenting Volume EM Datasets; **Trace Christensen**, Lindsay Nevalainen, Jeffrey Salisbury
Scientific Program

Physical Sciences Poster Sessions – Tuesday Afternoon

3:00 PM – 5:00 PM EXHIBIT HALL

P07.P1 Prof. Wilbur C Bigelow Centenary Symposium In Situ Heating and Gas-Reaction Studies in Materials Sciences

POSTER # 173

446 Analysis of Thermal Stability and Degradation Behavior for High-Ni NCMA Cathode Materials using Thermal In-Situ STEM-EELS; Jong Seok Jeong, Jungwon Park

POSTER # 174

447 Effects of Membrane Thickness, Gas Pressure and Electron Dose in Gas Cell Transmission Electron Microscopy; Xiaobing Hu, Kunmo Koo, Paul Smeeets, Vinayak Dravid

POSTER # 175

448 Emission-Based Temperature Mapping with STEM EBIC; William Hubbard, Matthew Mecklenburg, Ho Leung Chan, B. C. Regan

POSTER # 176

449 Graphene Seals for in situ TEM in Catalysis; Anton Bjørnlund, Hjalte Ambjørner, Tobias Bonczyk, Edwin Dollekamp, Lau Kaas, Sofie Colding-Fagerholt, Kristian Speranza Molhave, Christian Damsgaard, Stig Helveg, Peter Vesborg

POSTER # 177

450 In Operando Transmission Electron Microscopy Studies on Diffusion-Induced Phenomena at Dielectric-Electrode Interfaces in Ge2Te3-Based Memristor Devices; Krishnamurthy KMahalingam, Austin Shallcross, Derek Winner, sabyasachi Ganguli, Guru Subramanyam, Cynthia Bowers

POSTER # 178

451 In Situ Investigation of the Mechanistic Causes of Sintering in Platinum – Aluminum Oxide Catalysts; Jacob Smith, Miaofang Chi, Wenpei Gao

POSTER # 179

452 Exploiting 2D Perovskites for Catalyst Support Applications; Dmitri Zakharov, Lucas Alameda, Kim Kisslinger, Aaron Stein, Anibal Boscoboinik, Judith Yang

POSTER # 180

453 In-situ Formation of TiC from Titanium/Stearic Acid Powders by Mechanical Alloying Structural and Microstructural Point of View; M.L. Camacho-Rios, Guillermo Herrera-Perez, M.A. Ruíz-Esparza-Rodríguez, Raúl Pérez-Bustamante, Jose Betancourt-Cantera, C. Carreño-Gallardo, D. Lardizabal-Gutiérrez

POSTER # 181

454 Investigation of Cu Species in Dealuminated Beta Zeolite Studied by Operando Closed-Cell Gas Reaction STEM; Kinga Unocic, Stephen Purdy, Lawrence Allard, Gregory B. Collinge, Junyan Zhang, Shivangi N. Borate, Qiyuan Wu, Evan C. Wegener, Noroh Samad, Susan Habas

POSTER # 182

455 Nanoparticle Mobility and Coalescence During Sintering of a Ni/MgAl2O4 Methane Steam Reforming Catalyst; Abhaya Datye, Thomas Wilum Hansen, Andrew DeLaRiva

P10.P2 Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

POSTER # 185

458 Atomic-Scale Imaging Polypeptoid Crystals with Varying Molecular Side Chains; Morgan Seidler, Tianyi Yu, Xubo Luo, David Prendergast, Ronald Zuckermann, Nitash Balsara, Xi Jiang

POSTER # 186

459 Domain Orientated Nanoparticle Exsolution in Defect Engineered Chanoate Perovskite; Yeon-seo Nam, Hyjei Sim, Yujeong Lee, Daseob Yoon, Junwoo Son, Si-Young Choi

POSTER # 187

460 Electron Microscopy of Ammonium Urate Crystallization under Tautomerism; Hector Calderon, Francisco C. Robles-Hernandez, WeiWei Tang, Jeffrey Rimmer

POSTER # 188

461 Elucidating the Role of Nanoscale Organics in Natural Nanocomposite Materials; Paul Smeeets, Xiaobing Hu, Vinayak Dravid

POSTER # 189

462 In Operando Transmission Electron Microscopy Studies on Diffusion-Induced Phenomena at Dielectric-Electrode Interfaces in Ge2Te3-Based Memristor Devices; Krishnamurthy KMahalingam, Austin Shallcross, Derek Winner, sabyasachi Ganguli, Guru Subramanyam, Cynthia Bowers

POSTER # 190

463 Investigation of Cu Species in Dealuminated Beta Zeolite Studied by Operando Closed-Cell Gas Reaction STEM; Kinga Unocic, Stephen Purdy, Lawrence Allard, Gregory B. Collinge, Junyan Zhang, Shivangi N. Borate, Qiyuan Wu, Evan C. Wegener, Noroh Samad, Susan Habas

POSTER # 191

464 Observation Of Al-Cu Interface Instability During Room Temperature Storage; Jørgen A Sørhaug, Per Vullum, Randi Holmestad

POSTER # 192

465 Nanoparticle Mobility and Coalescence During Sintering of a Ni/MgAl2O4 Methane Steam Reforming Catalyst; Abhaya Datye, Thomas Wilum Hansen, Andrew DeLaRiva

Tuesday, July 25
POSTER # 195

468 Probing Single In-Donor Emitter Sites in ZnO: Ion-Beam Processing to Overcome Diffraction-Limited Optical Measurements; Bethany Matthews, Kai-mei Fu, Steven Spurgeon, Christian Zimmermann, Ethan Hansen, Vasileios Niaouris

POSTER # 196

469 Synthesis and Characterization of Perovskite Oxide Reinforced Polymer Nanocomposites; Zhiping Luo, Starfari McClain, Thomas Murray, Richard Harry, Navadeep Shrivastava, Sivasankara Rao Ede, Shaik Zainuddin

POSTER # 197

470 TEM Observation of the Deterioration and Thermal Recovery Process of Argyrodite-type Solid Electrolytes under Dry-Room-Simulated Condition; Hirofumi Tsukasaki, Shigeo Mori

POSTER # 198

471 TEM Studies of a New Modulated Structure in Mn2RuSn Alloy and Intermetallic Phases in Fe3+xCo3-xTi2 (x = 0, 1, 2, 3) Alloys; Xing-Zhong Li, Shah Valloppilly

POSTER # 199

472 Temperature Dependence of Mn5Ge3-Mn11Ge8 Phase Formation in Co-sputtered Thin Films; Adriana Alvidrez-Lechuga, José Holguín-Momaca, Ricardo López Antón, Sion olive-Méndez
Tuesday, July 25

Outreach Poster Sessions – Tuesday Afternoon

3:00 PM – 5:00 PM  EXHIBIT HALL

X90.P1  Outreach—Microscopy in the Classroom

POSTER # 200

473 3D Auto fluorescent analysis of the Human Cornea; Frank Denaro, Myla Worthington, T Richard, T Atanda, T Boddy, T Dunham, T Johnson, James Wachira

POSTER # 201

474 A STEM Training Program Focused on Microscopy; Frank Denaro, Simon Nyaga, Davide Zella, Joseph Bryant, Francesca Benedetti

POSTER # 202

475 Autofluorescence Microscopy can Reveal the Fine Structure of the Tooth; Frank Denaro, K Howard, J Mack, D Pearson, I Simmons, R Vereen, O Vines

POSTER # 203

476 Cost-effective Photooxidation Laboratory for Undergraduates; Giovanna Grandinetti, Taylor Metz, Hannah Gove, Rileigh Simpson, Bryce Civin, Amy Santas

POSTER # 204

477 Histopathological Changes in the Heart of the HIV-1 Transgenic Rat; Frank Denaro, Sumiko Williams, Myla Worthington, Davide Davis, Joseph Bryant

POSTER # 205

478 Neuromorphological Analysis of the Primate Claustrum; Frank Denaro, R.K. Holmes, I Sofowora, Y. Liadi, T. Solomon, P. Dike, J. Ladow, James Wachira, L.R. Edelstein,

POSTER # 206

479 Remote Operation of Instruments for Education and Research; Fernando Camino, Armando Rua, Dalice Pinero, Fernando Nieto-Fernandez, Aleida Perez, Kim Kisslinger, Judith Yang

POSTER # 207

480 Training the Next Generation of HIV/AIDS Researchers; Frank Denaro, Kenneth Samuel, Davide Zella, Francesca Benedetti, Davide Davis, Joseph Bryant
### Scientific Program

#### A02.5 Microscopy and Microanalysis for Real World Problem Solving

**Wednesday 8:30 AM**  
**Room 200-A**

**8:30 AM A081** Reliable Microscopy and Microanalysis Strategies for Real-World Batteries; *(Invited)* Kai He  
**9:00 AM A099** FIB Sample Preparation and Low Dose STEM Characterisation Challenges of Hybrid Organic-Inorganic Perovskite (HOIP) Solar Cells; Mounib Bahri, Felipe Schneider, Michel De Keersmaecker, Erin Ratcliff, Neal Armstrong, Nigel Browning  
**9:15 AM A104** Characterization of Li-ion Batteries by Scanning Electron Microscopy: Quantification of Chemical Composition Including the Li Content; Ute Golla-Schindler, Estefane BarbosaSa, Christian Weisenberger, Volker Knoblach, Gerhard Schneider  
**9:30 AM A105** Electron Microscopy of Carbon Soots for Battery Applications; Francisco C. Robles Hernandez, Héctor Calderón Benavides, Sampresh Risal, Zheng Fan  
**9:45 AM A106** Study of Lithiation Dynamics in Primary Particles of Cathode Materials by In-Situ TEM Techniques Applications; Arnaud Demortière, Kevyn Gallegos, Ahmed Yousfi

#### A04.5 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials

**Wednesday 8:30 AM**  
**Room 200-B**

**8:30 AM A114** Optimizing Parameters for High-resolution and Low-dose Electron Ptychography; *(Invited)* Yi Jiang, Michael Cao, Zhen Chen, Yimo Han  
**9:00 AM A115** Three-dimensional Analysis of Nanoscale Dislocation Loops with Multislice Electron Ptychography; Colin Gilgenbach, Xi Chen, Michael Xu, James LeBeau  
**9:15 AM A116** 3D Sectioning of Rough Interfaces Using Mixed-State Multislice Ptychography, Annular Dark Field, and Integrated Differential Phase Contrast Imaging; Shake Karapetyan, Ta-Kun Chen, Vincent D.-H. Hou, David Muller  
**9:30 AM A117** Achieving Super Resolution Ptychography with a Quadrant Detector; Xiuye Zhang, Zhen Chen, Yu-Tsun Shao, Yi Jiang, Ariana Ray, David Muller  
**9:45 AM A118** Live Data Processing of 4D-STEM Experiments: LiberTEM Meets ARINA Hybrid-Pixel Detector; Daniel Stroppa, Alexander Clausen, Dieter Weber, Elisabeth Müller, Emiliya Pogosyan, Rafal Dunin-Borkowski

#### A07.5 In Memoriam of David Joy: Scanning Electron and Ion Microscopy

**Wednesday 8:30 AM**  
**Room 200-D**

**8:30 AM A119** In the Beginning – A Look at the Origins of Quantitative Electron Microprobe Analysis; *(Invited)* Eric Lifshin  
**9:00 AM A120** Factors Affecting Martensite Tetragonality During EBSD Analysis; Gregorz Cios, Aimo Winkelmann, Gert Noize, Tomasz Tokarski, Marta Gajewksa, Łukasz Rychłowski, Piotr Bala  
**9:15 AM A122** PyEBSIndex: Indexing Electron Backscattered Diffraction Patterns on the GPU; David Rowenhorst, Patrick Callahan, Hakon Wilk Ånes  
**9:30 AM A123** Low Electron Beam Energy X-ray Microanalysis: The Adventure Continues; Dale Newbury, Nicholas Ritchie  
**9:45 AM A124** Non-Local Means Denoising of EDS Spectra for Rapid Composition Mapping in a Nickel Aluminum Bronze; Patrick Callahan, David Rowenhorst, Dillon Watting

#### A11.5 Nanoscale Infrared Spectroscopy with Electrons and Photons

**Wednesday 8:30 AM**  
**Room M-100-H**

**8:30 AM A125** Pendulum Atomic Force Microscopy for Imaging Fluctuation Dynamics in Correlated Quantum Materials at Millikelvin Temperatures; *(Invited)* Aaron Coe, Benjamin November, Federico Maccago, Stefan Ulrich, Jennifer Hoffman  
**9:00 AM A126** Simulations of Magnon Diffuse Scattering in bcc Fe: The Impact of Temperature on Magnon Detection in STEM; José Ángel Castellanos-Reyes, Paul Zeiger, Anders Bergman, Demie Kepaptsoglou, Quentin Ramasse, Juan Carlos Idrobo, Jan Rusz  
**9:15 AM A127** Vibrational Spectroscopy of MnPSe3 in the Scanning Transmission Electron Microscope; Alexander Reifsnyder, Mohamed Nawwar, Jordan Hachtel, Vicky Doan-Nguyen, David McComb  
**9:30 AM A128** Imaging Phonon Dynamics at Hetero-Interfaces by Vibrational EELS; *(Invited)* Xiaoqiang Pan, Xingxu Yan, Chaitanya Gdire, Toshihiro Aoki

#### A13.1 Computational Advances in Electron Microscopy

**Wednesday 8:30 AM**  
**Room M-100-B**

**8:30 AM A129** abTEM: A Fast and Flexible Python-based Multislice Simulation Package for Transmission Electron Microscopy; *(Invited)* Jacob Madsen, Toma Susi  
**9:00 AM A130** Fast STEM Simulation Technique to Improve Quality of Inpainted Experimental Images Through Dictionary Transfer; Alex Robinson, Jack Wells, Daniel Nicholls, Amirafshar Moshtaghpour, Miaofang Chi, Angus Kirkland, Nigel Browning
Tuesday, July 25
Scientific Program

69

9:15 AM  518  Streamlining Phantom Tomogram Generation Through Situs and TomoSim Integration; Peter Scheible, Salim Sazzed, Jing He, Willy Wriggers

9:30 AM  533  Pyxem: A Scalable Mature Python Package for Analyzing 4-D STEM Data; Carter Francis, Paul Voyles

9:45 AM  548  Fluctuation Component Analysis-Based K-Means Clustering in 4D-STEM of Heterogeneous Materials; Hanyu Hou, Saran Pidaparthry, Haoyang Ni, Jian-Min Zuo

A14.5  Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

Wednesday 8:30 AM  Room 200-C

8:30 AM  486  Mechanical Spectroscopy: Machine Learning and High Speed Nanoindentation for High Throughput Material Evaluation; (invited) Douglas Stauffer, Eric Hintsa, Bernard Becker, Benjamin Stadnick, Ude Hangen, Moujuri Sau, Nathan Mara

9:00 AM  504  Identifying the Microscopic Nature of Two Level System Loss Channels in Acoustic Devices Using X-ray Photoelectron Spectroscopy and Atomic Force Microscopy; Rachel Gruenke, Gitanjali Multani, Oliver Hitchcock, E. Alex Wollack, Erik Szakiel, Christopher Sarabalis, Nathan Lee, Agnetta Cleland, Amir Cleland

9:15 AM  519  Visible to Mid-IR Spectromicroscopy with Top-Down Illumination and Nanoscale (= 10 nm) Resolution; Devon Jakob, Andrea Centrone

9:30 AM  534  Characterization of Cellulose Aerogel TiO2 Structure and its Photocatalytic Activity by Means of AFM and Super-Resolution Techniques; José Jorge Chanona-Pérez, Susana Díazney Gallegos-Cerda, Josué Hernández-Varela, Stephany Montserrat Gutiérrez Martínez, Carlos Alberto Huerta-Aguilar, Juan Vicente Méndez Méndez

9:45 AM  549  Nanoendoscopy-AFM for Visualizing Intracellular Nanostructures of Living Cells; Keisuke Miyazawa, Marcos Penedo, Hirotsuki Furusho, Takehiko Ichikawa, Mohammad Shahidul Alam, Kazuki Miyata, Chikashi Nakamura, Takeshi Fukuma Fukuma
### Biological Sciences Symposia – Wednesday Morning

**B02.4 3D Structures: from Macromolecular Assemblies to Whole Cells (3DEM FIG)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td><strong>487</strong> Dynamin Superfamily Proteins Involved in Membrane Fission and Fusion; [Invited] Jenny Hinshaw, Sarah Nyenhuis, John Jimah, Nidhi Kundu, Jonathan Harrision, Bertram Canagarajah</td>
</tr>
<tr>
<td>9:00 AM</td>
<td><strong>505</strong> Novel ADP State Found in Smooth Muscle Heavy Meromyosin by CryoEM; Alimohammad Hojjatian, Hosna Rastegarpouyani, Dianne Taylor, kenneth taylor</td>
</tr>
<tr>
<td>9:15 AM</td>
<td><strong>520</strong> Tracing Randomly Oriented Filaments in Cryo-Electron Tomography Maps; Willy Wriggers, Salim Sazzed, Peter Scheible, Jing He</td>
</tr>
<tr>
<td>9:30 AM</td>
<td><strong>535</strong> Structure and Arrangement of Non-Myosin Proteins in the Flight Muscle Thick Filament from the Bumble Bee, Bombus ignitus by cryoEM; Jiawei Li, Hamidreza Rahmani, Fatemeh Abbasi Yeganeh, Hosna Rastegarpouyani, Dianne Taylor, Micheal Previs, Neil Wood, Hiroyuki Iwamoto, kenneth Iwamoto</td>
</tr>
<tr>
<td>9:45 AM</td>
<td><strong>550</strong> Structural and Functional Analysis of Flagellar Filaments of Caulobacter crescentus; Juan Sanchez, Eric Montemayor, Nicoleta Ploscariu, Daniel Parrell, Jae Yang, Bryan Sibert, Kai Cai, Elizabeth Wright Wright</td>
</tr>
</tbody>
</table>

**B03.1 Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td><strong>488</strong> State of the Art for Machine Learning in Bioimage Analysis; [Invited] Kyle Harrington</td>
</tr>
<tr>
<td>9:00 AM</td>
<td><strong>506</strong> Unsupervised Particle Picking and Clustering in Cryo-EM Micrographs; Alireza Nasiri, Darnell Granberry, Tristan Bepler</td>
</tr>
<tr>
<td>9:15 AM</td>
<td><strong>521</strong> Training Neural Networks with Simulated CryoET Data; Carson Purnell, Jessica Heebner, Matthew Swulius</td>
</tr>
</tbody>
</table>

**B08.1 Biological Soft X-ray Tomography**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td><strong>489</strong> Applications of Soft X-ray Tomography for the Direct Observation of Native Cellular Event; [Invited] Maria Harkiolaki, Chidinma Okolo, Archana Jadhav, Kamal Nahas, Thomas Fish, Amy Watts</td>
</tr>
<tr>
<td>9:00 AM</td>
<td><strong>507</strong> Large Volume Imaging Soft X-Ray Tomography of Infected Cells; Venera Weinhardt</td>
</tr>
<tr>
<td>9:15 AM</td>
<td><strong>522</strong> A Laboratory Based Soft X-ray Microscope for 3D Imaging of Whole Cells; Kenneth Fahy, Paul Sheridan, Sergey Kapishnikov, William Pyans, Fergal O’Reilly, Tony McEnroe</td>
</tr>
<tr>
<td>9:30 AM</td>
<td><strong>537</strong> Mitochondrial Reorganization in Herpesvirus-Infected Cells; Maija Vihinen-Ranta, Simon Leclerc, Kari Kunnas, Axel Ekman, Eva Pereiro, Kenneth Fahy, Carolyn Larabell, Venera Weinhardt, Mark Le Gros, Carolyn Larabell</td>
</tr>
<tr>
<td>9:45 AM</td>
<td><strong>551</strong> Soft X-ray 3D imaging: A Powerful Tool for Visualizing Virus Infections with Increased Resolution and Field of View; Jian-hua Chen, Bieke Vanslembrouck, Axel Ekman, Valentina Loconte, Venera Weinhardt, Mark Le Gros, Carolyn Larabell</td>
</tr>
</tbody>
</table>
Cross-Cut/Interdisciplinary Sciences Symposia – Wednesday Morning

C02.1 Extracting Information from Data: Applications of Artificial Intelligence in Microscopy Application of Artificial Intelligence to Microscopy in the Materials and Biological Sciences

Wednesday 8:30 AM  Room M-100-G

8:30 AM  490  Autonomous Electron Tomography Reconstruction using Bayesian Optimization; William Millsaps, Jonathan Schwartz, Zichao Wendy Di, Yi Jiang, Robert Hovden

8:45 AM  498  Advanced Gaussian Processes for Function Approximation, Uncertainty Quantification, and Autonomous Experimentation; (Invited) Marcus Noack

9:15 AM  523  Resolving the Preferred Orientation Problem in CryoEM Reconstruction with Self-Supervised Deep Learning; (Invited) Yuntao Liu, Jason Hu, Z. Hong Zhou

9:30 AM  538  Practical and Parsimonious Real-Time Analysis in Materials Microscopy; (Invited) Joshua Agar

C03.3 Correlative and Multimodal Microscopy and Analysis

Wednesday 8:30 AM  Room L-100-J

8:30 AM  491  Multimodal Imaging of Nitrogen-fixing Cyanobacteria in the Near-native State; (Invited) Vivian Merk, Bobby Duersch, Steven Soini, Yanqi Luo, Xiaoyang Liu, Si Chen

9:00 AM  508  Correlative Microscopy for the Identification of Intracellular Nanoparticles and their Cellular Processing; Ingo Lieberwirth, Shen Han, Anke Kaltbeitzel, Gunnar Glasser, Katharina Landfester

9:15 AM  524  Automation in Cryo-FIB Preparation, from Cellular to Tissue Structural Biology; (Invited) Alex de Marco, Patrick Cleeve, Monica Pia Caggiano, David Dierick

9:30 AM  539  Depth Correction of 3D SIMS Images of Mammalian Cells with Secondary Ion Images Captures the Effects of Differential Sputtering; (Invited) Mary Kraft, Melanie Brunet, Brittney Gorman
Scientific Program

**P01.1** Revealing the Working Morphology of Energy Materials and Its Impact on Performance

**Wednesday 8:30 AM**

**Room 200-I**

8:30 AM 492 CryoEM and Autonomous Characterization for Investigating Cathode Active Materials and Solid-Solid/Solid-Liquid Interphoces in Energy Storage Devices; [Invited] Huolin Xin, Chunyang Wang, Rui Zhang, Yubin He, Peichao Zou

9:00 AM 509 Imaging Li Vacancies in a Li-Ion Battery Cathode Material by Depth Sectioning Multi-slice Electron Ptychographic Reconstructions; Dasol Yoon, Yus-Tsun Shao, Yao Yang, Dong Ren, Héctor Aburúa, David Muller

9:15 AM 525 Three-Dimensional Imaging of Surface Structural Transformations on Electrocatalyst Nanoparticles Using Multi-Slice Electron Ptychography; Zixiao Shi, Rui Zeng, Yu-Tsun Shao, Harikrishnan K. P., Dasol Yoon, David Muller, Héctor Aburúa

9:30 AM 540 Atomic-Scale Origin of the Low Grain-Boundary Resistance in Perovskite Solid Electrolyte Li0.375Sr0.4375Ta0.75Zr0.25O3; Tom Lee, Ji Qi, Chaitanya Gadre, Huaixun Huyan, Shu-Ting Ko, Yunxing Zuo, Ruqian Wu, Jian Luo, Shyue Ping Luo

9:45 AM 552 Local Structural Environments in Perovskite Oxide Solid Electrolytes; Junghwa Kim, Kiarash Gordiz, Daniele Vivona, Lambert Hu, Yang Shao-Horn, James LeBeau

**P04.1** Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing

**Wednesday 8:30 AM**

**Room 200-F**

8:30 AM 493 Optical Orientation Mapping of Additively Manufactured Alloys Using Directional Reflectance Microscopy; [Invited] Matteo Seita, Tan Phuc Le, Chenyang Zhu

9:00 AM 510 High-Throughput EBSD Characterization of Additively Manufactured Microstructures; Luis Jauregui, Tim Ruggles, Elliott Fowler, Dale Cillessen, Kyle Johnson, Shelley Williams, Brad Boyce

9:15 AM 526 Improving Porosity Analysis in Additive Manufacturing through 3D Resolution Recovery using Deep Learning-Based Reconstruction; Yulia Trenkhina, Hirishkesh Bale, Stephen Kelly


**P05.1** Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

**Wednesday 8:30 AM**

**Room 200-G**

8:30 AM 494 Irradiation and Corrosion: Friends or Foes?; [Invited] Stephen Raiman

9:00 AM 511 In-situ Thermal Oxidation of Fusion PFM Tungsten Using Atmospheric Environmental TEM; Yuanyuan Zhu, Rajat Sainju, Lichun Zhang, Weilin Jiang, Wahyu Setyawan, Osman El Atwani

9:15 AM 527 Analysis of the Degradation Trend in AISI 4140 Steels used in Internal Combustion Engine Components; Misael Baez, Israel Baez, Guillermo Manuel Urriolagotia, Guillermo Urriolagotia Sosa, Beatriz Romero, Israel Fernando Barajas Ambriz, Cecilio Garcia Campos

9:30 AM 542 Atomic Insights into Pitting Corrosion on Metal Surfaces Through Liquid Phase TEM; Haimei Zheng, Xinxing Peng, Junyi Shangguan

**P10.5** Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

**Wednesday 8:30 AM**

**Room 200-J**

8:30 AM 495 From Microanalysis to Atomic Electron Pair Distribution Function (ePDF): Adding Another Degree of Freedom in Analyzing Nanoscale Materials; [Invited] Yang Liu, Mary Buckett, Geng Bang Jin, Matthew Burch, Alyssa Rosas, Grant Thoma, Andy Steinbach

9:00 AM 512 Dose-Efficient Structure Mapping of Nano-Crystallites in Organic Solar Cells with Fast 4D-SCED Experiments Using Hybrid Pixel Detector; Daniel Stroppa, Mingjian Wu, Erdmann Spiecker

9:15 AM 528 A New Low-dose STEM Imaging Mode with Probability Driven Intra-pixel Beam Blanking; Lewys Jones, Jonathan Peters, Bryan Reed, Yu Jimbo, Alexandra Porter, Daniel Masiel

9:30 AM 543 3D Magnetization Reconstruction for Lorentz Microscopy using Differential Programming; Arthur McCray, Mathew Cherukara, Amanda Petford Long, Charudatta Phatak

9:45 AM 553 Liquid Electron Microscopy with Non-Aqueous Solvents: Evaluating the Beam-Sample Interactions of Complex Liquid Structures; Justin Mulvey, Aoon Rizvi, Joe Patterson
### Technologists’ Forum – Wednesday Morning

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>X30.1</td>
<td><strong>Technologists’ Forum - Methods in Tissue Clearing and Expansion to Achieve Improved Resolution</strong></td>
<td>Wednesday 8:30 AM</td>
<td>Room 200-E</td>
</tr>
</tbody>
</table>

8:30 AM  **496**  *Quantitative Cleared Tissue Imaging*:  
Kevin Dean, Hazel Borges, Jinlong Lin, Zach Marin

9:00 AM  **513**  *Considerations for Microscopic Imaging of Whole Organs and Animals*:  
Alan Watson, Iaroslavna Vasylieva, Megan Smith

9:30 AM  **544**  *Considerations for Tissue Clearing Services in a Shared Research Facility*:  
Patrick Willey, Mark Sanders, Nadia Kane

### Cross-Cut/Interdisciplinary Sciences Tutorial – Wednesday Morning

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Time</th>
</tr>
</thead>
</table>
| CT      | **Need For Speed: Imaging Biological Ultrastructure with the 64-beams FAST-EM**:  
(Invited) Arent Kievits, Peter Duinkerken, Ben Giepmans, Jacob Hoogenboom | 8:30 AM  **497**          |
Scientific Program

## Analytical/Instrumentation Sciences Symposia – Wednesday Late Morning

### A02.6 Microscopy and Microanalysis for Real World Problem Solving

**Wednesday 10:30 AM**  
**Room 200-A**

**10:30 AM**  
[554] **554**  
In-situ Observation of Chemically Reacted Particles In Gas Atmosphere With an Aberration Corrected STEM/SEM; [Invited] Hiroaki Matsumoto, Takeshi Sato, Keisuke Igarashi, Takahito Hashimoto, Hiromi Inada

**11:00 AM**  
[574] **574**  
Electron Microscopy of Hierarchically Structured Nano-array Catalysts: Jingyue Liu, Yuwei Yu, Chunxiang Zhu, Binchao Zhao, Puxian Gao

**11:15 AM**  
[589] **589**  
Image-Based Characterization of Carbonate Mudrocks to Link Nano-Scale Pore Characteristics to Thermal Maturity; Shannon Eichmann, Qiushi Sun, David Jacobi, Poorna Srinivasan, Jennifer Rodriguez, Ahmed Nahwi

**11:30 AM**  
[602] **602**  
High Resolution Electron Microscopy Study of Mesoporous Structure Evolution in ZSM-5 Zeolite; Yali Tang, Charles Kanyi, Mehdi Allahverdi

**11:45 AM**  
[618] **618**  
Controlling Thermal Gradients during In Situ Transmission Electron Microscopy Heating Experiments; Yi-Chieh Yang, Siriam Vijayan, Thor Bjerregård Sneppen, Joerg Jinschek

### A03.1 Standards and Reference Materials and their Applications in Quantitative Microanalysis

**Wednesday 10:30 AM**  
**Room M-100-H**

**10:30 AM**  
[555] **555**  
Epidote Reference Material Development Calibrated for Oxygen Isotope Determination by Secondary Ion Mass Spectrometry (SIMS); [Invited] Claudia Roig González, Chloë Bonamici, Tyler Blum, William Nachlas, Mike Spicuzza

**11:00 AM**  
[576] **576**  
Development of Preliminary New Reference Concentrations for ATHO-G Major Elements and Lipari Obsidian ID-3506 Trace Elements; Stephen Kuehn

**11:15 AM**  
[590] **590**  
Evaluating Consensus in Experimental K-ratios from over 40 WDS and EDS Measurement Systems; William Nachlas, Aurélien Moy, Nicholas Ritchie, John Donovan, John Fournelle, Julien Allaz, Renat Almeev, Emma Bullock, Joel Bullock, Karsten Goemann

**11:30 AM**  
[603] **603**  
Development of Reference Materials for Microanalysis in Geosciences: the Case of Olivine MongOl Sh1-2; [Invited] Valentina Batanova, Alexander Sobolev

### A04.6 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials

**Wednesday 10:30 AM**  
**Room 200-B**

**10:30 AM**  
[630] **630**  
Automated Experiment and Big Data Methods in Praxis of 4D STEM; [Invited] Sergei Kalinin, Rama Vasudevan, Maxim Ziatdinov, Kevin Roccapiore

**11:00 AM**  
[650] **650**  
Phase Diversity in Ptychographic Reconstructions with a Programmable Phase Plate; Stephanie Ribet, Steven Zeltmann, Georgios Varnavides, Roberto dos Reis, Vinayak Dravid, Colin Ophus

**11:15 AM**  
[666] **666**  
High-Speed 4D-STEM using Electrostatic Subframing; Bryan Reed, Ruth Bloom, Kazuki Yagi, Daniel Masiel

**11:30 AM**  
[680] **680**  

**11:45 AM**  
[696] **696**  
Magnetic Field Mapping in STEM-DPC by Utilizing Artificial Neural Networks; Gregory Nordahl, Sivert Dagenborg, Magnus Nord

### A05.1 Advanced Measurement Techniques in (S)TEM-EELS

**Wednesday 10:30 AM**  
**Room 200-D**

**10:30 AM**  
[556] **556**  
Theory and Simulations of Ultra-Low Energy Loss Spectroscopy at High Spatial Resolution; [Invited] Jan Rusz, Paul Zeiger, José Ángel Castellanos-Reyes, Anders Bergman

**11:00 AM**  
[576] **576**  
Unveiling Phonon Dispersion Behavior of AlN/GaN Heterostructures using EELS; Joaquin E. Reyes-Gonzalez, Niklas Dellby, Benjamin Plotkin-Swing, Ping Wang, Ayush Pandey, Zetian Mi, Maureen Joel Lagos

**11:15 AM**  
[591] **591**  
Mapping Phonon Dispersion Surfaces at Nanometer Scale; Benedikt Haas, Guillaume Radtke, Steven Quillin, Tracy Lovejoy, Niklas Dellby, Ondrej Krivanek, Adnan Hammud, Tim Schroder, Christoph Schroder

**11:30 AM**  
[604] **604**  
Simultaneous HAADF & EELS Data Acquisition for Relative Quantification of Temperature and Thickness Effects on Thermal Diffuse Scattering in STEM; Paul Minson, Felipe Rivera, Richard Vanfleet

**11:45 AM**  
[619] **619**  
### A13.2 Computational Advances in Electron Microscopy

**Wednesday 10:30 AM  Room M-100-B**

10:30 AM  **557** Post-Experiment Forensics and Human-in-the-Loop Interventions in Explainable Autonomous Scanning Transmission Electron Microscopy; *(Invited)* Sergei Kalinin, Rama Vasudevan, Maxim Ziatdinov, Kevin Roccapriore

11:00 AM  **577** Convolution Neural Networks and Position Averaged Convergent Beam Electron Diffraction for Determining the Structure of 2D Materials; Andrew Yankovich, Magnus Röding, Victor Wählstrand Skärström, Alok Ranjan, Eva Olsson

11:15 AM  **592** Atomic Scale Cluster Finding using GIS-Inspired Spatial Statistics; Charles Evans, Elizabeth Dickey

11:30 AM  **605** How to Create Small but Useful Neural Networks; Alexander M Rakowski, Benjamin Savitzky, Matthew L Henderson, Shreyas Cholia, Maria KY Chan, Colin Ophus

11:45 AM  **620** Random Forest Prediction of Crystal Structure from Diffraction Patterns; Samuel Gleason, Alexander M Rakowski, Jim Ciston, Colin Ophus

### A14.6 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

**Wednesday 10:30 AM  Room 200-C**

10:30 AM  **558** Characterizing Surfaces and Interfaces in the Medical Device Industry; *(Invited)* Bill Theilacker, Anna Belu, Tony Anderson, Reza Jahanbekam

11:00 AM  **578** Surface Characterization of Bacteria, Biofilms and Solid-Liquid Interfaces using Near-Ambient Pressure XPS; *(Invited)* Andreas Thissen, Paul Dietrich, Francesca Mirabella

11:30 AM  **606** Getting Structural and Compositional Insights into Biological and Beam Sensitive Samples Using Three Complementary Detection Modalities on a Cryo FIB Instrument; Olivier De Castro, Tatjana Taubitz, Antje Biesemeier, Tom Wirtz

11:45 AM  **621** Effective Characterization of Dental Enamel Nanostructures Using Pattern Matching: A Combined TEM and SEM-TKD Study; Pat Trimby, Sandra Piazolo, Mohammed Al-Mosawi, Maisoon Al-Jawad, Stuart Micklethwaite, zabeada Aslam, Aimo Winkelmann
## Scientific Program

### Biological Sciences Symposia – Wednesday Late Morning

**B02.5**

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

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td>Cryo-EM Analysis of the Clostridioides difficile Transferase Reveals Intoxication Intermediates; <em>(invited)</em> Michael Sheedlo, Robin Mulliard, Eva Grant</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Characterization of Two New Proteins Found in the L. pneumophila Dot/Icm T4SS; <em>Jacquelyn Roberts</em>, Arwen Frick-Cheng, Louise Chang, Clarissa Dune, Henry Styron, Melanie Ohi</td>
<td></td>
</tr>
<tr>
<td>11:15 AM</td>
<td>High-Resolution Cryo-EM Structure of Staphylococcus aureus Bacteriophage 80a Portal Protein and SaPPI Capsid; <em>Amarni Mukherjee</em>, James Kizziah, Laura Parker, Terje Dokland</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>How a Potent Anti-Neuraminidase Monoclonal Antibody Navigates Recent Immune-Evasive Influenza Strains: A Structural Study by Single-Particle CryoEM; <em>Ha Dang</em>, Corey Momont, Kevin Hauser, Fabrizia Zatta, Gyorgy Snell, Matteo Pizzuto</td>
<td></td>
</tr>
<tr>
<td>11:45 AM</td>
<td>Reconstruction of the entire RB43 Bacteriophage by Single Particle Cryo-EM; <em>Olga Sokolova</em>, Rafael Ayala, Maya Street, Andrey Moiseenko, Evgeny Kulikov, Alexander Kuznetsov, Matthias Wolf, Andrey Letarov Letarov</td>
<td></td>
</tr>
</tbody>
</table>

**B03.2**

**Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td>Machine Learning Methods in the 3D Analysis of Histopathological Data; <em>(invited)</em> Katarzyna Kedziora</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Automated Segmentation of 3D Cytoskeletal Filaments From Electron Micrographs with TARDIS; <em>Robert Kiewisz</em>, Gunar Fabig, Thomas Müller-Reichert, Tristan Bepler</td>
<td></td>
</tr>
<tr>
<td>11:15 AM</td>
<td>Application of Deep Learning Image Segmentation to Synchrotron Radiation μCT Bone Microstructure Datasets; <em>Joshua Taylor</em>, Medhat Hassan, Janna Andronowski</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Towards Generalizable Organelle Segmentation in Volume Electron Microscopy; <em>(invited)</em> Larissa Heinrich, Will Patton, Davis Bennett, David Ackerman, Grace Park, John Bogovic, Alyson Petrucio, Jan Funke, Stephan Funke, Aubrey Weigel</td>
<td></td>
</tr>
</tbody>
</table>

### Biological Soft X-ray Tomography

**B08.2**

**Wednesday 10:30 AM Room M-100-E**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td>Lewy Body-Like Condensates Sequester Membrane-Bound Organelles; <em>(invited)</em> Dragomir Milovanovic, Roberto Sansevino, Christian Hoffmann, Jian-hua Chen, Johannes Vincent Tromm, Joshua Jackson, Mark Le Gros, Daniele Bano, Carolyn Bano</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Direct Observation of Uptake and Dissolution of Cholesterol Crystals by Macrophages Using Combined Fluorescence and X-ray Microscopy; <em>Daniel Wüstner</em>, Alice Dupont Juhi, Suzana Kozakijevic, Maria Szomok, Tido Wills, Jacob Eggebjerg, Katja Thaysen, Stephan Werner, Gerd Werner, Peter Müller</td>
<td></td>
</tr>
<tr>
<td>11:15 AM</td>
<td>Correlative Cryo Soft X-ray Tomography and Spectroscopy To Study Ca Biominalization Processes In Frozen Hydrated Whole Cells; <em>Andrea Sorrentino</em>, Francesca Rossi, Giovanna Picone, Emil Malucelli, Ana J. Perez, Stefano Iotti, Eva Pereiro</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Charting Cytoskeleton-Organelle Interplay in Living Cells Through High Resolution 3D Correlative Cryo-Imaging; <em>Ivy Wang</em>, Peter Wing, Michael Schwertner, Martijn van Nugteren, Petros Ligoxygakis, Maria Harkiolaki</td>
<td></td>
</tr>
<tr>
<td>11:45 AM</td>
<td>Integration of Laboratory Cryo Soft X-ray Tomography into CLEM Workflows for Multimodal Multiscale Imaging of Bulk Samples; <em>Sergey Kapishnikov</em>, William Fyans, Fergal O’Reilly, Tony McEnroe, Paul Sheridan, Kenneth Fahy</td>
<td></td>
</tr>
</tbody>
</table>
### Scientific Program

#### Cross-Cut/Interdisciplinary Sciences Symposia – Wednesday Late Morning

**C02.2**  
**Extracting Information from Data: Applications of Artificial Intelligence in Microscopy**  
**Application of Artificial Intelligence to Microscopy in the Materials and Biological Sciences**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td><em>Machine Learning Prediction of Charge State from EELS Spectra of Third Row Transition Metals; Samuel Gleason, Deyu Lu, Jim Ciston</em></td>
</tr>
<tr>
<td>11:00 AM</td>
<td><em>Marrying Microscopy, Modeling, and Machine Learning; (Invited) Maria KY Chan</em></td>
</tr>
<tr>
<td>11:30 AM</td>
<td><em>Decoding Spatial Symmetry and EELS Spectroscopic Fine Structures; (Invited) Huolin Xin, Chunyang Wang, Dong Zhu, Zhengran Ji, Mike Hu, Lingli Kong</em></td>
</tr>
</tbody>
</table>

**C03.4**  
**Correlative and Multimodal Microscopy and Analysis**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:30 AM</td>
<td><em>Conjoining Simple Supervised and Unsupervised Machine Learning Methods with 4D-STEM to Identify Complex Nanostructures; Timothy Yoo, Eitan Hershkovitz, Xiaofei Pu, Lingfeng He, Honggyu Kim</em></td>
</tr>
<tr>
<td>10:45 AM</td>
<td><em>A Point Process Analysis Framework for Quantitatively Describing Spatial Patterns from Fluorescence Microscopy Data; (Invited) Andrew Soltisz, Rengasayee Veeraraghavan</em></td>
</tr>
<tr>
<td>11:15 AM</td>
<td><em>Multi-resolution Cross-modality Image Registration using Unsupervised Deep Learning Approach; Daksh Daksh, Anke Kaltbeitzel, Ingo Lieberwirth, Katharina Landfester</em></td>
</tr>
<tr>
<td>11:30 AM</td>
<td><em>TEML: Correlative Transmission Electron Microscopy and Photoluminescence Assisted by 3D Machine Learning; Shery Chang, Haotian Wen, Christian Dwyer</em></td>
</tr>
<tr>
<td>11:45 AM</td>
<td><em>Dose and Sampling Requirements for Fused Multi-Modal Electron Tomography; Jason Manassa, Jonathan Schwartz, Yi Jiang, Huihuo Zheng, Jeffrey A. Fessler, Zichao Wendy Di, Robert Hovden</em></td>
</tr>
</tbody>
</table>
Scientific Program

Physical Sciences Symposia – Wednesday Late Morning

P01.2 Revealing the Working Morphology of Energy Materials and Its Impact on Performance

Wednesday 10:30 AM Room 200-I


11:00 AM 583 Revealing the Internal Architecture of Alkaline Fuel Cell Membranes with Cryo-4D-STEM and Cryo-STEM-EELS; [Invited] Danielle Markovich, Michael Colletta, Yue Yu, Megan Treichel, Jesse Hu, Bryan Pivovar, Brett Fors, Kevin J. Noonan, Lena Noonan


11:30 AM 612 Structure and Dynamics of Graphite Intercalation Compounds Analyzed using in situ 4D-STEM; [Invited] Peter Schweizer, Lilian Vogl, Erdmann Speecker, Colin Ophus, Andrew Minor

11:45 AM 625 Probing the “Order” in Complexity: Entropy-engineered Thermoelectric Materials; [Invited] Yukun Liu, Stephanie Ribet, Hongyao Xie, Roberto dos Reis, Mercouri Kanatzidis, Vinayak Dravid

P04.2 Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing

Wednesday 10:30 AM Room 200-F

10:30 AM 565 On the Role of Interfaces During Metal Additive Manufacturing; [Invited] Sophie Primig

11:00 AM 584 Gamma Prime Characterization in Additively Manufactured Haynes 282 after One-Step and Two-Step Post-Process Heat Treatments; [Invited] Alivia Mourot, Sriman Vijayan, Avantika Gupta, Joerg Jinschek, Carolin Fink

11:15 AM 598 Microstructural and Mechanical Property Differences Resulting from Melt Pool Interactions with the Electron Beam Chamber Environment; [Invited] Katie O’Donnell, Maria Quintana, Peter Collins

11:30 AM 613 Microstructural and Nanostructural Evolution in Splat Quenched Stainless Steels; [Invited] Luke Brewer, Zachary Hasenbuch, Andy Deal, Ben Brown, Laurentiu Nastac

P05.2 Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

Wednesday 10:30 AM Room 200-G

10:30 AM 566 The Physical and Engineering Limits of Coupled In situ TEM Experiments; Khalid Hattar, Ryan Schoell, Eric Lang, Ben Wolf, Thomas Moore, Katherine Jungjohann

10:45 AM 573 Effect of Dopants, Impurities, and Substrate on Anomalous Crystallization of SiN; Calvin Parkin, Paul Kotula, Jennie Podlevsky, Carlos Chacon, Scott Grutzik, Tesia Janicki, J. Matthew Lane, Hojun Lim, Christopher Lim, Khalid Hattar

11:00 AM 585 Atomic-Level Insights into the Radiation Damage and Recovery of β-Ga2O3 for High-Performance Semiconductors; Hsien-Lien Huang, Christopher Chae, Jared Johnson, Alexander Senckowski, Shivam Sharma, Uttam Singhisetti, Man Hoi Wong, Jinwoo Hwang Hwang

11:15 AM 599 In situ TEM Characterization of Elasticity and Crazing Behavior of Polymer Grafted Nanoparticle Thin Films as a Function of Disorder and Radiation Damage; Daniel Long, Kyoungwoon Park, Lawrence Drummy

11:30 AM 614 In situ Irradiation-Corrosion Monitoring of Metals Exposed to Advanced Nuclear Reactor Coolants with Thick-Target Particle-Induced X-Ray Emission Microscopy (PIXE); [Invited] Franziska Schmidt, Matthew Chancey, Hysom Kim, Scott Parker, Peter Hosemann, Yongqiang Wang

P08.1 Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena

Wednesday 10:30 AM Room 200-H


11:00 AM 586 Translational Symmetry Breaking at Charged Domain Walls in a Layered Perovskite Ferroelectric; Hiroshi Nakajima, Kosuke Kurushima, Hirofumi Tsukasaki, Shigeo Mori

11:15 AM 600 Direct Observation of Strain-Induced Ferrochal Transition in Quasi-ID BaTiS3; Guodong Ren, Gwan-Yeong Jung, Huan Dong Chen, Rama Vassudevan, Andrew Lupini, Miaoang Chi, Jordan Hachtel, Di Xiao, Jayakanth Xiao, Rohan Mishra

Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

**Wednesday, July 26**

10:30 AM  **568**  Correlation Between Solid Electrolyte Interphase and Li Morphology Revealed by Cryogenic Electron Microscopy; (Invited) **Yaobin Xu**, Hao Jia, Dingchuan Xue, Ruyue Fang, Ji-Guang Zhang, Sulin Zhang, Wu Xu, Chongmin Wang Wang

11:00 AM  **587**  Degradation Mechanism of Si Anode in Sulfide-based All-Solid-State Batteries Revealed by Observation of SEI Layer Using 4D-STEM/Super-EDS; **Hyeyoung Cho**, Sangjun Kang, Kyong-Ryol Tag, Hyelin Cho, Hyun-woo Gong, Hong-Kyu Kim, Hae-Ryoung Kim, Jae-Pyoung Ahn

11:15 AM  **601**  A New Superstructure in Beam Sensitive Cathode Material Revealed by Multimodal STEM Combining ADF, iDPC and EDX Mapping Techniques; **Maria Meledina**, Alexander Meledin, Eric G.T. Bosch, Ivan Lazić, Xiaochao Wu, Ulrich Simon, Boy Markus, Bert Freitag, Sorin Freitag, Paolo Longo

11:30 AM  **616**  Direct Observation of Zinc Dendrite Growth in Zinc Air Battery by Operando (S)TEM; **Xiaodong Liu**, Nigel Browning, B. Layla Mehdi

11:45 AM  **626**  Development of a Multi-Scale Imaging and Analysis Workflow for Batteries: From Cell Level to Electrode Particle Porosity; **Wesley De Boever**, Jan Dewanckele
Scientific Program

Technologists' Forum –
Wednesday Late Morning

X32.1 Technologists' Forum - 4D STEM Tips and Techniques
[Partnering with AO4]

Wednesday 10:30 AM Room 200-E

10:30 AM 569 Scanning Electron Diffraction: To Precess or not to Precess? [Invited] Tina Bergh, Randi Holmestad, Emil Frang Christiansen, Elisabeth Thronsen, Gregory Nordahl, Magnus Nord, Antonius T. J. van Helvoort

11:00 AM 588 Principles and Applications of 4D-STEM Diffraction Imaging for Characterizing Complex Crystalline Materials; [Invited] Yu-Tsun Shao, Jian-Min Zuo, David Muller

11:30 AM 617 Choosing Detectors and Analysis Software for 4D-STEM; [Invited] Steven Zeitmann, David Muller

Physical Sciences Tutorial –
Wednesday Late Morning

X41 Physical Sciences Tutorial

Wednesday 10:30 AM Room M-100-C

10:30 AM 570 Specimen Preparation for MEMS-Based in situ Transmission Electron Microscopy Experiments; [Invited] Sriram Vijayan
### Scientific Program

#### A02.7 Microscopy and Microanalysis for Real World Problem Solving

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>Wednesday 1:30 PM Room 200-A</td>
<td><strong>Meeting the Ubiquitous Challenges of Hydrocarbon Contamination</strong>; <em>(Invited)</em> Barbara Armbruster</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Wednesday 1:30 PM Room 200-A</td>
<td><strong>Improved Sample Preparation Technique for Transmission Kikuchi Diffraction (TKD) Analyses Allows Large Area Data Acquisition</strong>; Pawel Nowakowski, Cecile Bonifacio, Mary Ray, Paul Fischione</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Wednesday 1:30 PM Room 200-A</td>
<td><strong>Analysis of Coronado State Historic Site Artifacts using X-rays</strong>; Brian Patterson, Steven Young, James Valdez, Michelle Espy, Alex Edgar, Jack Brett, Michael Pettes, Math Mathers, Matt Mathers</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Wednesday 1:30 PM Room 200-A</td>
<td><strong>Evaluating the Dislocation Structures Involved in Dwell Fatigue Crack Initiation</strong>; Baris Yavas, Nadib Akram, Asa Frye, Vasiisht Venkatesh, Adam Pilchak, David Furrer, Iuliana Cernatescu, Mark Window Window</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Wednesday 1:30 PM Room 200-A</td>
<td><strong>Self-regulating Oxidation Resistance at Rough Surface of Achromatic Copper</strong>; Young-Hoon Kim, Seong-Gon Kim, Seunghun Lee, Miyeon Cheon, Su Jae Kim, Se-Young Jeong, Young-Min Kim</td>
</tr>
</tbody>
</table>

#### A03.2 Standards and Reference Materials and their Applications in Quantitative Microanalysis

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>Wednesday 1:30 PM Room M-100-H</td>
<td><strong>What is the Best Way to Extract a k-ratio from an EDS Spectrum?</strong>; <em>(Invited)</em> Nicholas Ritchie</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Wednesday 1:30 PM Room M-100-H</td>
<td><strong>An Optimized Deconvolution Algorithm for Energy-Dispersive X-ray Spectroscopy</strong>; Jakub Klus, Stephen Seddie, David Rohde, Petr Hlavenka</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Wednesday 1:30 PM Room M-100-H</td>
<td><strong>EDS and WDS Analysis of Ni-Si Samples at Low Acceleration Voltages</strong>; Ralf Terborg, Silvia Richter</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Wednesday 1:30 PM Room M-100-H</td>
<td><strong>Methods and Reference Materials used to Calibrate PIXL, the Mars 2020 In Situ XRF Spectrometer</strong>; <em>(Invited)</em> Chris Heinweg</td>
</tr>
</tbody>
</table>

#### A04.7 The Praxis of 4D-STEM - Extracting Information from Biological and Functional Materials

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>Wednesday 1:30 PM Room 200-B</td>
<td><strong>Nucleation and Phase Development of Precipitates in Age-Hardenable Aluminium Alloys studied by 4D-STEM</strong>; <em>(Invited)</em> Randi Holmesstad, Elisabeth Thronsen, Yasuhiyo Kawahara, Tina Bergh, Jørgen A Serhaug, Christoph M Hell, Ruben Bjerge, Emil Frang Christiansen, Kenji Christiansen, Calin D. Mariaora</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Wednesday 1:30 PM Room 200-B</td>
<td><strong>Broadening Application Spectrum of idPC-STEM Imaging from Beam Sensitive Solid Materials to Biological and Cryo Nano-Particles Using Single Particle Analysis</strong>; Ivan Lazic, Maarten Wirix, Daniel Mann, Akiakertini Filopoulou, Max Leo Leidl, Knut Muller-Caspar, Arno Meingast, Anna Carlsson, Felix Carlsson, Carsten Sachse</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Wednesday 1:30 PM Room 200-B</td>
<td><strong>Beyond MicroED: Ab Initio Crystal Structures Using 4D-STEM</strong>; Ambarenil Saha, Alexander Pattison, Matthew Mecklenburg, Aaron Brewster, Peter Ercius, Jose Rodriguez</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Wednesday 1:30 PM Room 200-B</td>
<td><strong>Deciphering the Structure of Amorphous Functional Materials using 4D-STEM</strong>; Gabriel Calderon Ortiz, Soohyun Im, Mehrdad Abbasi Gharacheh, Minhazul Islam, Jinwoo Hwang</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Wednesday 1:30 PM Room 200-B</td>
<td><strong>Imaging Gas Adsorption in MOFs via 4D-STEM</strong>; Sarah (Sally) Karstens, Ryan Murphy, Ever Velasquez, Karen Bustillo, Jeffrey Long, Andrew Minor</td>
</tr>
</tbody>
</table>

#### A05.2 Advanced Measurement Techniques in (S)TEM-EELS

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>Wednesday 1:30 PM Room 200-D</td>
<td><strong>Spatial Resolution in Aloof EELS</strong>; <em>(Invited)</em> Ray Egerton, Yifan Wang, Peter Crozier</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Wednesday 1:30 PM Room 200-D</td>
<td><strong>The Radiation Chemistry of Water inside the Electron Microscope Studied via Electron Energy Loss Spectroscopy</strong>; Patricia Abellan, Eric Gautron, Jay Lamerre</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Wednesday 1:30 PM Room 200-D</td>
<td><strong>Quasi Instantaneous ELNES Mapping of Multi Element Compounds</strong>; Daen Jannis, Nicolas Gauquelin, Maria Meledina, Yucheng Zhao, Yunzhong Chen, Johan Verbeye</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Wednesday 1:30 PM Room 200-D</td>
<td><strong>EELS at Very High Energy Losses - An Opportunity to provide complementary Information to X-ray Absorption Spectroscopy (XAS)</strong>; Sorin Lazar, Maria Meledina, Claudia Schnorr, Thomas Hoeche, Peter Tiemeijer, Paolo Longo, Bert Freitag</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Wednesday 1:30 PM Room 200-D</td>
<td><strong>Continuous Multiple Pass Electron Counted Spectrum Imaging Optimized for In-Situ Analysis</strong>; Liam Spillane, Benjamin Miller, Bernhard Schaffer, Paul Thomas, Ray Tweesten, Shelly Michele Conroy</td>
</tr>
</tbody>
</table>
A13.3  Computational Advances in Electron Microscopy

Wednesday 1:30 PM  Room M-100-B

1:30 PM  632  Data Acquisition and Control of Electron Microscopes; (Invited) Chris Meyer, Niklas Dellby, Tracy Lovejoy, Benedikt Haas, Gwyn Skone, Benjamin Plotkin-Swing, Andreas Mittelberger, Ondrej Krivanek Krivanek

2:00 PM  652  Deep Learning Approach for High-Accuracy Electron Counting of Direct Electron Detectors at Increased Electron Dose; Jingrui Wei, Kalani Moore, Benjamin Bammes, Barnaby Levin

2:15 PM  668  How to Count Electrons with Pixelated Semiconductor Detectors; Björn Eckert, Stefan Aschauer, Martin Huth, Petra Majewski, Heike Soltau, Lothar Strueder

2:30 PM  682  Observation of Simultaneous Successive Twinning Using Atomic Electron Tomography; (Invited) Mary Scott, Philipp Pelz, Kate Groschner, Alexandra Bruefach, Colin Ophus

A14.7  Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

Wednesday 1:30 PM  Room 200-C

1:30 PM  633  Correlative Surface Analysis: Combining XPS, Electron Microscopy, and Other Spectroscopies; (Invited) James Lallo, Tim Nunney, Paul Mack, Robin Simpson, Helen Oppong-Mensah

2:00 PM  653  Wide Field of View versus High Spatial Resolution and High Sensitivity – the Advantage of Correlative Microscopies (APT, SIMS, EBSD, µXRF) for the Analysis of Minerals; (Invited) Robert Ulfig, Steven Reddy, David Saxey, William Rickard, Denis Fougerouse, Mark Pearce, Louise Fisher, Matt Kilburn, David Kilburn, David Larson

2:30 PM  683  Synthesis and Characterization of Porous Graphite Oxide under a Simple Stirring Process; Geraldo Gonzalez-Martínez, Juan Zarate-Medina, Gerardo Rosas Trejo

2:45 PM  698  Interfacial Microstructure and Thermal Property of Diamond/Si and 3C-SiC/Si Film; Chunyan Zhang, Yuying Zhang, Chaoying Ni
### Scientific Program

#### Biological Sciences Symposia – Wednesday Afternoon

**B05.1** Technical Advances in cryoEM  
Wednesday 1:30 PM  
Room M-100-D

1:30 PM  **634** Advances in Microsecond Time-Resolved Cryo-Electron Microscopy; (Invited) Ulrich Lorenz, Gabriele Bongiovanni, Oliver Harder, Sarah Barrass, Marcel Drabbe1s

2:00 PM  **654** Direct Measurement of Mechanical Properties of Vitreous Ice by Cryo-FIB; Heonhwa Choi, Emre Fir1lar, Judit Penzes, Adrian Mann, Jason kaelber

2:15 PM  **669** Mass-per-length Measurements Using STEM in SEM; Daniel Veghte, Christian O'Neil, Sean Smrt, Giovanna Grandinetti, Christopher Jaroniec

2:30 PM  **684** Measuring Electron Dose Efficiency in TEM and STEM; Mathew Peet, Richard Henderson, Christopher Russo

**B07.1** Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants  
Wednesday 1:30 PM  
Room M-100-F

1:30 PM  **635** Large-Scale Electron Microscopy to Find Nanoscale Detail in Cancer; (Invited) Jessica Riesterer, Cecilia Bueno, Erin Stempinski, Steven Adamou, Claudia Lopez, Guillaume Thibault, Lucas Pagano, Joseph Grieco, Samuel Grieco, Archana Machireddy

2:00 PM  **655** Lymphatics and The Intestinal Stem Cell Niche: An Ultrastructural and 3D-Immunofluorescence Study; Hilda Pasolli

2:15 PM  **670** Indirect CLEM identifies Nanoscale Remodeling Associated with Atrial Fibrillation in Diverse Etiologies, Enabling a Unified Therapeutic Approach; Louisa Mezache, Andrew Soltisz, Przemyslaw Radwanski, Gerard Nuovo, Rengasayee Veeraraghavan

2:30 PM  **685** Volume and Large Field of View Electron Microscopy as Tools for Rapid and Detailed Cellular Analysis in Preclinical Therapeutic Testing; (Invited) Grahame Kidd, Emily Benson

**B08.3** Biological Soft X-ray Tomography  
Wednesday 1:30 PM  
Room M-100-E


2:00 PM  **656** Quantitative Structural Mapping of Insulin Maturation in Beta Cells; Kate White

2:15 PM  **671** Strong Intracellular Signal Inactivation Produces Sharper and More Robust Signaling From Cell Membrane to Nucleus; Samuel Isaacson, Jingwei Ma, Myan Do, Mark Le Gros, Charles Peskin, Carolyn Larabell, Yoichiro Mori

2:30 PM  **686** Analysis and Segmentation of cytoplasm with U-Net; Ayse Erozan, Philipp Lösel, Venera Weinhardt, Vincent Heuveline

2:45 PM  **699** The Role of Soft X-Ray Tomography in Generating Whole-Cell Models; Valentina Loconte, Jian-hua Chen, Bieke Vanslembrouck, Axel Ekman, Mark Le Gros, Carolyn Larabell
Scientific Program

Cross-Cut/Interdisciplinary Sciences Symposia – Wednesday Afternoon

C02.3 Extracting Information from Data: Applications of Artificial Intelligence in Microscopy
Application of Artificial Intelligence to Microscopy in the Materials and Biological Sciences

Wednesday 1:30 PM Room M-100-G

1:30 PM 637 EELS Clustering in Strained Nanocrystal using Machine Learning: A Case Study of Core/Shell Nanocrystal with Uniform Grain Boundary Defects; Min Gee Cho, Myoungthwan Oh, Colin Ophus, Mary Scott

1:45 PM 646 Developing Robust Neural Networks for High-Resolution TEM Image Analysis; Katherine Sytwu, Luis Rangel DaCosta, Mary Scott

2:00 PM 657 Physics-Augmented Machine Learning for Automated and Autonomous Experiments in Microscopy; (Invited) Maxim Ziatdinov

2:30 PM 687 Extracting High Spatio-Temporal Information using Machine Learning from Pt Nanoparticles in CO Gas Environment; Piyush Haluai, Adria Morales, Matan Leibovich, Mai Tan, Joshua Vincent, Carlos Fernandez-Granda, Peter Croom

2:45 PM 700 Discovering the Electron Beam Induced Transition Rates for Silicon Dopants in Graphene With Deep Neural Networks in the STEM; Kevin Roccapriore, Max Schwarzer, Joshua Greaves, Jesse Farebrother, Rishabh Agarwal, Maxim Ziatdinov, Ekin Cubuk, Aaron Courville, Marc Courville, Sergei Kalinin

C03.5 Correlative and Multimodal Microscopy and Analysis

Wednesday 1:30 PM Room L-100-J

1:30 PM 638 Multimodal Analysis of InAs/InGaAlAs Quantum Dots Using Transmission Electron Microscopy and Atom Probe Tomography; Yudai Yamaguchi, Yuya Kanitani, Michinori Shiomori, Mikihiro Yokozeki, Jun Uzushashi, Tadakatsu Ohkubo, Kazuhiro Hono, Kouiichi Akahane, Naokatsu Akahane, Shigetaka Tomiya

1:45 PM 647 Automated Workflow Development for 3D Chemical Mapping via TriBeam Tomography; Andrew Polonsky, Paul Kotula, Julia Deitz, Daniel Perry, Damion Cummings, Joe Boro, Dustin Ellis

2:00 PM 658 Effect of Microstructure on Microhardness of Plasma-Sprayed Coating of CaO (5%) Stabilized-Zirconia on Stainless Steels; Mohamed Hafeez, Sameh Akila, Mohamed Khedr, Ali Khalil

2:15 PM 672 Electron Microscopy of 2D/3D ZnAl/ZnSn(OH) Hydrotalcite/Zinc Tin Composite Nanophotocatalyst; Hector Calderon, Guadalupe Romero Ortiz, Enrique Samaniego, Angeles Mantilla, F Tzompantzi, Vicente Garibay Fábregas

2:30 PM 688 Temperature Effect on the Synthesis of Composite Material KNNS-Bi2Te3; Gerardo Resendiz-Hernandez, Jesus Eduardo Leal-Perez, Abel Hurtado-Macias

2:45 PM 701 A High-Speed Rotational Diamond Anvil Cell for In Situ Analysis of Hierarchical Microstructural Evolution of Metallic Alloys during Extreme Shear Deformation; Arun Devaj, Tingkun Liu, Changyong Park, Stas Sinogeikin
Scientific Program

**P01.3** Revealing the Working Morphology of Energy Materials and Its Impact on Performance

**Wednesday 1:30 PM**
1:30 PM  **639** Imaging Dynamically-Evolving Electrodes for Energy Transformation; *(Invited)* William Chueh

2:00 PM  **659** Comparison of Structure and Li intercalation Properties in Natural and Artificial Graphite Materials as the Anodes in Li-ion Batteries; Ioannis Siachos, Zachary Ruff, Clare P. Grey, B. Layla Mehdi

2:15 PM  **673** In Situ Observation of Lithium Stripping and Plating Process in an Open-Cell All-Solid-State Lithium Metal Battery; Zheng Fan, Chaoshan Wu, Lihong Zhao, Qing Ai, Sampresh Risal, Jun Lou, Yan Yao

2:30 PM  **689** Operando Elemental Imaging Using SIMS: Correlative Structural, Chemical, and Electrochemical Analysis of Solid-State Batteries; Luca Cressa, Yanyan Sun, Dustin Andersen, Maryam Nojambee, Mathieu Gerard, Tom Wirtz, Santhana Eswara

**P04.3** Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing

**Wednesday 1:30 PM**
1:30 PM  **640** Slag Formation During Additive Manufacturing of Dispersion-Strengthened Superalloys; *(Invited)* Zachary Cordero, Wenyuan (Roger) Hou, Donovan Leonard

2:00 PM  **660** Study of Phase-Transformation Behavior in Additive Manufacturing of Nitinal Shape Memory Alloys by In Situ TEM Heating; Yi-Chieh Yang, Jia-Ning Zhu, Thor Bjergregård Sneppen, Alice Fanta, Vera Popovich, Joerg Jinschek

2:15 PM  **674** Graphene Reinforced 316L Stainless Steel Prepared via Laser Powder Bed Fusion; Wen Qian, Maxwyl McConnell, Joseph Turner, Xin Chen, Bai Cui

2:30 PM  **690** Characterization of Quasi-continuous Reinforcement Network in the Selective Laser Melted Titanium Matrix Nanocomposite using Correlative FIB-SEM Tomography and STEM; *(Invited)* Yufeng Zheng, Dian Li, Sydney Fields, Xing Zhang, Rongpei Shi, Yiliang Liao

**P05.3** Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

**Wednesday 1:30 PM**
1:30 PM  **641** Ultrahigh Temperature In Situ Transmission Electron Microscopy Characterization of Capillary Response in Model Bicrystals; *(Invited)* Shen Dillon, Ryan Schoell, Khalid Hattar

2:00 PM  **648** In situ Observation of Disconnection-Mediated Nucleation of Annealing Twins at Triple Junctions; Yuan Tian, Yutong Bi, Mingjie Xu, Xiaoguo Gong, Jonathan Zimmerman, Eugen Rabkin, Jian Han, David Srolovitz, Xiaojing Srolovitz

2:15 PM  **675** Thermal Stability of Nanolaminates Containing Thick 3D interfaces: An Ex-situ/In-situ Annealing Study; Justin Cheng, Zezhou Li, Jon Baldwin, Khalid Hattar, Nathan Mara

2:30 PM  **691** Experimental Analysis of Fracture in 6063 Aluminum Alloys Subjected to Accelerated Aging; Israel Flores Baex, Misael Baez, Guillermo Manuel Urriolagootia Calderon, Guillermo Urriolagootia Sosa, Beatriz Romero, Israel Fernando Barajas Ambriz, Daniel Sanchez Huerta

2:45 PM  **702** Investigating a Wide Array of Thermally-Driven Events: From Understanding the Temperature-Induced Structure and Morphology Changes of Metal Chalcogenides to Thermolysis-Based Material Generation; Eric Formo, Casey Rowe, John Allen, Jordan Hachtel, Holli Threlkeld, Yassamin Ghafoori, Matthew Bloodgood, Tina Salguero Salguero

**P08.2** Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena

**Wednesday 1:30 PM**
1:30 PM  **642** Probing Local Symmetry Breaking in a Ferroelectric Superconductor; *(Invited)* Susanne Stemmer, Guomin Zhu, Nicholas Combs, Salva Salmani-Rezaie, Hanbyeo Jeong, Ryan Russel, John Harter

2:00 PM  **661** Role of Substrate Phonon in the Electron-phonon Coupling at FeSe/SrTiO3 Interface; Hongbin Yang, Yinong Zhou, Guangyao Miao, Xiaofeng Xu, Xianhan Xu, Xuetao Zhu, Jiandong Guo, Ruqian Wu, Xiaojing Wu

2:15 PM  **676** Atomic-Scale Investigations of Self-Assembled Superstructures in Ferroic Materials; Shiqing Deng, Chuanrui Huo, Ye Liu, Jing Zhu, He Qi, Yimei Zhu, Jun Chen

2:30 PM  **692** Ultrascale Ferroelectricity by Oxygen Polyhedral Structure; *(Invited)* Si-Young Choi
### Scientific Program

**P09.1 Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials**

**Wednesday 1:30 PM**  
Room 200-J

1:30 PM **643** Atomic Resolution Imaging of Phase Transitions in Strongly Correlated Oxides with Continuously Variable Temperature Cryo-STEM; *(invited)* [Noah Schnitzer](#), Greg Powers, Berit Goodge, Elisabeth Blanco, Ismail El Baggari, Lena Kourkoutis

2:00 PM **662** Metal/Insulator Transitions in V2O3 Systems Investigated at the Nanoscale by Spectromicroscopy Techniques Under Cryo-Conditions; [Odile Stéphan](#), Ibrahim Koita, Luiz Tizei, Jean-Denis Blazit, Xiaoyan Li, Nathalie Brun, Etienne Janod, Laurent Cario, Marcel Cario, Laura Bocher

2:15 PM **677** Phase Modulation of CrCl3 using Atomic-scale Cryogenic STEM; Hsin-Yun Chao, Miaofang Chi

2:30 PM **693** The Structure of Charge Density Waves in TaS2 Across Temperature and Dimensionality; *(invited)* Robert Hovden, Suk Sung

### Technologists’ Forum – Wednesday Afternoon

**X31.1 Technologists’ Forum—New and Developing Technologies in Light Microscopy**

*(Partnering with B06)*

**Wednesday 1:30 PM**  
Room 200-E

1:30 PM **644** Improving Spatial Analysis of Fluorescence Microscopy Images using Point Process Analysis; *(invited)* [Andrew Soltisz](#), Rengasayee Veeraraghavan

2:00 PM **663** Novel Genetically Encoded Peptide Tags for Correlative Imaging: Lessons Learned; *(invited)* [Claudia Lopez](#), Kaylyn Devlin, Erin Stempinski, Kimberly Beatty

2:30 PM **694** Multichannel Live Cell STED – Dye Combinations and Imaging Techniques for Live Cell Super-resolution Imaging; *(invited)* [Christian Wurm](#), Florian Grimm, Mary Grace Velasco, John Waka, Karsten Bahlmann, Jessica Matthias

### Biological Sciences Tutorial

**X42 Biological Sciences Tutorial**

**Wednesday 1:30 PM**  
Room M-100-C

1:30 PM **645** CryoAPEX: Inception, Growth and Evolution of the Method; *(invited)* [Ranjan Sengupta](#), Robert Stahelin, Seema Mattoo
A03.P1  Standards and Reference Materials and their Applications in Quantitative Microanalysis

POSTER # 208

703  Distinguishing Detrital Mineral Phases in Carbonate Source Rocks to Monitor Eustacy During Deposition using Energy Dispersive Spectroscopy and Back Scatter Electron; David Jacobi, John Longo, Jennifer Rodriguez

POSTER # 209

704  Quantification of Si, Al, Ti and O Composition in Si/Al Oxide Based Synaptic Resistor Circuits; Mingjie Xu, Dawei Gao, Jian-Guo Zheng, Yong Chen

POSTER # 210

705  Tephra Community Tools for Archiving Sample Information, Analytical Methods, Samples Geochemistry, and Standards Geochemistry at SESAR and EarthChem; Stephen Kuehn, Marcus Bursik, Andrei Kurbatov, Kerstin Lehnert, Matthew Loewen, Lucia Profeta, Sarah Ramdeen, Kristi Wallace

POSTER # 211

706  The Holy Trinity of Microanalysis: Standards, K-ratios and Physics; John Donovan, Aurélien Moy, William Nachlas, John Fournelle

POSTER # 212

707  Theoretical Calculation and Experimental Determination of X-Ray Production Efficiencies for Copper, Zirconium, and Tungsten; Ralf Terborg, Mathias Procop

POSTER # 213

708  Using Bulk Standards for Quantification of STEM-in-SEM EDX Spectra; Nicholas Ritchie, Andrew Herzing, Vladimir Oleshko

A05.P1  Advanced Measurement Techniques in (S)TEM-EELS

POSTER # 214

709  Capabilities of a New Compact SEM / STEM Electron Detector for Energy Resolved Scanning Imaging, Reflection Electron Energy Loss Spectroscopy (REELS) and Elastic Peak Electron Spectroscopy (EPES); Philippe Staib

POSTER # 215

710  Combine 4D STEM and EELS Using a Fast Pixelated Direct Detector with Center Hole; Martin Huth, Björn Eckert, Stefan Aschauer, Emma Hedley, Peter Nellist, Petra Majewski, Lothar Strueder, Heike Soltau

POSTER # 216

711  Convexity Constraints on Linear Background Models for Electron Energy-Loss Spectra; Wouter Van den Broek, Daen Jannis, Johan Verbeeck

POSTER # 218

713  EELS Spectrum Imaging of Ca Segregation at Grain Boundaries in Magnesium Aluminate Spinel; Alexander Campos Quiros, Animesh Kundu, Masashi Watanabe

POSTER # 219

714  Investigation of Electronic Excitations in Monoclinic HfO2 Studied by Energy-Filtered Transmission Electron Microscopy-Spectrum-Imaging and Momentum-Resolved Electron Energy Loss ω-q Mapping Techniques; Sz-Chian Liou, Vladimir Oleshko, Xun Zhan, GUO-JIAN SHU

POSTER # 220

715  Mapping Nonlinear Optical Effects in an Integrated Photonics Microresorator; Jan-Wilke Henke, Yujiia Yang, F. Jasmin Kappert, Arslan Sayid Raja, Germaine Arend, Guanhao Huang, Armin Feist, Zheru Qiu, Tobias Kippenberg, Claus Ropers

POSTER # 221


POSTER # 222

717  Seeing Cation Dopants in Gd-doped Ceria with STEM-EELS; Mai Tan, Peter Crozier, Shize Yang
<table>
<thead>
<tr>
<th>POSTER #</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>223</td>
<td>Compressed Sensing System For Scanning Probe Microscopy; Edward Principe, Jeffrey Hagen, Brian Kempshall, Kirk scammon</td>
<td></td>
</tr>
<tr>
<td>224</td>
<td>Development of an Automated Reciprocal-Space Navigator in a JEOL FEMTUS Platform; Surui Huang, Brian Chen, Aparna Bharati, Martin Harmer, Masashi WATANABE</td>
<td></td>
</tr>
<tr>
<td>225</td>
<td>Fourier-Ring Correlation Resolution for Time-Resolved Measurement in Charged Particle Microscopy; Oguz Kagan Hitit, Akshay Agarwal, Vivek Goyal</td>
<td></td>
</tr>
<tr>
<td>226</td>
<td>Mapping Atomic Displacements in Perovskite Structures using VecMap; Tao Ma</td>
<td></td>
</tr>
<tr>
<td>227</td>
<td>Measuring Three-Dimensional Strain in Nb3Sn Grains by Combining ZOLZ and HOLZ Diffraction; Zhaslan Baraissov, Zeming Sun, Yu-Tsun Shao, Matthias Liepe, David Muller</td>
<td></td>
</tr>
<tr>
<td>228</td>
<td>New Features in Landyne 5 - a Software Suite for Materials Characterization and Crystallography by Transmission Electron Microscopy; Xing-Zhong Li</td>
<td></td>
</tr>
<tr>
<td>229</td>
<td>Probe Aberration Correction in Scanning Electron Microscopy using Artificial Neural Networks; Surya Kamal, Harshkumar Prajapati, Nathan Cahill, Richard Hailstone</td>
<td></td>
</tr>
<tr>
<td>230</td>
<td>Progress in Secondary Electron Yield Mapping in Charged Particle Microscopy; Akshay Agarwal, Leila Kasaeli, Albert Schultz, Leonard Feldman, Vivek Goyal</td>
<td></td>
</tr>
<tr>
<td>231</td>
<td>Using Realistic Valence Electron Wave functions in 4D-STEM Simulations; Mark Oxley, Wei Luo, Mina Yoon, Miaofang Chi</td>
<td></td>
</tr>
</tbody>
</table>
Biological Sciences Posters – Wednesday

3:00 PM – 5:00 PM  Exhibit Hall

B03.P1  Machine Learning in Biological Imaging – How to Train Your Artificial Neural Network

POSTER # 232
727  An Automated Approach to Synechocystis Cell Analysis in TEM Image Datasets; Rebekah White, Carter Bodinger, Kaitlin Simmons, Latamba Hampton, Qingfang He

POSTER # 233
728  Appraisal of AlphaFold2-Predicted Models in Cryo-EM Map Interpretation; Maytha Alshammari, Jing He, Willy Wriggers

POSTER # 234
729  Automated Segmentation of Mitochondria in Virus-Infected Cells using Deep Learning Models; Matthijs Schrage, Mario-Alin Rus, Marre Niessen, Thomas Burgoyne, Katherine Lau

POSTER # 235
730  Data Driven Approach To Delineate Membrane Structures In Em Images Using Vesselness Filter and Machine Learning Model; Suhail Parvaze Pathan

POSTER # 236

POSTER # 237
732  High-Throughput Low-Dose Biomolecule Imaging in Liquid Phase Electron Microscopy; Nicolette Shaw, Tyler Lott, Ariel Petruk, Natalie Hamada, Carmen Andrei, Yibo Liu, Juwen Liu, Germán Sciani, Kostystyn Pichugin,

POSTER # 238
733  Real-time Image Deblurring to Improve Throughput of Serial-Section Volume Electron Microscopy for Neural Connectomic Studies; Richard Schalek, Nadaan Parikh, Yuelong Wu, Jeff Lichtman, Donglai Wei

POSTER # 239
734  Using X-ray Microscopy and Machine Learning to Boost Image Quality in 3D Histology; Rosy Manser, Kedar Narayan, Rachna Parwani

B05.P1  Technical Advances in cryoEM

POSTER # 240
735  Accounting for the Ewald Spheres in CryoEM Reconstructions and Their Relationship to 3D Fourier Transforms of Focal Series; Bernard Heymann, Alan Merk, Jana Ognjenovic

POSTER # 241
736  Chamelogator: A Software Tool for Chameleon Data Analysis; Ouliana Panova, Ivan Fong, Miriam Weckener, Paul Thaw, Michele C. Darrow

POSTER # 242
737  Comparative Analysis of Cryo-Electron Microscopy and Liquid-Electron Microscopy Image Processing Workflows; G.M. Jonaid

POSTER # 243
738  Cryo-EM Pipeline for Pharmaceutical and Biotechnology Industries; Anil Kumar, Kai Cai, Bryan Sibert, Matthew Larson, Jae Yang, Elizabeth Wright

POSTER # 244
739  CryoFAST™: Automated Cryo-Electron Microscopy Data Acquisition using Machine Learning Methods; Narasimha Kumar, Elliot Gray, Dmitry Lyumkis, Atousa Mehrani

POSTER # 245
740  High-Throughput, High-Resolution Data Collection Workflow For Structure-Based Drug Discovery Using Cryo-Transmission Electron Microscopy; Abhay Kotecha, Adrian Koh, Victoria Cushing, Basil Greber

POSTER # 246
741  Improving Every Image: HexAuFoil™ Ultra-Small Hole Sample Supports for CryoEM Reconstructions; Claire Naylor, Russell S. King

POSTER # 247
742  Maximize Access to Cryo-EM Learning and Research Tools with Web Apps; Wen Jiang, Xiaoji Zhang, Sakshibeedu Bharath, Daoyi Li

POSTER # 248
743  Measuring the Effect of Ice Thickness and Microscope Configuration on Resolution in Single Particle Cryo-EM; Eugene Chua, Kasahun Neselu, Bing Wang, William Rice, Clint Potter, Bridget Carragher

POSTER # 249
744  Microscope Operations at the National Center for CryoEM Access and Training (NCCAT); Aygul Ishemgulova, Jing Wang, Kasahun Neselu, Bing Wang, William Rice, Clint Potter, Bridget Carragher

POSTER # 250
745  The National Center for CryoEM Access and Training - Establishing a Cross-Facility Honored Training Curriculum; Edward Eng, Christina Zimanyi, Mahira Aragon, Elina Kopylov, Joshua Mendez, Charlie Dubbeldam, Edward Eng

POSTER # 251
746  VitroJet: Moving Sample Preparation into the New Era; Maaike Schotman, Rene Henderikx, Bart Beulen, Frank Nijpels
Scientific Program

B08.P1  Biological Soft X-ray Tomography

POSTER # 252
747 A Laboratory-Based Soft X-ray Microscope for 3D Imaging of Whole Cells. Poster: Kenneth Fahy

POSTER # 253
748 Analysis and Segmentation of Cytoplasm with U-Net. Poster: Ayse Erozan

POSTER # 254
749 Charting Cytoskeleton-Organelle Interplay in Living Cells Through High Resolution 3D Correlative Cryo-Imaging. Poster: Ivy Wang

POSTER # 255

POSTER # 256

POSTER # 257
752 Soft X-ray 3D Imaging: A Powerful Tool for Visualizing Virus Infections with Increased Resolution and Field of View. Poster: Jian-hua Chen

POSTER # 258
753 Soft X-ray Tomography for Mapping and Quantifying Intracellular Organelle Interactions. Poster: Valentina Loconte, Jitin Singla, Angdi Li, Jian-hua Chen, Axel Ekman, Gerry McDermott, Andrej Sali, Mark LeGros, Kate White, Carolyn Larabell

POSTER # 259
754 A Comparison of Image Analysis Tools for Segmentation on SEM Micrographs – Zeiss ZEN Intellisys vs. Thermofisher AVIZO. Poster: Patrik Jozefović, Ondřej Ambrož, Jan Čermák, Sarka Mírková, Jiří Man

POSTER # 259.5: Real Time Machine Learning in Operando Microscopy: Challenges and Opportunities. poster: Mitra Taheri

POSTER # 260

POSTER # 261
756 Exploring the Emergence of Complex Grain Boundary Structures via Hybrid Probabilistic Generative Model. Poster: Jiadong Dan, Moaz Waqar, Duane Loh, Stephen Pennycook

POSTER # 262
757 Machine Learning Enhanced Image Segmentation for High-Fidelity STEM Data Analysis. Poster: Xiner (Lucy) Lu, Kai He

POSTER # 263

POSTER # 264
759 Transfer Learning with Domain Adaptation for Palynological Image Segmentation. Poster: Weichang Li, Ali Almadan, Mustafa Al Ibrahim
C03.P1  Correlative and Multimodal Microscopy and Analysis

POSTER # 265
760 Correlative Workflow Utilizing Dual Energy 3D X-ray Tomography and 3D FIB Tomography to Identify the Probability of Detection of Defects in Titanium; Yara Suleiman, Sina Shahbazmohamadi, Christopher pelliccione, Iuliana Cernatescu

POSTER # 266
761 Developing Customizable TEM Membranes for in-situ Experiments of Functional Nanostructures and Thin Films; Marthe Linnerud, Jens Høvik, Ingrid Hallsteinsen, Magnus Nord

POSTER # 267
762 Electron Microscopy Study of (ZnS)10/(Ni1Fe99)90 Nanowires; Wen-An Chiou, Xu-Xiang Cai, Jiancun Rao, Hong-Ming Lin, Yuh-Jing Chiou, Chung-Kwei Lin

POSTER # 268
763 Elemental and Crystallographic Analysis of Trapiche Ruby using Micro X-Ray Fluorescence Spectroscopy, X-ray Pole Figure Map, and Low Vacuum Type Field Emission Scanning Electron Microscopy; Junji Yamanaka, Keisuke Arito, Takuma Ampo, Yasushi Takahashi

POSTER # 269
764 Intelligent Ultrasound Pulsed Laser Machining Using Laser-Induced Breakdown Spectroscopy; Hongbin Choi, Adrian Phoulady, Pouria Hoveida, Nicholas May, Sina Shahbazmohamadi, Pouya Tavousi

POSTER # 270
765 Metalization of DNA Origami Triangles Probed with HAADF-S/TEM, SEM, and AFM: A Correlative Study; Krishna Verma, Tanya Prozorov

POSTER # 271
766 Methodology for Collecting and Aligning Correlative SEM, CLSM and LOM Images of Bulk Material Microstructure to Create a Large Machine Learning Training Dataset; Jan Čermák, Ondřej Ambržov, Martin Zouhar, Patrik Jozefović, Sarka Mímková

POSTER # 272
767 Particle Shape influence in Magnetic Behavior of Pure and 3.0% Mn-doped CuO Nanofibers; M. Piñón-Espitia, Guillermo Herrera-Perez, A. Duarte-Miller, Beatriz López-Walle, M.T. Ochoa-Lara

POSTER # 273
768 Visualizing Nanosecond Transient Electric Fields with Pulsed Electrons; Thomas Gege, Daniel Durham, like Arslan, Haihua Liu, Charudatta Phatak, Supratik Guha

C04.P1  Lens on Diversity in the Microscopy and Microanalysis Community

POSTER # 274
769 Gauging How Widespread Availability of Smart Phone Cameras by Themselves or in Combination with Magnification Devices Can Displace Optical Microscopes in Grade Level Education; Evangeline Formo, Eric Formo

POSTER # 275
770 History and Impact of the Annual Women in Microscopy Breakfast; Lee Pullan, Trisha Rice

POSTER # 276
771 I Feel Seen: Exposing Students to Minority Speakers Fosters Learning and Community Building; Maria Solares, Troy Ott

POSTER # 277
772 Initial Considerations for Accessibility in Microscopy; Allison Boley

POSTER # 278
773 Managing Microscopy Research and Education Resources at a Medium-Sized Institution; James Wachira

POSTER # 279
774 MAS Goldstein Scholarship: Help for Your Degree; Abigail Lindstrom

POSTER # 280
775 Resisting Radiation Through Tardigrade DSUP; Douglas Shattuck, Benjamin Hurley, Julia Gamitto, Saman Abbas, Markus Buehler, Emily Parker, Sophia Salinas, Grace Gunning

POSTER # 281
776 Small Steps to Diversify the Electron Microscopy Community; Rosa Diaz

POSTER # 282
777 The Microscopy Australia Staff Shadowing Scheme: Peer-to-Peer Knowledge Exchange Building a Connected Microscopy Community; Karen Privat, Rhiannon Kuchel, Lisa Yen

POSTER # 283
778 Use of Basalt Fibers on the Moon—An Outreach Collaboration of Middle and High School Researchers with MIT and JEOL USA; Douglas Shattuck, Haley Talbot, Mia Hubbard, Saman Abbas, Vern Robertson, Markus Buehler

POSTER # 284
779 What Does a Microscopist Look Like? An Exploration of Vintage Ads and Brochures in Microscopy and Microanalysis; Anette von der Handt
Scientific Program

**Physical Sciences Posters – Wednesday**

3:00 PM – 5:00 PM  Exhibit Hall

**P01.P1** Revealing the Working Morpohology of Energy Materials and Its Impact on Performance

**POSTER # 285** 780 3D Multi-modal Elemental Characterization of Li-Ion Battery Components using SEM, EDS and ToF SIMS in the FIB-SEM Tomography; Jiří Dluhoš, Tomáš Šamfil, Václav Ondráčka, Martin Sláma, Petr Klimek

**POSTER # 286** 781 Atomic-Scale Understanding of New Phase Transition Pathway and Phase Boundary Structures in Layered Oxide Cathodes for Lithium-Ion Batteries; Chongyang Wang, Rui Zhang, Huolin Xin

**POSTER # 287** 782 Direct Imaging of Lattice Structure and Formation Kinetics of Metal-Organic Layer Composites; Hongguang Wang, Hang Liu, Qian Song, Elias Klemm, Peter A. van Aken

**POSTER # 288** 783 Innovative In-Situ Workflow for Battery Sample Analysis Using Afm-In-Sem; Veronika Hegrova, Radek Dao, Aleksandr Kondrakov, Ute Heinemeyer, Libor Novak, Petr Zakopal, Jan Neuman

**POSTER # 289** 784 In-situ Air-Free 4D-STEM Biasing of Model Lithium-Sulfur Batteries; Hadas Sternlicht, Benjamin Savitzky, Alpesh Shukla, Colin Ophus, Andrew Minor

**POSTER # 290** 785 Investigation into Cathode Precursor Material Choice Influence on the Morphology and Electrochemical Performance; Maksim Sultanov, Jianguo Wen, Yasuo Ito, Arturo Gutierrez, Jason Croy

**POSTER # 291** 786 Microstructural Analysis of Pb2CuF6 as a Cathode Material for All-Solid-State Fluoride-ion Batteries; Hiroshi Nakajima, Takeshi Tojigamori, Hirofumi Tsukasaki, Kousuke Noi, Hidenori Miki, Takeshi Abe, Shigeo Morii

**POSTER # 292** 787 Structural Characteristics and Phase Evolution of Calcium-Reduced (Sm,Zr)Fe,Co,Ti]12 Particles; Chaoya Han, Alexander Gabay, George Hadjipanayis, Chaoying Ni

**POSTER # 293** 788 The Impact of 3D Microscopy Strategies on Computational Analysis for Battery Research; Yulia Trenikhina, Stephen Kelly, Roman Buchheit, Sarah Reeb

**POSTER # 294** 789 Twinning and Crack Detection in a Layered Cathode Battery Material with High Resolution FESEM and Low Voltage STEM; Meysam Naghizadeh, Raynald Gauvin, Nicolas Dumaresq, Lise Guichhaoua, Stéphanie Bessette, Chisu Kim

**POSTER # 295** 790 Understanding the Origin of Lithiophilicity Toward Molten Li-Metal Using In-situ Scanning Electron Microscopy (SEM); Shrin Kaboli, Wen Zhu, Daniel Clement, Martin Dountigny, Frédéric Gendron, Kamyab Amouzegar, Ashok Viji, Abdelfaith Guerfi, Michel Trudeau, Andrea Paolalilla

**POSTER # 296** 791 Unravelling Li Growth Kinetics in Solid Electrolytes due to Charging Effect under Electron Microscopy; Tofunmi Ogunfunmi, Xinxing Peng, Qingsong Tu, Yaqian Zhang, KyuJung Jun, Fengyu Shen, Michael Tucker, Gerbrand Ceder, Mary Scott, Yingzhi Sun

**P04.P1** Correlative Microanalysis of Rapid Solidification Microstructures in Additive Manufacturing

**POSTER # 298** 793 Characterization of Complex Microstructure in the Selective Laser Melted Near-a Ti-6Al-4Sn-2Zr-4Mo-3Ta-1Mo Alloy Using Correlative Scanning Electron Microscopy and Scanning Transmission Electron Microscopy; Deepak Pillai, Ansan Munna, Cameron Tucker, Yiliang Liao, Yufeng Zheng

**POSTER # 299** 794 Characterization of Graphene Coatings on 8620 Alloy Additive Manufactured Steel; Kaleb Hood, Sarah Ahmed, Jun Jiao

**POSTER # 300** 795 Comparison of PLA and ABS Properties with Different Infill Percentages at 40%, 80% and 100%; Gerardo Pérez Mendoza, Humiko Hernández Acosta, Alejandro Miranda Cid, Noemi Corro Valdez, Christopher René Torres San Miguel, Jorge Víctor Cortes Suárez, Noel López Perruquia, Marco Antonio Dorn Ruiz

**POSTER # 301** 796 Dispersion of the CrMnFeCoNi and the CrFeWNbMoTaV High Entropy Alloy Powders into an H13 Tool Steel by Mechanical Alloying; Raul Pérez-Bustamante, J.J. Loredo-Pintor, K.V. Lucio-Collazo, M. Garica-Guerrero, O.E. Pantoya-Avizos, R. de-León-Sánchez, J.E. Gómez-Cerda, F. Pérez-Bustamante, M.O. Ramos-Azeiteira, Marco Antonio Dorn Ruiz

**POSTER # 302** 797 Effect of HIP and Mixture of Rare Earth Elements on the Microstructure and Mechanical Performance of Aged Nanostructured Inconel 718; Hansel Medrano, A. Santos-Beltrán, Verónica Gallegos, mIRIAM Santos-Beltrán, C.G. Garay-Reyes, G. Rodríguez-Cabralies, I. Estrada-Guei, J.S. Castro-Carmona, H. Camacho-Montes, R. Martínez-Sánchez
Scientific Program

POSTER # 303

POSTER # 305
800 Mechanical Properties of PLA with CF Printed at 40%, 80% and 100% Infill Percentages; Gerardo Pérez Mendoza, Humiko Hernández Acosta, Alejandro Miranda Cid, Noemi Corro Valdez, Dulce Viridiana Melo Maximo, Milton Elias Espinosa, Noé López Perrusquia, Marco Antonio Doñu Ruiz

POSTER # 306
801 Microstructural Investigations on Selectively Laser Treated Li6.6La3Zr1.6Ta0.4O12 Solid Electrolyte for Solid-State Batteries; Pinar Kaya, David Kolb, Stefan Kreissl, Elias Reisacher, Simon Ruck, Harald Riegel, Volker Knoblauch

POSTER # 307
802 Microstructure – Mechanical Property Relationship in Pristine and Aged Forsterite as a New Support Material for Solid Oxide Fuel Cells; Pinar Kaya, Volker Knoblauch, Manuel Grudenik, Matthias Meffert, Dagmar Gerthsen, Piero Lupetin, Michael J. Hoffmann

POSTER # 308

POSTER # 309

POSTER # 310
805 The Effect of Space Holder Size on the Mechanical Properties of Porous Titanium; Armando Tejeda-Ochoa, Katia Rivera, José Ernesto Ledezma, José Herrera-Ramírez, C. Carreño-Gallardo

POSTER # 311
806 Hydrogen Induced Transition of Failure Mode in Metallic Twinned Nanowires; Guangming Cheng, Nan Yao, Yong Zhu

POSTER # 312
807 In situ SEM Micromechanical Testing of Engineered Coatings at Elevated Temperatures; Eric Hintsala, Jasmine Johnson, Sanjit Bhowmick, Douglas Stauffer

POSTER # 313
808 In Situ Tensile and Fracture Behavior of Ultra-thin Amorphous Carbon in TEM; Jongchan Yoon, Younggeun Jang, Kangsik Kim, Jaemin Kim, Seungwoo Son, Zonghoon Lee

POSTER # 314
809 In-Situ Tensile and Fracture Behavior of Ultra-thin Amorphous Carbon in TEM; Jongchan Yoon, Younggeun Jang, Kangsik Kim, Jaemin Kim, Seungwoo Son, Zonghoon Lee

POSTER # 315
810 Mapping the Evolution of Point Defects Formed at a Ni/ Cr Bi-metal Interface Under Varied Temperature and Irradiation Using Advanced STEM-based Methods; Dongye Liu, Sean Mills, Andrew M Minor

POSTER # 316
811 Pearlite Size Effects on Ductility at Cryogenic Temperature via In-Situ Cantilever Loading; Jarod Robinson, Eric Hintsala, Douglas Staffer, Sanjit Bhowmick, Eric Homer, Gregory Thompson

POSTER # 317
812 Structural Tolerance of Zirconium Diboride under Electron Irradiation through in-situ Convergent Beam Electron Diffraction and Energy-dispersive X-ray Spectroscopy; Yucheng Lan, Maohong Fan
Scientific Program

**Physical Sciences Posters – Wednesday cont.**

**P10.P3** Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

**P10.P3** Advanced Imaging and Spectroscopy for Sensitive Materials and Interfaces

**POSTER # 318**
813 A Correlated STEM/APT Study of Multidimensional and Interconnected Multi-element Nanostructures Derived from a Complex Concentrated Oxide; Huiming Guo, Christopher Mead, Marquez Balingit, Soham Shah, Xin Wang, Mingjie Xu, Jack Samaniego, Kandis Abdul-Aziz, Lincoln Lauhon, William Bowman

**POSTER # 319**
814 An IR Filter for In-Situ STEM-EDS Heating and Multimodal STEM Experiments in DigitalMicrograph; Anahita Pakzad, Fernando Castro

**POSTER # 320**
815 Assessing Critical Dose for Beam-Sensitive Samples Using Low-Dose Counted In-Situ Video; Benjamin Miller, Mingjie Xu, Cory Czarnik

**POSTER # 321**
816 Broadband Ultrafast Electron Microscopy Using Electrically Driven Pulse Generation; Spencer Reisbick, Myung-Geun Han, Chuhang Liu, Alexandre Pofelski, Eric Montgomery, Chenguang Jing, Yimei Zhu

**POSTER # 322**
817 Development of a Fast Through Focus System Synchronized With Camera Shutter Timing; Yuki Ninota, Bryan Reed, Yu Jimbo, Akihiro Ikeda, Syunsaku Waki, Takumi Nomura, Hiroyuki Tanaka, Hidetaka Sawada

**POSTER # 323**
818 Development of a Stable Ultrafast Photoemission Architecture Using In-Situ Nickel Wehnelt Aperture Surface; Simon Willis, David Flannigan

**POSTER # 324**
819 Dose-Fractionated EELS Through Multipass In-Situ Spectrum Imaging; Andrew Thron, Liam Spillane, Ray Twesten

**POSTER # 325**
820 Electron Ptychography for Investigating Magnetic Textures in Micro- and Nano- Scale Magnets via Lorentz Transmission Electron Microscopy; Kayna Mendoza Trujillo, Yue Li, Raul Divan, Yi Jiang, Arthur McCray, Charudatta Phatak, Amanda Petford Long

**POSTER # 326**
821 Machine Vision Software Enables Normalization of Electron Dose Calibration Between Microscopes and Delivers Accurate Quantifiable Tracking of Electron Dose for In-Situ, Operando, and Dose Sensitive Experiments; Madelin Dukes, Yaofeng Guo, Franklin Walden, Nynke Krans, Kate Marusak, Tim Eldred, John Damiano

**POSTER # 327**
822 Mapping Conductivity in the TEM with SEEVIC; William Hubbard, Ho Leung Chan, B. C. Regan

**POSTER # 328**
823 Persistent Hot Carrier Diffusion in Boron Arsenide Single Crystals Imaged by Ultrafast Electron Microscopy; Usama Choudhry, Fengjiao Pan, Xing He, Basamat Shaheen, Taeyong Kim, Ryan Ghabasik, Alex Ackerman, Ding-Shyue Yang, Zhifeng Ren, Bolin Liao

**POSTER # 329**
824 Rapid-Acquisition FEM – Grappling the Noise; Armin Zjajo, Hongchu Du, Rafal Dunin-Borkowski, Aram Rezikyan, Murray Gibson, Michael Treacy

**POSTER # 330**
825 Statistical Control Over Electron Beams Using Coulomb-Correlated Few-Electron States In A Transmission Electron Microscope; Rudolf Haindl, Armin Feist, Till Domröse, Marcel Moller, Sergey Yalunin, Claus Ropers

**POSTER # 331**

**POSTER # 332**
827 Ultimate Limits of Transmission Electron Microscopy; Christian Dwyer

See the full list of posters and their details on the Microscopy.org website for up-to-date meeting information.
**Scientific Program**

### Analytical/Instrumentation Sciences Symposia – Thursday Morning

#### A05.3 Advanced Measurement Techniques in (S)TEM-EELS

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>829</td>
<td>Measuring Phase and Symmetries in STEM-EELS;</td>
<td>Benjamin McMorrnan, Cameron Johnson, Amy Turner</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>864</td>
<td>4D Energy-Filtered STEM: A New Approach for Mapping Orbital Transitions;</td>
<td>Stefan Löffler; Manuel Ederer</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>878</td>
<td>Coherent Manipulation of Ultrashort Free Electrons Pulses Via Quantized Electron-Photon Interaction Mediated By Transversely- And Longitudinally-Shaped Optical Fields;</td>
<td>Vincenzo Grillo</td>
</tr>
</tbody>
</table>

#### A09.1 Analytical Scanning Probe Microscopy

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>830</td>
<td>High-Fidelity Micro- and Nano-Scale Infrared Spectroscopic Imaging;</td>
<td>Rohit Bhargava, Kevin Yeh, Seth Kenkel</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>849</td>
<td>Multimodal Nano-IR through Peak Force Infrared (PFIR) Microscopy;</td>
<td>Xiaoji Xu</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>879</td>
<td>Correlative Nanoscale Topographical, Mechanical, Electrical and Chemical Property Mapping of Polymers and Complex Materials;</td>
<td>Cassandra Phillips, Chunzeng Li</td>
</tr>
</tbody>
</table>

#### A10.1 The Road to Atomic Scale Tomography

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>844</td>
<td>Introduction to Atomic-Scale Tomography;</td>
<td>Tom Kelly, Brian Gorman, Simon Ringer</td>
</tr>
<tr>
<td>8:45 AM</td>
<td>850</td>
<td>The Need for Atomic-Scale Tomography;</td>
<td>Hamish Fraser, Stoichko Antonov, Tom Kelly, Dierk Raabe</td>
</tr>
<tr>
<td>9:15 AM</td>
<td>880</td>
<td>The TOMO Project – Integrating a Fully Functional Atom Probe in an Aberration-Corrected TEM;</td>
<td>Joachim Mayer, Juri Barthel, Ashok Vayyal, Rafal Dunin-Borkowski, Maarten Bischoff, Hugo van Leeuwen, Stephan Kujawa, Joe Bunton, Dan Bunton, Tom Kelly</td>
</tr>
<tr>
<td>9:45 AM</td>
<td>831</td>
<td>Integrating APT on TEM: Everything You’ve Always Wanted to Know about a Cubic Micron, but were Afraid to Ask;</td>
<td>Hugo van Leeuwen, Stephan Kujawa, Pleun Done, Hans Persoon, Casper Smit, Ron van den Boogaard, Joe Bunton, Dan Lenz, Maurice Lenz, Erik Ruinemans</td>
</tr>
</tbody>
</table>

#### A12.1 New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-Liquid Interfaces

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>832</td>
<td>Investigating and Controlling Material Interfaces using Cryo-FIB/SEM and In-Situ TEM;</td>
<td>John Watt</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>851</td>
<td>A High-Throughput Method for Bulgeless Liquid Cell Imaging in the Transmission Electron Microscope;</td>
<td>Tyler Lott, Ariel Petruk, Nicolette Shaw, Natalie Hamada, Carmen Andrei, Yibo Liu, Juwenn Liu, German Scaini Scaini</td>
</tr>
<tr>
<td>9:15 AM</td>
<td>865</td>
<td>Cryo-Scanning Electron Microscopy Analysis for the Structural Evolution of Cellulose Nanocrystals based Hydrogels;</td>
<td>Jae-Young Cho, Emily Grabovac, Doug Vick, Patrick Price, Darren Makeiff, Marianna Kulka Kulka</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>881</td>
<td>Diving into COVID-19: Visualizing SARS-CoV-2 Patient Proteins using Liquid-Electron Microscopy;</td>
<td>Samantha Berry, Liza DiCecco, Jennifer Gray, Jack Boylan, Maria Solares, Deb Kelly</td>
</tr>
</tbody>
</table>

#### A13.4 Computational Advances in Electron Microscopy

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>833</td>
<td>Semi-Automated Hierarchical Clustering Model for 4D-STEM Datasets;</td>
<td>Chuqiao Shi, Nannan Mao, Yao Yang, Jing Kong, Yimo Han</td>
</tr>
<tr>
<td>9:00 AM</td>
<td>852</td>
<td>High Efficiency Compression Algorithm for Four-Dimensional Scanning Transmission Electron Microscopy;</td>
<td>Hsu-Chih Ni, Renliang Yuan, Jiong Zhang, Jian-Min Zuo</td>
</tr>
<tr>
<td>9:15 AM</td>
<td>866</td>
<td>4D-STEM Diffuse Scattering Characterization for Detection of Short-Range Ordering – A New Procedure for Pattern and Spatial Distribution Visualization;</td>
<td>Po-Cheng Kung, Kajun Yin, Jian-Min Zuo, Jessica Anne Krogstad</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>882</td>
<td>Imaging Structural Phase Transitions with Higher Order Laue Zones Using 4D-STEM;</td>
<td>Magnus Nord, Giulio Guzzinati, Gentian Koster, Nicolas Gauquelin, Johan Verbeeck</td>
</tr>
</tbody>
</table>
Scientific Program

B05.2  Technical Advances in cryoEM

Thursday 8:30 AM  Room M-100-D

8:30 AM  834  Towards Cryogenic Soft Landing of Native Protein Complexes; (invited) Michael Westphall, Austin Salome, Kenneth Lee, Timothy Grant, Joshua Coon

9:00 AM  853  3D Electron Diffraction of Small Molecules on the MerinEM Detector; Adriana Kliszewko, Pedro Nunes, Matus Krajnak, Alistair C. Siebert

9:15 AM  867  In-Line and Off-Axis Electron Holography for the Study of Biological Specimens; Elio Karim, Bumsu Park, Cécile Marcelot, Stéphanie Balor, Sara Bals, Amélie Leforestier, Célia Plisson-Chastang, Christophe Gatel, Pierre-Emmanuel Gatel, Etienne Snoeck


B07.2  Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants

Thursday 8:30 AM  Room M-100-F

8:30 AM  835  Screening Morphological Characteristics of Large Populations of Synaptic Vesicle Clouds and Active Zones from 3D EM Data; (invited) Connon Thomas, Jordan Anderson, McLean Bolton, Naomi Kamasawa

9:00 AM  854  Correlative Cryo-FIB and Cryo-ET of Dendritic Spines and Synaptic Connections; Erik Anderson, Steven Ludtke, Christopher Cronkite, Kimberley Fuchs

9:15 AM  868  Using Cryo-EM to Reconstruct and Inform p53 Clinically-Relevant Mutation Models; Maria Solares, G.M. Jonaid, Deb Kelly


B10.1  Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter

Thursday 8:30 AM  Room M-100-E

8:30 AM  836  Variations of Organic and Inorganic Components across Human Dentin-Enamel Junction Revealed by SEM-EDS; (invited) Rose Wang, Donggao Zhao, Yong Wang

9:00 AM  855  The Characterization of Hydroxyapatite and Octa-Calcium Phosphate with Electron Energy Loss Spectroscopy; Ya-Hsiang Hsu, Asra Hassan, Amanda Trout, John Bartlett, Charles Smith, James Simmer, David McComb

9:15 AM  869  Multi-Modal and Correlative Microscopy Reveals Significant Changes in Composition, Structure and Biomechanical Properties in Dentine and Enamel Exposed to Common Acid Solutions; Louise Hughes, Pedro Machado, Jonathan Moffat, Joshua Lea

9:30 AM  885  Applications of SEM/FIB to Drive Development and Innovation in the Oral Care Industry; (invited) Shiyou Xu
### Scientific Program

#### Cross-Cut/Interdisciplinary Sciences Symposia – Thursday Morning

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01.1</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
<td>Thursday 8:30 AM</td>
<td>Room M-100-G</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8:30 AM</td>
<td>837</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:00 AM</td>
<td>856</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:15 AM</td>
<td>870</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:30 AM</td>
<td>886</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>C03.6</td>
<td>Correlative and Multimodal Microscopy and Analysis</td>
<td>Thursday 8:30 AM</td>
<td>Room L-100-J</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8:30 AM</td>
<td>838</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8:45 AM</td>
<td>845</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:00 AM</td>
<td>857</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:15 AM</td>
<td>871</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:30 AM</td>
<td>887</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9:45 AM</td>
<td>894</td>
</tr>
</tbody>
</table>
Physical Sciences Symposia – Thursday Morning

**P01.4**  Revealing the Working Morphology of Energy Materials and Its Impact on Performance

**Thursday 8:30 AM**  Room 200-I

8:30 AM  **839**  Probing Catalyst Surfaces at the Atomic-Scale; *(Invited)* Stig Helveg, Martin Ek, Lars P. Hansen, Furuong Home, Dirk Van Dyck, Christian Kisielowski, Petra Specht, Christian Damsgaard, Joerg Damsgaard

9:00 AM  **858**  *In situ* Environmental TEM Observation of Cu/Cu2O Interface-Modulated Methanol Reaction Dynamics; Meng Li, Matthew Curnan, Stephen House, Wissam Saidi, Goetz Vesper, Judith Yang

9:15 AM  **872**  *In situ* Study of Surface Oxygen Exchange and Transport on Ceria at Different Temperatures; Mai Tan, Peter Crozier, Matan Leibovich, Carlos Fernandez-Granda

9:30 AM  **888**  *In-situ* ETEM Observation of Competing Mechanisms for Filamentous Carbon Gasification; Mania Nielsen, Seth March, Rajat Sainju, Chunxiang Zhu, Puxian Gao, Steven Subb, Yuanyuan Zhu

9:45 AM  **895**  Linking Atomic and Reactor Scale Plasmon Photocatalysis in Acetylene Hydrogenation with Optically Coupled ETEM; Briley Bourgeois, Claire Carlin, Daniel Angell, Dayne Swearer, Weh-Hui Cheng, Alan Dai, Lin Yuan, Jennifer Dionne Dionne

**P02.1**  Electron Beam Manipulation of Covalently Bound Materials

**Thursday 8:30 AM**  Room 200-F

8:30 AM  **840**  Engineering Qubits in Silicon with Atomic Precision; *(Invited)* Michelle Simmons

9:00 AM  **859**  Probing the Atomic-Scale Internal Phases with the Electron Beam of Multiferroic Domain Walls Formed During Dynamics; Michele Conroy, Eoghan O’Connell, Kalani Moore, Lewys Jones, Quentin Ramasse, Sinead Griffin, Colin Ophus

9:15 AM  **873**  Single Heteroatom Configurations in Graphene and Diamond; Jani Kotakoski, Alberto Trentino, Georg Zagler, Manuel Lingle, Diana Propst, Harriet Ahlgren, Clemens Mangler, Kimmo Mustonen, Toma Mustonen

9:30 AM  **889**  Direct Positioning of Point Defects in 3D Materials Using STEM; *(Invited)* Bethany Hudak, Alexander Markevich, Toma Susi, Andrew Lupini, Rhonda Stroud

**P05.4**  Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

**Thursday 8:30 AM**  Room 200-G

8:30 AM  **841**  The Design of Relativistic Ultrafast Electron Diffraction and Imaging (RUEDI) Facility for Materials in Extremes; Yoshi Murooka, William Bryan, James Clarke, Michael Ellis, Professor Kirkland, Julian McKenzie, B. Layla Mehdi, R. J. Dwayne Mehdi, Timothy Noakes

8:45 AM  **846**  *In-situ* Electrical Discharging Studied within a Transmission Electron Microscope; Ryan Schoell, Matthew Hopkins, Christopher Moore, Khalid Hattar

9:00 AM  **860**  Symbiotic Beams: Using Non-Microscopy Electron Sources to Bring LPTEM’s Puzzles into Better Focus; Wyeth Gibson, Joe Patterson, Justin Mulvey

9:15 AM  **874**  Evaluation of Human-Bias in Labeling of Ambiguous Features in Electron Microscopy Machine Learning Models; Gabriella Bruno, Matthew Lynch, Ryan Jacobs, Dane Morgan, Kevin G. Field

9:30 AM  **890**  Computer-Vision aided *In situ* TEM Studies of Microstructure Evolution under Irradiation; *(Invited)* Wei-Ying Chen, Zhi-Gang Mei, Logan Ward, Brandon Monsen, Vincent Caulian, Jianguo Wen, Nestor zaluzec, Abdellatif Yacout, Meimei Yacout

**P08.3**  Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena

**Thursday 8:30 AM**  Room 200-H

8:30 AM  **842**  Understanding Oxides in Extreme Environments Via Machine Intelligence; *(Invited)* Steven Spurgeon

9:00 AM  **861**  Characterization of Anisotropic Electric Field Effects on Grain Boundary Structures in Oxide Ceramics; William Hahn, Boyi Qu, Daria Eteeneer, Joseph Wood, Klaus van Benthem

9:15 AM  **875**  Strain-Induced Ferromagnetism at LaFeO3/SrTiO3 Interface; Menglin Zhu, Joseph Lanier, Sevim Polat Genlik, Maryam Ghazisaeidi, Fengyuan Yang, Jinwoo Hwang

9:30 AM  **891**  Photoinduced Evolution of Lattice Orthohorombicity and Conceivably Enhanced Ferromagnetism in LaMnO3 Membranes; *(Invited)* Yimei Zhu, Lijun Wu
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>843</td>
<td>Development of a Stable Cryogenic In Situ Biasing System for Atomic Resolution (S)TEM; (Invited) Eva Bladt, Yevheniy Pivak, Hongyu Sun, Tijn van Omme, Hector Hugo Perez Garza, Shelly Michele Conroy, Leopoldo Molina-Luna</td>
<td></td>
</tr>
<tr>
<td>9:00 AM</td>
<td>862</td>
<td>Liquid Helium TEM Sample Holder with High Stability and Long Hold Times; Emily Rennich, Suk Hyun Sung, Nishkarsh Agarwal, Robert Hovden, Ismail El Baggari</td>
<td></td>
</tr>
<tr>
<td>9:15 AM</td>
<td>876</td>
<td>Ultra-High Energy Resolution EELS and 4D STEM at Cryogenic Temperatures; Benjamin Plotkin-Swing, Andreas Mittelberger, Benedikt Haas, Juan Idrobo, Brent Graner, Niklas Dellby, Michael Hotz, Steven Quillin, Ondrej Quillin, Tracy Lovejoy</td>
<td></td>
</tr>
</tbody>
</table>
New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-Liquid Interfaces

Effects of L-arginine and L-aspartic Acid on the Nucleation and Growth Rates of Calcium Oxalate Crystals; LieDing Shiau, YuChao Hsu, LiChun Lin, JiaHao Ye

In Situ Atomic-Scale STEM Imaging of Electron-Beam Induced Dynamics at PbS–Pb Solid–Liquid Nanointerfaces; Shunsuke Yamashita, Yuya Inatomi, Yuta Inaba, Mamoru Tanabe, Toshio Nishi, Yoshihiro Kudo

Study of the Lithiation Dynamics via in situ TEM Experiments and the Phase-Field Model; Ahmed Yousfi, Arnaud Demortière, Guillaume Boussinot

Analytical Scanning Probe Microscopy

AFM Evaluation of Different-Sized Active Materials and Interface of All-Solid-State Lithium-Ion Batteries; Christopher Macey, Eiji Iida, Akinori Kogure, Takeshi Miyamoto, Hideo Nakajima, Hyosuke Mukohara, Naoki Morimoto, Ryoya Yamasaki, Hirotoshi Yamada


Individual Iron and Cobalt Atoms Identification using Atomic Force Microscopy; Dingxin Fan, Pengcheng Chen, James Chelikowsky, Nan Yao

Sterical Structure of Molecules Determined by Scanning Probe Microscopy; Pengcheng Chen, Dingxin Fan, Nan Yao

Time-Domain Noise in “per-Decade Spectra” from AFM Images of Mica; Phil Fraundorf, Ted Davich, Bishal Nepal

The Road to Atomic Scale Tomography

Combining Structure, Chemistry and Properties at the Nanoscale With Correlative Tomography Approaches; François Vurpillot, Williams Lefebvre, Celia Castro

Laser Wavelength Dependence on Perovskite Interface Elemental Diffusion During Atom Probe Experiments; Jonathan Poplawsky, Jith Sarker, Manuel Gutierrez, Yimeng Chen

Nanoscale Distribution of Alloying Elements in Optimized ZIRLO Using the Invizo 6000; Siyu Huang, Levi Tegg, Jiangtao Qu, Limei Yang, Ingrid McCarroll, Patrick Burr, Julie Cairney
**Scientific Program**

**B07.P1**  
**Electron and Light Microscopy**  
Research and Diagnosis of Diseases in Humans, Animals and Plants

**POSTER # 354**  
917 Antioxidant Activity of Aqueous Extracts from Eucommia ulmoides and Cistanche deserticola: an In Vitro Study; **Anastasia Arkhipova**, Huan He, Tolbert Osire, Xinyu Zhang, Qixin Zheng, Alla Ramonova

**POSTER # 355**  
918 Application of Focused Ion Beam and Scanning Electron Microscopy for the Sectioning and Study of Acanthocephalan Hooks; **Solinus Farrer**, Michael Standing, Felipe Rivera, Omar Amin

**POSTER # 356**  
919 Compact GHz Ultrasonic Micro-Imager for Cells and Tissues; **Anuj Baskota**, Justin Kuo, Serhan Ardanuc, Amit Lal

**POSTER # 357**  
920 Comparative Characterisation of the Expression Profile of Cardiac Kv7.1 Channels Containing Two Rare Genetic Variants; **Olga Sokolova**, Alexander Pashkov, Maria Karlova, Anastasia Moisenovich, Denis Abramochkin, Elena Zaklyazminskaya

**POSTER # 358**  
921 Controlling the Biochemistry On-The-Fly and Visualizing Reaction Dynamics during in-situ Liquid Phase TEM: A Strong Tool for Biopharmaceutical Development; **Hector Hugo Perez Garza**, Hans Radhoe, Evgeniya Pechnikova, Vasili Papadimitriou, Alejandro Rozene, Hongyu Sun

**POSTER # 359**  
922 Development of a Cryo-Pre-Embedding Immungold Labeling Protocol for the Ultrastructural Localization of PDL1 in Human Tonsils; **Miriam Baca**, Cecile Chalouni, Hartmut Koeppen, Linda Rangell, Meredith Sagolla, Mike Reichelt

**POSTER # 359**  
923 Effects of Porosity and Stiffness of Fibroin-based Scaffolds on Osteoblast-like Cell Growth; **Anastasia Arkhipova**, Tolbert Osire, Alla Ramonova, Kangcheng Xu, Shirou Fan, Ruyi Liu, Xiaoyue Xiao

**POSTER # 360**  
924 Electron Microscopists going MAD: Overcoming challenges in Mice, Ant, and Drosophila Projects; **Anurag Sharma**, Hilda Pasolli

**POSTER # 361**  
925 Imaging the Cellular Distribution of Amino Acid Derivatives of Tricarbonylrhenium(I) 1, 10-orthophenanthroline Compounds; **Birsen Varisli**, James Wachira, Santosh Mandal

**POSTER # 363**  
926 In vitro Biofilm Formation by Bacillus subtilis and AR9 phage infection: SEM Study; **Olga Sokolova**, Yueqi Wang, Tolbert Osire

---

**B05.P2 Technical Advances in cryoEM**

**POSTER # 346**  

**POSTER # 347**  
910 Automated Continuous Diffraction Tomography with Gatan Direct Detection Electron Counting Cameras: Advantages and Best Practices for Data Acquisition; **Sahil Gulati**, Anahita Pakzad

**POSTER # 348**  
911 Cryo-Tomography of Cryo-EXLO Manipulated Yarrowia Lipolytica Yeast; Ahmed Danwsh, Thomas Dougherty, Brandon Heck, Kyle Beggs, Alain Kassab, Alice Dohnalkova, Lucille Giannuzzi

**POSTER # 349**  
912 Fluorescence-Guided Cryo-Lift-Out Using an Integrated Fluorescence Light Microscope and an Optimized Sample-Needle Attachment Procedure; **Veronika Vrbovská**, Sven Klumpe, Christopher Thompson, Alexander Rigort, John Mitchels, Tilman Franke, Michaela Műllerová, Anna Kasáková, Miloš Hovorka,

**POSTER # 350**  
913 High-resolution structure determination at 100kV enabled by new Falcon-C direct Electron Detector; **Adrian Koh**, Wen Yang, Dimple Karia, Abhay Kotecha, Lingbo Yu

**POSTER # 351**  
914 Improving Cryo-Electron Tomography Data Quality and Throughtput by Streamlining the Workflow; **Mairi Smeets**, Katherine Lau

**POSTER # 352**  
915 Precise 3D Localization by Integrated Fluorescence Microscopy (iFLM) for Cryo-FIB-milling and In-situ Cryo-ET; **Jae Yang**, Veronika Vrbovská; Tilman Franke, Bryan Sibert, Matthew Larson, Tom Coomes, Alexander Rigort, John Mitchels, Elizabeth Wright.

**POSTER # 353**  
916 Tomographic Particle Picking using 2D Single Particle Analysis Tools; **William Rice**, Huilui Kuang, Bing Wang

**POSTER # 353.2**  
916.5 Results from the Quantum C100, a Novel CMOS Detector Optimised for 100 keV Cryo Electron Microscopy; **Adriana Klyszejko**, Deividas Krukauskas, Mohamed El Sharkawy, Ben Marsh, Tobias Starborg, Jonathan Barnard, Matus Krajnak, Roger Goldsborough, Angus Kirkland, Liam O’Ryan
B10.P1  Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter

POSTER # 370

**933**  Biofunctionalized Gold Nanoparticles Obtained from Two Different Plant Extracts and its Chemical and Structural Comparison; Roel González-Montes De Oca, Janny Francisco Cruz-Hernández, Diana Lesem García-Rubio, Maricela Villanueva-Ibáñez, Blanca Estela Jaramillo-Loranca

POSTER # 371

**934**  Determining the Effect in the Adhesion Between Modified PLA Matrix and Natural Fibers Using SEM and Micro-Raman Spectroscopy; Johnathan Vargas, Roya Akrami, Natalia Marin alzate, Sara Michel Mesa, Guillermo Idarraga, Cesar Isaza, Liu Yang, Juan Meza

POSTER # 372

**935**  On the Electron Dose-rate Dependency of Radiation Effects and Total Dose Criteria in ZIF-8 Metal-Organic-Framework (MOF); Pritam Banerjee, Kathrin L. Kollmannsberger, Roland A. Fischer, Joerg Jinschek
### Cross-Cut/Interdisciplinary Sciences Posters – Thursday

**C01.P1**  
**Machine Intelligence in Action:** Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems

**POSTER # 377**  
**940 Autonomous Multimodal Spectrum Imaging for High Throughput Data Acquisition:** Liam Spillane, Bernhard Schaffer, Paul Thomas, Michael Zachman

**POSTER # 378**  
**941 Fast Correction of Astigmatism and Focus in the Scanning Electron Microscope using a GPU-accelerated PC:** David Holburn, Bernie Breton, Tim Rowsell

**POSTER # 379**  
**POSTER # 380**

**POSTER # 381**  
**943 Improving Automated TEM Metrology based on AI Few Shot Learning-DRAM Word Line Patterning Layer and Logic NMOS eSD Seam:** Seungwoo Oh, Sung Jin Lim, Soon-Gun Lee, SeongHoon Jeong, Changseop Song, Chanwoong Kong, Su-Bong Shon, Hansaem Park, SungHo Lee, Hyunsu Choi

**POSTER # 382**  
**944 Machine Learning Enabled Image Classification for Automated Data Acquisition in the Electron Microscope:** Carolin Wahl, Alexandra Day, Vishu Gupta, Roberto dos Reis, Wei-keng Liao, Chad Mirkin, Alok Choudhary, Vinayak Dravid, Ankit Agrawal,

**POSTER # 382.5**

**1093 Automated Crystal System Identification from Four-dimensional Scanning Transmission Electron Microscopy Data Using Brain-Inspired Artificial Intelligence:** Carolin Wahl, Jie Chen, Hengrui Zhang, Wei Liu, Shengtong Zhang, Jiezong Wu, Chad Mirkin, Vinayak Dravid, Daniel Apley, Wei Chen

---

### C03-P2 Correlative and Multimodal Microscopy and Analysis

**POSTER # 383**

**946 Effect of Metallographic Pretreatment of TRIP Steel Specimens on Correlative Imaging and Electron Backscatter Diffraction Analysis:** Ondřej Ambrož, Patrik Jozefović, Jan Čermák, Sarka Mikmekova

**POSTER # 384**


**POSTER # 385**

**948 Electron Microscopy of Volcanic Rocks: from Optical to SEM analysis of Volcanic Rocks and its Mineralogical Constitution:** Hector Calderon, Berenice Castañeda, Hugo Martínez

**POSTER # 386**

**949 High-Frequency Induction Heat Sintering of Al2O3/Al7075 Composites:** Raúl Pérez-Bustamante, Eusebio Cardoso-Lozano, Bertha laura Vargas-Rodriguez, Hugo Arcos-Gutierrez, F. Pérez-Bustamante

**POSTER # 387**

**950 Influence of TiC Content and Milling Time on the Kinetics of Precipitation of TiC/Al7075 Composites:** Raúl Pérez-Bustamante, José Mendoza, D. Lardizabal-Gutiérrez, C.G. Garay-Reyes, I. Estrada-Guel, R. Martínez-Sánchez

**POSTER # 388**

**951 ITO/Au/ZnS Thin Film Array: ZnS by Thermal Evaporation Sphealerite Ore:** Alejandra Perales Escobedo, Hilda Esparza-Ponce, Carla Sánchez González, Juan José López-Rodríguez, Rosa Ruvalcaba Ontiveros

**POSTER # 389**

**952 Plasma Transferred Arc Cladding of an H13 Tool Steel Modified with a CoCrFeMnNi High Entropy Alloy:** Raúl Pérez-Bustamante, Luis-Alberto Cáceres-Díaz, José Antonio Betancourt-Cantera, John Edison-Garcia, M.F. mata-Moreno, F. Pérez-Bustamante, Víctor Hugo Mercado-Lemus, José Mendoza

**POSTER # 390**


**POSTER # 391**

**954 Synthesis of Mesoporous Cerium Oxide Nanoparticles from Pluronic F127 as Template:** Salomón Borjas, José Méndez Montes de Oca, Pablo Martínez Torres, Jesús Vargas Correa, Gerardo Rosas Trejo
Physical Sciences Posters – Thursday

10:00 AM – 12:00 PM  Exhibit Hall


POSTER # 392
955  3D and in situ Imaging of Electrochemical Energy Devices Powered by AI-driven X-ray Microscope Reconstruction Technologies; Stephen Kelly, Yulia Trenikhina, Hrishikesh Bale, Benjamin Tordoff

POSTER # 393
956  Band-bending Analysis of Metal-Oxide-Semiconductor (MOS) Interface by In Situ Biasing Electron Holography; Yuta Fukushima, Daisuke Morii, Yutaka Terao, Kazuo Yamamoto, Aki Takigawa

POSTER # 394
957  Benchmarking of In-Situ Electrochemistry and Heating Liquid-Cell Instrumentation and Its Potential for Battery Research; Yingjie Yang, Robert Klie

POSTER # 395
958  Electron Microscopy of Photocatalyst TiO2/ZnTiO3 with Cu and Co Additions; Hector Calderon, David Ramirez Ortega, Ricardo Gomez, Rodolfo Zanella

POSTER # 396
959  Investigation of Carbon Products Produced by Catalytic Methane and Ethene Pyrolysis; James Poston, Jarrett Riley, Ranjani Siriwardane, Christopher Attah

POSTER # 397
960  L10 Ordering in MnAl and FeNi Influenced by Magnetic Field and Strain; Chaoya Han, Brian Lejeune, Xiaoyu Zhang, Chaoying Ni, Laura Lewis

POSTER # 398
961  Lessons Learned using in-situ TEM liquid corrosion of Al Alloys; Khalid Hattar, Kathryn Small, Laura Merrill, Nancy Missert, Katherine Jungjohann

POSTER # 399
962  Microstructural Characterization of Biogenic ZnO Nanostuctures Synthesized by Two Aqueous Extracts for Energy Production; Roel Gonzalez-Montes De Oca, Victoria Perla Camargo-Perez, Marco Antonio Flores-Gonzalez, Maricela Villanueva-Ibanez

POSTER # 400
963  Microstructure of 2D/2D Nanosheets Interface for Improved ORR Electrochemical Kinetics; Anum Iqbal

POSTER # 401
964  Observation of Deuterated Double-Perovskite Hydroxide CoSn(OH)6 Nanocubes; Zhiping Luo, Menuka Adhikari, Starfari McClain, Rekha George, Sivasankara Rao Ede, Hui Wu, William Ratcliff, Liurukara Sanjeeva, Cheng Li,

Scientific Program

POSTER # 402

POSTER # 403

POSTER # 404
967  W Deposited PdGa Catalyst with Tailored Hydrogen Adsorption and Reduction; Jianjun Rao, Guoweil Li

P02.P1  Electron Beam Manipulation of Covalently Bound Materials

POSTER # 405
968  Angular Momentum Transfer from Swift Electrons to Small Spherical Nanoparticles in the Dipole Approximation; Jorge Briseño-Gómez, Atzin López-Tercero, José Ángel Castellanos-Reyes, Alejandro Reyes-Coronado

POSTER # 406
969  Fabrication of Atomic-scale Defect Structures within 2D Materials through Automated Electron Beam Control; Matthew Boebinger, Kevin Roccapriore, Ayana Ghosh, Kai Xiao, Andrew Lupini, Maxim Zaitadinov, Sergei Kalinin, Raymond Unocic

POSTER # 407

P05.P2  Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

POSTER # 408
971  A Novel Preparation Route for Enhancing Mechanical Properties of High Entropy Alloys; Petr Kratochvil, Filip Prúša, Hana Thúrlóvá

POSTER # 409
972  An investigation of elastic modulus in Zr doped CoCrFeMoNi HEA by three-point bending; Santiago Brito-Garcia, Cristina Jimenez-Marcos, Julia Mirza-Rosca, Ionelia Voiculescu

POSTER # 410
973  Electron Microscopy Characterization of Minerals in the K-No-Al-Si-O System Recovered from High Pressure-Temperature Experiments; Jeffrey Pigott, George Amulele, Tuğçe Uz, Rachel Margulies, James Van Orman, Jennifer Carter
Physical Sciences Posters – Thursday cont.

POSTER # 411

**974** Influence of the Al Content on the Microstructure and Mechanical Properties of (CoCrFeNiMn)100-XAlX (X = 5, 10, 16.6) High-Entropy Alloys Prepared of Mechanical Alloying; Hana Thůrlová, Tomáš Najser, Petr Kratochvíl, Filip Průša

POSTER # 420

**983** Moiré Wavelength and Exciton Engineering through Heterostrain in van der Waals Heterostructures; M. Abir Hossain, Thomas Gage, Jianguo Wen, Priti Kharel, Yue Zhang, Kelly Hwang, Pinshane Huang, Arend van der Zande

POSTER # 412

**975** Mechanically Alloyed High-Entropy Alloys Compacted by Spark Plasma Sintering; Filip Průša, Petr Kratochvíl, Hana Thůrlová, Miroslav Karlík, Jaroslav Čech, Petr Haušild, Marcello Cabibbo

POSTER # 421

**984** Nanoscale and Wafer Scale Study of Epitaxial Ruthenium Films on Amorphous SiO2 Substrate with van der Waals Graphene Buffer Layer; Kim Kisslinger, Lihua Zhang, Zonghuan Lu, Neha Dhuli, Tung-Sheng Kuan, Morris Washington, Toh-Ming Lu, Gwo-Ching Wang

POSTER # 413

**976** What’s the Limit? High Spatial Resolution Analyses of Trace Oxygen in Ta Alloys by EPMA; Joe Boro, Chris Finfrock, Rachel White

POSTER # 422

**985** Nanoscale Electron Energy Loss Spectroscopy (EELS) Study of Phase Transition in Barium Titanate (BaTIO3); Bibash Sapkota, Serdar Ogut, Robert Klie

POSTER # 414

**977** Atomistic mechanism of phase transformations in the Pt-Sn system studied by in-situ TEM; Hwanhui Yun, Delin Zhang, Jian-Ping Wang, Turan Birol, K. Andre Mkhoyan

POSTER # 423

**986** Phase Coexistence in Multiferroic BiFeO3 Nano-Needles Driven by Surface Boundary Conditions; Francisco Guzman, Christopher Addiego, Moaz Waqar, Xiaqing Pan

POSTER # 415

**978** Characterizing TeO2 Formation in CdTe Devices Using Transmission Electron Microscopy; John Farrell, Robert Klie, Manoj Jamarkatte, Ebin Bastola, Michael Heben, Walajabad Sampath

POSTER # 424

**987** Probing local symmetry breaking of EuxSr1-xTiO3 films with HAADF-STEM; Guomin Zhu, Nicholas Combs, Binghao Guo, arda genc, Susanne Stemmer

POSTER # 416

**979** Chemical Characterization for III-V Semiconductor Heterostructures Investigated by Aberration-Corrected STEM; Rosa Diaz, Roy D. Peña, Shuang Liang, Michael J. Manfra

POSTER # 425

**988** Real-space Observation of Polar Nanoregions in a Relaxor Ferroelectric; Hiroshi Nakajima, Satoshi Hiroi, Hirofumi Tsukasaki, Charlotte Cochard, Pierre-Eymeric Janolin, Shigeo Mori

POSTER # 417

**980** Defects in Pyrochlore Dy2Ti2O7 Thin Film; Yan Xin, Chengkun Xing, Haidong Zhou, Jian Liu

POSTER # 426

**989** TEM Study on Epitaxial BiFeO3 Film under Biaxial Tensile Strain: In-Tae Bae, Zachary Lingley, Brendan Foran, Paul Adams, Hanjong Paik

POSTER # 418

**981** Dopant Mapping of Partially Hydrogenated Vanadium Dioxide using the Energy Loss Near Edge Structure Technique; Alexandre Pofelski, Sunbin Deng, Haoming Yu, Michael Taejoon Park, Haif Jia, Sukriti Manna, Maria KY Chan, Sankaranarayanan Subramanian, Shriram Ramanathan, Yimei Zhu

POSTER # 427

**990** Understanding inherent structural defects at topological superconductor interfaces using advanced electron microscopy; Rosa Diaz, Tiantian Wang, Michael J. Manfra, Michael Capano

POSTER # 419

**982** Electron Holography Observation of Magnetic Bubbles and Stripe-Shaped Domains under a Magnetic Field; Ken Harada, Hiroshi Nakajima, Keiko Shimada, Shigeo Mori, Yoshio Takahashi

POSTER # 428

**991** Vanadium dioxide metal insulator transition characterization with in-situ radio frequency excitation using ultrafast transmission electron microscopy; Alexandre Pofelski, Chuhang Liu, Spencer Reisbick, Myung-Geun Han, Yimei Zhu

P08.P1  Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena
Physical Sciences Posters – Thursday cont.

P09.P1 Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials

POSTER # 429
992 Control of Magnetic Skyrmions in an Exchange Biased van der Waals Ferromagnet; Arthur McCray, Dmitry Lebedev, Sevdenur Arpaci, Suzanne Velthuis, Victor Lopez-Dominguez, Pedram Kholili Amiri, Mark Hersam, Amanda Petford Long, Charudatta Phatak,

POSTER # 430
993 Development of a Low-Cost, Modular Cryo-Transfer Station for the Side-Entry Transmission Electron Microscope; Alexander Reifsnyder, Andrew Lupini, Jordan Hachtel, David McComb

POSTER # 431
994 Imaging Modulated Structure in EuAl₄ using Cryogenic 4D-STEM; Haoyang Ni, Miaofang Chi, Jian-Min Zuo

POSTER # 433
996 Spatially Resolved Moiré Excitons Fine Structure Using Cryogenic Low-Loss EELS; Sriram Sankar, Sandhya Susarla, Patrick Hays
Scientific Program

A05.4 Advanced Measurement Techniques in (S)TEM-EELS

Thursday 1:30 PM  Room 200-D

1:30 PM  997 Nanosecond Temporal Correlations Between Electron Spectroscopies to Explore Excitation Dynamics in Nanomaterials; (Invited) Luiz Tizei

2:00 PM  1018 Electron-Photon Pairs Enable Contrast Enhanced Cavity Mode Imaging; F. Jasmin Kappert, Armin Feist, Guanhao Huang, Germaine Arend, Yujia Yang, Jan-Wilke Henke, Arslan Sajid Raja, Hugo Lourenco-Martins, Tobias Lourenco-Martins, Claus Ropers

2:15 PM  1031 Optical Excitations in an Integrated Photonics Microresonator: Jan-Wilke Henke, Arslan Sajid Raja, Armin Feist, Yujia Yang, Germaine Arend, Guanhao Huang, F. Jasmin Kappert, Rui Ning Wang, Tobias Wang, Claus Ropers

2:30 PM  1042 Structural and Temperature Dependence of Emergent Electronic States in PbSe Quantum Dot Superlattices; Eric Hoglund, Geemin Kim, Mahmut Kavrik, Matt Law, Jordan Hachtel

2:45 PM  1056 Aluminum Nanoplasmonics Integrated onto Suspended Monolayer Graphene; Kenan Elibol, Peter A. van Aken

A09.2 Analytical Scanning Probe Microscopy

Thursday 1:30 PM  Room M-100-H

1:30 PM  998 Photothermal AFM-IR interrogation of Polymeric Materials; Greg Haugstad


2:30 PM  1043 AFM Probe and Optical Based Photothermal Infrared Spectroscopy and Imaging; (Invited) Curtis Marcott

A10.2 The Road to Atomic Scale Tomography

Thursday 1:30 PM  Room 200-A

1:30 PM  999 Nanomaterial Transformations Captured by Atomic Resolution 3D Electron Microscopy; (Invited) Sara Bals, Wiebke Albrecht, Ece Arslan Irmak, Kellie Jenkinson, Mikhail Mychinko, Daniel Arenas Esteban, Thomas Altantzis, Sandra Van Aert Van Aert

2:00 PM  1019 Comparing Methodologies for Achieving Atomic-Scale Tomography; Brian Gorman, Tom Kelly

2:15 PM  1033 Information-Theory Based Symmetry Classifications of Sets of S/TEM Zone-Axis Images in Support of Nanocrystallography and Discrete Electron Tomography; Peter Mocek

2:30 PM  1044 Scanning Nanobeam Electron Diffraction for Atomic Scale Tomography; (Invited) Megan Holtz, Andrew Herzing, Brian Gorman

A12.2 New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-Liquid Interfaces

Thursday 1:30 PM  Room 200-C

1:30 PM  1000 Radiation Chemical Effects at Interfaces; (Invited) Jay LaVerne, Patricia Abellan

2:00 PM  1020 Towards Unveiling the Mystery of Electron-Liquid Interaction in Liquid-Phase TEM: Implications for Practical Application; (Invited) Andreas Hutzler, Birg Fritsch, Andreas Körner, Thais Cousin, Roberts Blukis, Liane Benning, Michael P.M. Jank, Erdmann Spiecker Spiecker

2:30 PM  1045 Live-Imaging and Quantification of Complex Nanostructure Hydrodynamic Motion in 3D using Liquid Phase Transmission Electron Microscopy; Murat Yesibolati, Agnese Callegari, Jesus Pineda, Maciej Lisicki, giovanni Volpe, Kristian Speranza Malove

A13.5 Computational Advances in Electron Microscopy

Thursday 1:30 PM  Room M-100-B

1:30 PM  1002 From Data to Discovery: Maximizing the Value of Experiments with Machine Learning Software; (Invited) Maxim Ziatdinov

2:00 PM  1004 EMD 1.0 and `emfile`: an HDF5 / Python interface; Benjamin Savitzky, Steven Zeltmann, Alexandra Bruefach, Alexander M Rakowski, Mary Scott, Matthew L Henderson, Colin Ophus


2:30 PM  1003 Foundry-ML: a Platform for FAIR Machine Learning in Materials Science; Paul Voyles, Jingrui Wei

2:45 PM  1005 TomoFlows: Pre-Processing Workflows For Cryo-Electron Tomography; Matthew Larson, Yan Zhuang, Djay Pallavur Naduvakkat, Jae Yang, Bryan Sibert, Elizabeth Wright
### B05.3 Technical Advances in cryoEM

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>1006</td>
<td>Better, faster, cheaper, smarter: advancing cryo-EM; (Invited) Bridget Carragher, Clinton Potter</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>1021</td>
<td>Expanding the reach of cryo-EM through open design robotics and remote screening; Mario Borgnia, Steven Zhang, Wyatt Peele, Jonathan Bouvette, Qinwen Huang, Alberto Bartesaghi, Venkata Dandey</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td>1034</td>
<td>TOMOMAN: Streamlining Cryo-electron tomography and subtomogram averaging workflows using TOMOgram MANager; Sagar Khavnekar, Philipp Erdmann, William Wan</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>1046</td>
<td>Anisotropy in CryoEM Resolution is Dominated by Preferred Orientations, but not Structure Factors: A Study Using a Highly Symmetric Structure; Philip Baldwin, Srijam Aiyer, Timothy Strutzenberg, Dmitry Lyumkis</td>
<td></td>
</tr>
<tr>
<td>2:45 PM</td>
<td>1057</td>
<td>3D Flexible Refinement: Determining Structure and Motion of Flexible Proteins from Cryo-EM; Ali Punjani, David Fleet</td>
<td></td>
</tr>
</tbody>
</table>

### B07.3 Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>1007</td>
<td>Optical and Scanning Electron Microscopy are essential approaches to studying trichome development; (Invited) Eloisa Vendemioti, Vagner Beneditto</td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>1022</td>
<td>Ultrastructural Studies of Osm and Neural Senescence in Fish; Subrata De, Swaraj Sarkar, Swasti Barman, Gour Mafy, SK Samim Hossin</td>
<td></td>
</tr>
<tr>
<td>2:30 PM</td>
<td>1047</td>
<td>In Vitro Reconstitution in Xenopus laevis Egg Extracts Reveals Molecular Mechanisms That Control B-Type Lamin Assembly; (Invited) Ross Pedersen, Ru-Ching Hsia, Yixian Zheng</td>
<td></td>
</tr>
</tbody>
</table>
### Scientific Program

#### Cross-Cut/Interdisciplinary Sciences Symposia – Thursday Afternoon

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Code</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 PM</td>
<td>C01.2</td>
<td>Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems</td>
<td><strong>1009</strong> Approach to Ecosystems of Analytical Equipment Based on Integrated Analytical Platform in Transmission Electron Microscope; <strong>(Invited)</strong> Eiji Okunishi, Masashi Nishikawa, Osamu Hirahara</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>C01.2</td>
<td></td>
<td><strong>1024</strong> Automated Oblique Tilt Series in STEM; <strong>Matthew Olszta</strong>, Steven Spurgeon, Kevin Fiedler, Derek Hopkins, Kayla Yano, Christina Doty, Sarah Akers, Nikhil Deshmuk Deshmuk</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>C01.2</td>
<td></td>
<td><strong>1037</strong> Physics-informed Bayesian Optimization of an Electron Microscope; <strong>Desheng Ma</strong>, Chenyu Zhang, Yu-Tsun Shao, Zhaslan Baraissov, Cameron Duncan, Adi Hanuka, Auralee Edelen, Jared Maxson, David Maxson</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>C01.2</td>
<td></td>
<td><strong>1049</strong> Retrofitting and Reconfiguring Existing Microscopes for Digital DPC: An Accessible Approach to Low-Dose Phase Mapping; <strong>(Invited)</strong> Julie Marie Bekkevold, Jonathan Peters, Tiarnan Mullarkey, Lewys Jones</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>C03.7</td>
<td>Correlative and Multimodal Microscopy and Analysis</td>
<td><strong>1010</strong> Correlative Microscopy Applied to Battery Research; <strong>Ute Schmidt</strong>, Niklas Biere, Florian Johann, Joshua Lea, Stefan Kreissel, Dominik Zimmer</td>
</tr>
<tr>
<td>1:45 PM</td>
<td>C03.7</td>
<td></td>
<td><strong>1017</strong> Correlative Nanoscopy and Spectroscopy at Nanoscale; <strong>Artem Danilov</strong>, Tobias Gokus, Paul Suman, Adrian Cernescu, Andreas Huber</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>C03.7</td>
<td></td>
<td><strong>1025</strong> Probing Dielectric Breakdown in Single Crystal Hexagonal Boron Nitride; <strong>Alok Ranjan</strong>, Andrew Yankovich, Kenji Watanabe, Takashi Taniguchi, Eva Olsson</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>C03.7</td>
<td></td>
<td><strong>1038</strong> Exploring the Dynamics of Grain Growth in Thin Specimens using Laboratory Diffraction Contrast Tomography; <strong>Varun Venkatesh</strong>, Marcel Chlupsa, Hrishikesh Bale, Jette Oddershede, Ashwin Shahani</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>C03.7</td>
<td></td>
<td><strong>1050</strong> Spectral CT in the World of Electronics: Moving Toward Failure Free Devices; <strong>Jan Dewanckele</strong>, Marijn Boone, Denis Van Loo, Wesley De Boever</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>C03.7</td>
<td></td>
<td><strong>1058</strong> Multimodal Analysis of Concrete and Cementitious Materials; <strong>Joshua Lea</strong>, Daniel Haspel, Ana Blanco-Alvarez, John Kolawole, Liam Whyte, Matt Hiscock</td>
</tr>
</tbody>
</table>
### Scientific Program

#### P01.5 Revealing the Working Morphology of Energy Materials and Its Impact on Performance

**Thursday 1:30 PM  |  Room 200-I**

1:30 PM  **1011** Operando Electrochemical Liquid-Cell 4D-STEM Studies of Dynamic Evolution of Cu Nanocatalysts for CO2 Reduction; *(Invited)* **Yao Yang**, Yu-Tsun Shao, Héctor Abrúñeh, David Muller, Peidong Yang

2:00 PM  **1026** Tracking the Incorporation of Fe into NiO Electroocatalysts during Reaction with Liquid Phase Electron Microscopy and Time-Resolved Elemental Mapping; *(Invited)* **Fengli Yang**, Mauricio Lopez Luna, Felix Haase, Daniel Escalera López, Aram Yoon, Ali Kosari, Mauro Porcu, Arno Bergmann, Beatriz Bergmann, See Wee Chee

2:30 PM  **1051** Metal electropolating/Stripping and 4D Stem Analysis Revealed by Liquid Phase Transmission Electron Microscopy; **Hector Hugo Perez Garza**, Eva Bladt, Yevheniy Pivak, Junbeom Park, Dieter Weber, Janghyun Jo, Hongyu Sun, Shibabrata Basak, Rudiger-Á. Basak

2:45 PM  **1059** Spatially Resolved Structural Order in Low-Temperature Liquid Electrolyte; **Yujun Xie**, Colin Ophus, Peter Ercius, Haiimei Zheng

#### P02.2 Electron Beam Manipulation of Covalently Bound Materials

**Thursday 1:30 PM  |  Room 200-F**

1:30 PM  **1012** AI-Enabled Automation of Atomic Manipulation and Characterization in the STEM; *(Invited)* **Kevin Roccapriore**, Matthew Boebinger, Julian Klein, Mads Weile, Frances Ross, Maxim Zlatdinov, Raymond Unocic, Sergei Kalinin Kalinin

2:00 PM  **1027** E-beam Patterning of Atoms in Graphene; **Stephen Jesse**, Ondrej Dyck, Andrew Lupini, Miha Yoon

2:15 PM  **1039** Challenges for Scaling Up Electron-Beam Manipulation of Lattice Impurities; **Toma Susi**

2:30 PM  **1052** Real-time Tracking of Atomic Dynamics; *(Invited)* **Ryo Ishikawa**, Yu Jimbo, Naoya Shibata, Yuichi Ikuhara

#### P08.4 Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena

**Thursday 1:30 PM  |  Room 200-H**

1:30 PM  **1014** Interferometric Imaging of Twisted Trilayer Graphene Moiré Superlattices; *(Invited)* **D. Kwabena Bediako**, Isaac Craig, Madeline Van Winkle, Catherine Groschner, Kaidi Zhang, Nikita Dowlatabadi, Takashi Taniguchi, Kenji Watanabe, Sinead Watanabe

2:00 PM  **1029** Direct Observation of Cation Diffusion Driven Surface Reconstruction at Van Der Waals Gaps; **Kevin Cui**, Weixiao Lin, Weichao Lu, Chengshan Liu, Zhixiao Gao, Hao Ma, Wen Zhao, Gustaaf Van Tendeloo, Xihan Van Tendeloo

2:15 PM  **1041** Imaging Charged Domain Walls in van der Waals Ferroelectric a-In2Se3 via 4D-STEM; **Gillian Nolan**, Edmund Han, Shahriar nahi, Arend van der Zande, Pinshane Huang, André Schießle

2:30 PM  **1054** Endotaxial Polypeptide Engineering: Enhancement of Incommensurate Charge Density Waves in TaS2; **Suk Hyun Sung**, Pat Kezer, Nishkarsh Agarwal, Yin Min Goh, Noah Schnitzer, Ismail El Baggari, Kai Sun, Lena Kourkoutis, John Kourkoutis, Robert Hovden

2:45 PM  **1060** Characterizing Magnetic Skyrmion Ordering and Dis-Ordering in the Presence of Crystalline Dislocations using Lorentz Transmission Electron Microscopy; **Reed Yalisove**, Peter Meisheimer, Hongrui Zhang, Rui Chen, Xiang Chen, Robert Birgeneau, Jie Yao, Ramamoorthy Ramesh, Mary Ramesh

#### P05.5 Microscopy and Microanalysis of Materials under Multiple Environmental Extremes

**Thursday 1:30 PM  |  Room 200-G**

1:30 PM  **1013** Atom Probe Tomography Measurement of Radiation Enhanced Diffusion; *(Invited)* **Kayla Yano**, Aaron Kohnert, Tiffany Kaspar, Hyosim Kim, Sandra Taylor, Yongqiang Wang, Blas Uberuaga, Daniel Schreiber Schreiber

2:00 PM  **1028** Atom-Probe Tomography Studies of Oxidation in NbTiZr Refractory High-Entropy Alloys; **Keith Knipling**, Patrick Callahan, David Beaudry, Mitra Taheri

2:15 PM  **1040** Stability of Nanotwins under in-situ Cryogenic Micro-Pillar Compression; **Jarod Robinson**, Eric Hintzala, Eric Homer, Gregory Thompson

2:30 PM  **1053** Popocatepetl Ash Infiltration in Lanthanum-Gadolinium Zincate Ceramics; **Ivan Bedoya Trujillo**, Marco Rivera-Gil, Cynthia Gujiosa-Garcia, Ravisankar Naraparaju, John Perez-Bedoya, Juan Muñoz Saldaña, Juan zarate-Medina

#### P09.3 Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials

**Thursday 1:30 PM  |  Room 200-J**

1:30 PM  **1015** Analytical Characterization of Functional Materials using Cryo-FIB/SEM and aberration-corrected cryo-STEM; *(Invited)* **Robert Klie**

2:00 PM  **1030** Cryogenic 4D-STEM of Semicrystalline Polymers for Energy Applications; *(Invited)* **Andrew Minor**

2:30 PM  **1055** Cryogenic FIB and (S)TEM for Energy Storage and Conversion Materials Research; *(Invited)* **Michael Zachman**, Alexis Williams, Lena Kourkoutis, David Cullen
## Scientific Program

### A

#### Analytical/Instrumentation Sciences Symposia – Thursday Late Afternoon

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
</table>
| 3:30 PM | A05.5 | Advanced Measurement Techniques in (S)TEM-EELS | Thursday 3:30 PM  Room 200-D  
4:00 PM 1075 Measuring Single Atomic Defects in 2D Materials With Off-Axis EELS using Real-Time AI-driven Detection;  Kevin Roccapriore, Maxim Ziatdinov, Riccardo Torsi, Joshua Robinson, Sergei Kalinin  
4:15 PM 1088 Imaging of Chemical Structure from low-signal-to-noise EELS Enabled by Diffusion Mapping;  Michael Colletta, Ray Chang, Ismail El Baggari, Lena Kourkouts  
4:30 PM 1098 Advancing EELS into an Unsupervised Quantification Method;  (Invited) Johan Verbeeck, Daen Jannis, Wouter Van den Broek, Arno Annys, Zezhong Zhang, Sandra Van Aert |

#### Analytical Scanning Probe Microscopy

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
</table>
| 3:30 PM | A09.3 | Analytical Scanning Probe Microscopy | Thursday 3:30 PM  Room M-100-H  
3:30 PM 1062 Nanoscale Mechanical Properties of Polymer Composites and their impact on Bulk Material Performance;  (Invited) Bede Pittenger, Sergey Osechinskiy, Dalia Yabolon, John Thornton, Thomas Mueller  
4:00 PM 1076 Quantifying Electromechanics in Emerging Functional Materials: Electrostatics, Blind Spots and Precision;  (Invited) Roger Proksch,  Joel Lefever, Ryan Wagner  
4:30 PM 1032 Nanoscale Analytics with AFM Probe-Assisted Techniques;  Artem Danilov, Tobias Gokus, Paul Sumari, Andreas Huber, Stefan Mastel |

#### The Road to Atomic Scale Tomography

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
</table>
| 3:30 PM | A10.3 | The Road to Atomic Scale Tomography | Thursday 3:30 PM  Room 200-A  
3:30 PM 1063 Role of Simulations and Experiments in Analytical Field Ion Microscopy;  (Invited) Shyam Katnagallu, Felipe F Morgado, Shalini Bhatt, Leigh Stephenson, Isabelle Mouton, Jörg Neugebauer, Dierk Raabe, Christoph Freysoldt, Baptiste Freysoldt  
4:00 PM 1077 Towards Atomic Scale Tomography Using Correlative Crystallography, Strain Mapping, and Atom Probe Tomography;  Edwin Supple, Brian Garman, Christopher J. K. Richardson, Chomani Gaspe |

### Thursday, July 25

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:15 PM</td>
<td>1089</td>
<td>Beyond Atom Mapping in Atom Probe Tomography Using Field Evaporation Energy Loss Spectroscopy;  François Vurpillot, Loic Rousseau, Alfred Cerezo, Constantin Hatzoglou, Baptiste Gault</td>
<td></td>
</tr>
<tr>
<td>4:30 PM</td>
<td>1099</td>
<td>Ab-Initio Simulation of Field Evaporation in Atom Probe Tomography;  Enhanced Zone Lines and Mixed-Layer Reconstructed Structures;  Jiayuwen Qi, Christian Oberdorfer, Emmanuelle Marquis, Wolfgang Windi</td>
<td></td>
</tr>
<tr>
<td>4:45 PM</td>
<td>1108</td>
<td>Improving Analytical Capability via Simultaneous Voltage and Laser Pulsing in Atom Probe Tomography;  Ty Prosa, David Larson, Yimeng Chen, David Reinhard, Isabelle Martin, Robert Ullig, Michael holman, Jesse Robinson, Dan Robinson</td>
<td></td>
</tr>
</tbody>
</table>

### Thursday, July 27

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
</table>
| 3:30 PM | A12.3 | New Methods for Accessing the Structure, Chemistry and Effect on Dynamic Processes of Solid-Liquid Interfaces | Thursday 3:30 PM  Room 200-C  
3:30 PM 1064 What Can Cryo-EM Teach us about Batteries?;  (Invited) Yuzhang Li  
4:00 PM 1078 Understanding Interfacial Electrochemical Reactions through in situ ec-STEM and IL-Cryo-STEM;  (Invited) Raymond Unocic, John Wang, Wan-Yu Tsai, Yury Gogotsi, Matthew Boebinger, Haoran Yu, David Cullen, Gabriel Veith, Alexis Veith, Michael Zachman  
4:30 PM 1100 Spectrum Imaging of a Lithium Ion Battery Anode Using Thin Fluid Cells;  Matthew Mecklenburg, Jared Lodico, Ho Leung Chan, Yueyun Chen, Xin Yi Ling, B. C. Regan |
B05.4  Technical Advances in cryoEM

Thursday 3:30 PM  Room M-100-D

3:30 PM  **1065** Developing Technologies for Correlative Cryo-Imaging Pipelines; *(Invited)* Elizabeth Wright, Jae Yang, Bryan Silbert, Matthew Larson, Joseph Kim, Daniel Parrell, Juan Sanchez, Anil Kumar, Kai Kumar

4:00 PM  **1079** National Center for In-situ Tomographic Ultramicroscopy and the Waffle Method: New and Improved; Dailja Bobe, Misha Kopylov

4:15 PM  **1090** High-Throughput Correlative Light and Cryo-Electron Microscopy Pipeline using PRIMO Micropatterning, CERES Ice Shield and the METEOR In-Chamber Fluorescence Light Microscope; Marit Smeets, Sabrina Bergkamp, Alexane Caignd, Riddhi Jani, Deniz Daviran, Carsten Sachse

4:30 PM  **1101** Getting the Most out of your Sample from SEM to TEM; *(Invited)* James Naismith

B07.4  Electron and Light Microscopy Research and Diagnosis of Diseases in Humans, Animals and Plants

Thursday 3:30 PM  Room M-100-F

3:30 PM  **1066** Low-Cost, In Vivo Optical Microscopy Methods for Examining Cellular Details at the Point of Care; *(Invited)* Dongkyun Kang

4:00 PM  **1080** MINFLUX Nanoscopy Reveals Ultra-Structural Details of the Synaptonemal Complex; Kingsley Boateng, Reza Rajabi-Toustani, Sasha Kakkassery, Huanyu Qiao

4:15 PM  **1091** Fluorescence In Resin Morphology (FIRM) Imaging Provides Histologic Context for Correlated Immunofluorescence and Electron Microscopy of Tissue Sections; Mike Reichelt, Cecile Chalouni, Miriam Baca, Joshua Webster, Meredith Sagolla

4:30 PM  **1102** Unsupervised Deep Learning Image Segmentation for DNA Double Strand Breaks and Nuclei in Fluorescence Microscopy Images; Xiaow Wang, Paul Inman, Amber Bible, Greeshma Agasthya, Sandra Davern

4:45 PM  **1109** Robotic Optimization of Specimen Preparation Protocol for Astrocytes Seeded on Coverslips for Imaging by Transmission Electron Microscopy (TEM); Thomas Strader, Benjamin August, Randall Massey, Linghai Kong, Su-Chun Zhang

B10.3  Microscopy and Microanalysis of Interfaces and/or Interactions Among Organic and Inorganic Matter

Thursday 3:30 PM  Room M-100-E

3:30 PM  **1067** From Micro-plastic to Mano-plastic in Wastewater: A Study of Their Potentials to Impact Biogeochemical Processes Using Electron Microscope; *(Invited)* Linduo Zhao

4:00 PM  **1081** Blood Clots in Dinosaur Bones: Seemingly Permanent Organic/Mineral Interfaces in Once-Living Structures; Mark Armitage

4:15 PM  **1092** Hierarchically Assembled Bowtie Shaped Hybrid Metamaterials with a Chirality Continuum; Prashant Kumar, Wenvian Xu, Jonathan Schwartz, Robert Hovden, Nicholas Kotov

4:30 PM  **1103** Synthesis of Gold Nanoparticles using Satureja Macrostema Extract and Their Evaluation in MCF-7 Cells; Minerva Frutis Murillo, Joel Edmundo Lopez Meza, Rodrigo Esparza Muñoz, Nicolás Cayetano castro, Gerardo Rosas Trejo
Cross-Cut/Interdisciplinary Sciences Symposia – Thursday Late Afternoon

C01.3 Machine Intelligence in Action: Delivering Resilient, Sustainable, and Reconfigurable Microscope Ecosystems

Thursday 3:30 PM  Room M-100-G

3:30 PM 1068 A Facility View – Maximising Biological Discovery In Microscopy; (Invited) Rebecca Thompson

4:00 PM 1082 Automating STEM Aberration Correction via Bayesian Optimization; Alexander Pattison, Marcus Noack, Peter Ercius

4:15 PM 945.5 Towards Autonomous Electron Microscopy for High-throughput Materials Discovery; Carolin Wahl, Chad Mirkin, Vinayak Dravid

4:30 PM 1104 Progress Update on the Development of a User Adjustable Pole-piece; Patrick McBean, Germano Motta Alves, Fletcher Thompson, Ryusuke Sagawa, Lewys Jones

4:45 PM 1110 N-Dimensional Dictionary Learning for Hyperspectral Scanning (Transmission) Electron Microscopy; Jack Wells, Daniel Nichols, Alex Robinson, Amirafshar Moshtaghpour, Yalin Zheng, Jony Castegna, Nigel Browning
Environmental Extremes

Covalently Bound Materials on Performance of Energy Materials and Its Impact

Tuesday, July 25
Scientific Program

04:15 PM 4:00 PM 3:30 PM Thursday 3:30 PM Room 200-I

P01.6 Revealing the Working Morphology of Energy Materials and Its Impact on Performance
Thursday 3:30 PM Room 200-I

3:30 PM 1069 Nanoscale Investigation of Energy Storage Systems By In Situ TEM; (Invited) Jungwon Park

4:00 PM 1083 Studying Charge Redistribution in Photocatalytic Nanoparticles using In Situ Light Illumination Coupled with Electron Holography; Piyush Halauai, Martha McCartney, Peter Crozier

4:15 PM 1094 Operando STEM and EELS Study of Oxide Memristor Devices; Di Zhang, Rohan Dhall, Chengyu Song, Jim Ciston, Matthew Schneider, Sundar Kunwar, Michael Pettes, Rodney McCabe, Aiping McCabe

4:30 PM 1105 Magnetic Crasstie Formation Driven by In-Situ Radio Frequency Excitation; Chuhang Liu, Spencer Reisbick, Myung-Geun Han, Alexandre Pofelski, Yimei Zhu

P02.3 Electron Beam Manipulation of Covalently Bound Materials
Thursday 1:30 PM Room 200-F

3:30 PM 1070 Sculpting 2D Materials: From Atom Vacancies and Pores to Nanoporous Membranes; (Invited) Marjia Drndic, Rachael Keneipp, Pia Bhatia, Parisa yasini

4:00 PM 1084 Fabrication of Atomically Precise Nanopores in 2D Hexagonal Boron Nitride Using Electron and Ion Beam Microscopes; Dana Byrne, Anchana Raja, Aleksandr Noy, Jim Ciston, Alex Smolyanitsky, Frances Allen

4:15 PM 1095 Electron Probe Interactions in Single Species Terminated MXenes; (Invited) Francisco Lagunas Vargas, Robert Klie

P05.6 Microscopy and Microanalysis of Materials under Multiple Environmental Extremes
Thursday 3:30 PM Room 200-G

3:30 PM 1071 Synchrotron X-ray Nano-tomography and Multimodal Analysis on Metal - Molten Salt Interactions; (Invited) Yuchen Karen Chen-Wiegart

4:00 PM 1085 Elucidating the Role of Cr Migration in Ni-Cr Exposed to Molten FLiNaK via STEM-Based Methods; Sean Mills, Ryan Hayes, Nathan Bieberdorf, Steven Zeilmann, Alexandra Kennedy, Mark Asta, Raluca Scarlat, Andrew M Minor

4:15 PM 1096 Effect of Al2O3 Nanoparticles in the Antiwear Properties of a Base Vegetal Lubricant; M. Moreno-Rios, N. A. Sanchez-Calva, A. I. Martinez-Pérez

P08.5 Atomic Scale Microscopy of Interfaces and Heterostructures with Correlated Phenomena
Thursday 3:30 PM Room 200-H

3:30 PM 1072 Visualizing Polar Distortions and Interface Effects with Multislice Ptychography; (Invited) Harikrishnan K. P., Yin Li, Kevin Crust, Aarushi Khandelwal, Yu-Tsun Shao, Zhen Chen, Rujuan Xu, Harold Hwang, Darrell Hwang, David Muller

4:00 PM 1086 Observation of Polarization Enhancement at BiFeO3/ La0.7Sr0.3MnO3 Interface; Chaojie Du, Francisco Guzman, Hongbin Yang, Moaz Waqar, Xiaojing Pan

4:15 PM 1097 Atomic-Scale Observations of Artificially Engineered Atomic Structure in Vertically Aligned Nanocomposite Films with Emergent Multiferroicity; Hongguang Wang, Run Zhao, Chao Yang, Jawang Hong, Weiwei Li, Peter A. van Aken

4:30 PM 1017 Monolayer-Interface-Driven Strain-Free Heteroepitaxy for Single-Crystal Ag Thin Films; Seon Je Kim, Su Jae Kim, Young-Hoon Kim, Min-Hyoung Jung, Hu Young Jeong, Se-Young Jeong, Young-Min Kim

4:45 PM 1112 Twisted Epitaxial Growth of Gold Nanodiscs Confined in Twisted Bilayer Molybdenum Disulfide; Yi Cui, Robert Sinclair, Yi Cui

P09.4 Advances in Cryogenic Transmission Electron Microscopy and Spectroscopy for Quantum and Energy Materials
Thursday 3:30 PM Room 200-J

3:30 PM 1073 Determining Cryogenic Temperatures in Specimens by Using EELS; Aishah Kumar, Kartik Venkatraman, Jordan Hachtel, Miaoang Chi

3:45 PM 1074 Revealing Atomic Structure, Strain and Moiré-Exciton Coupling of hBN/WSe2/ WS2 Superlattice at LN2 Temperature by Monochromated EELS and ADF-STEM Imaging; Elizaveta Tiukalova, Yuzhou Zhao, Jihui Yang, Xiaodong Xu, Andrew Lupini, Juan Idrobo

4:00 PM 1087 Cryogenic Electron Microscopy Challenges to Image the Nanoscale Exciton Density of States; (Invited) Sandhya Susarla
CryoGenium, Plunging robot for EM grid vitrification with real-time optical process control

Cryo-EM, cryo-tomography, Single Particle Tomography (SPT) and cryo-CLEM (Correlative Light and Electron Microscopy) have become standard tools for the investigation of protein 3D structures, cellular structures and more in the last decade. Despite progress, the conventional blotting approach to fluid thickness adjustment as well as manual steps requiring user training results in highly variable results. Linkam have developed the automated CryoGenium robot to address this problem using a patented suction method with optical monitoring to adjust the sample thickness in a controllable manner!

**Applications:**
- Protein Suspensions
- Cells
- Bacteria
- Lipid Vesicles

**CryoGenium Exhibitor Tutorials:**
Date: Monday, Tuesday and Wednesday at 17:45
Location: Linkam Booth #1420
Register your interest now!

Linkam develops and manufactures a broad range of high precision temperature and environmental control stages for both OEMs and end users. From high to cryo temperatures as well as humidity, electrical connections, gas purging, vacuum and pressure, add enhanced sample analysis to microscopy, spectroscopy and many other techniques.
3D-Micromac AG
BOOTH 1212
Technologie-Campus 8
Chemnitz Saxony 09126
Germany
Phone: 0049 371 40043 222
Fax: 0049 371 40043 40
Email: gebhardt@3d-micromac.com
www.3d-micromac.com

3D-Micromac's microPREP™ PRO facilitates laser-based sample preparation within minutes. It enables high-volume sample preparation of metals, semiconductors, ceramics, and compound materials. microPREP™ PRO can be used for a variety of semiconductor sample preparation applications, including in-plane geometries and bulk samples.

Abberior Instruments America
BOOTH 538
4350 East-West Highway, Suite 410
Bethesda MD 20814
Phone: 301-661-0078
Email: s.burton@abberior-ia.com
www.abberior.com

Abberior Instruments America represents a number of leading manufacturers supporting materials imaging and analysis. These include Hitachi Tabletop SEMs, Imina Nanoprobing systems, Point EBIC/EBAC, Leica Sample Prep tools, Deben Stages and Accessories, NenoVision In-Situ AFM, Alemnis In-Situ Nano-Indenters, EMSIS TEM Cameras, and Attolight Quantitative CL systems.

Advanced Microscopy Techniques Corp.
BOOTH 920
242 W Cummings Park
Woburn MA 01801
Phone: 978-774-5550
Fax: 978-739-4313
Email: adam@amtimaging.com
www.amtimaging.com

Advanced Microscopy Techniques (AMT) has devoted its design and manufacturing efforts toward the goal of providing excellence in digital camera imaging systems for the TEM. With an installed base of over 2,000 camera systems, AMT has developed a substantial local and international infrastructure in optics, electronics, software, sales, and support.

Advanced Research Corporation
BOOTH 1337
4459 White Bear Parkway
White Bear Lake, MN 55110
Phone: 651-789-9000
Email: sales@arcnano.com
www.arcnano.com

Advanced Research Corporation is the leader in the development & manufacturing of cutting-edge solutions for nanoscale applications. Its business sector ‘Nanoscale Analytics’, widely known for the “neaspec” product line, provides systems for nanoscale optical surface analysis. ‘Motion & Sensing’ offers high-precision positioning & measuring devices for ambient & vacuum conditions.

Angstrom Scientific Inc
BOOTH 632
120 N Central - Ste 3
Ramsey NJ 07446
Phone: 201-962-7222
Fax: 201-962-8290
Email: rms@angstrom.us
www.angstrom.us

Angstrom Scientific Inc. represents a number of leading manufacturers supporting materials imaging and analysis. These include Hitachi Tabletop SEMs, Imina Nanoprobing systems, Point EBIC/EBAC, Leica Sample Prep tools, Deben Stages and Accessories, NenoVision In-Situ AFM, Alemnis In-Situ Nano-Indenters, EMSIS TEM Cameras, and Attolight Quantitative CL systems.

Applied Physics Technologies
BOOTH 1214
1600 NE Miller St
McMinnville OR 97128
Phone: 503-434-5550
Email: kgullo@a-p-tech.com
www.a-p-tech.com

APTech specializes in thermionic and field emission cathodes, including CeB6 (cerium hexaboride), LaB6 (lanthanum hexaboride), HfC (hafnium carbide), CFE and ESE sources. Our cathodes have many applications, including X-ray, microscopy, microanalysis, additive manufacturing, and other industries that rely on effective electron sources. APTech is a valuable partner in many projects involving custom thermal emission, CFEs, and refractory metals.

Attocube Systems Inc.
BOOTH 1137
2115 Fourth St Suite B
Berkeley CA 94710
Phone: 510-649-9245
Email: infoUSA@attocube.com
www.attocube.com

Attocube is the leader in the development & manufacturing of cutting-edge solutions for nanoscale applications. Its business sector ‘Nanoscale Analytics’, widely known for the “neaspec” product line, provides systems for nanoscale optical surface analysis. ‘Motion & Sensing’ offers high-precision positioning & measuring devices for ambient & vacuum conditions.
Barnett Technical Services

BOOTH 1038
5050 Laguna Blvd - Ste 112-620
Elk Grove CA 95758
Phone: 916-897-2441
Fax: 773-965-7074
Email: steve.barnett@barnett-technical.com
www.barnett-technical.com

Barnett Technical Services is the Distributor for advanced microscopy systems for a wide range of industries, including Micro Support benchtop micromanipulators, Lasertec Confocal Laser Scanning Microscopes, and Nanoro Super-Resolution microscopes.

BlueQuartz Software, LLC

BOOTH 433
400 S Pioneer Blvd.
Springboro, OH 45066
Phone: 937-790-1600
Email: mike.jackson@bluequartz.net
www.bluequartz.net

BlueQuartz Software, LLC offers CrystalSight software that provides a single system solution to the challenges of high-resolution visualization and analysis of large, complex structures and images generated by various microscopy systems:

Carl Zeiss Microscopy, LLC

BOOTH 519
1 N. Broadway
White Plains NY 10594
Phone: 914-681-7627
Email: karin.salerno@zeiss.com
www.zeiss.com/microscopy

ZEISS Research Microscopy Solutions is the world’s only one-stop manufacturer of light, electron, X-ray and ion microscope systems and offers solutions for correlative microscopy. The portfolio comprises of products and services for life sciences, materials and industrial research, as well as education and clinical practice.

Bruker Corporation

BOOTH 832
5465 E Cheryl Pkwy
Madison WI 53711
Phone: 608-276-3000
Fax: 608-276-3006
Email: Michelle.anderson@bruker.com
www.bruker.com

Bruker offers a broad range of systems for enhanced analytical electron microscopy: EDS and WDS X-ray spectrometry, EBSD, micro-XRF, micro CT, and in-situ nanomechanical characterization. We also offer AFM platforms for a broad range of surface characterization and metrology capabilities, including nanoscale IR spectroscopy.

CAMECA

BOOTH 404
5470 Nobel Drive
Madison WI 53711
Phone: 608-274-6880
Fax: 608-442-0622
Email: cameca.us-sales@ametek.com
www.atomprobe.com

From its inception in 1929, CAMECA has been renowned for its precision mechanics, optics, and electronics. CAMECA is the world leader in Secondary Ion Mass Spectrometry (SIMS) and Atom Probe Tomography (APT) instrumentation.

Clark-MXR Inc

BOOTH 1009
7300 West Huron River Drive
Dexter MI 48130
Phone: 407-960-8055
Fax: 734-426-6288
Email: jkennedy@cmxr.com

Clark-MXR, Inc. manufactures femtosecond fiber lasers which integrate into Microscopy instrumentation and customized micromachined components. Customer’s concept to market requirements are met via contract production services and turnkey custom Micromachining systems. Please attend our tutorial session on Multiple Substrate Micromachining Monday, July 25 at our Booth.

ConnectomX Ltd

BOOTH 1239
Sweemans Cottage Yarnells Hill
Oxford OXON OX2 9BG
United Kingdom
Phone: 07787449022
Email: cheng@connectomx.com
connectomx.com

ConnectomX designs and manufacture the product 'katana microtome' which is an in-chamber microtome device that can transform any SEM to a volume SEM using the Serial Block-face Imaging technique.
**COXEM**

**BOOTH 409**

No. 2208, Techno 2-Ro, Yuseong-Gu, Deajeon, Korea (34025)

Deajeon Yuseong-Gu 34025

Korea (South)

Phone: 070-4754-6457

Email: ryan@coxem.com

www.coxem.com

COXEM has been providing table-top and compact SEM’s since 2007. With over 2000 systems installed world-wide COXEM is considered one of the world leaders in SEM technology and equipment. Support materials, manufacturing, research, and education applications. Join us and our North American partner JH Technologies, and see our newest EM40K Table-top SEM.

**DECTRIS Ltd**

**BOOTH 1012**

Taefernweg 1

Baden-Daettwil  5405

Switzerland

Phone: 041565002100

Email: darya.bachevskaya@dectris.com

www.dectris.com

At DECTRIS, we develop and manufacture X-ray and electron detectors that help scientists all over the world to realize the most challenging experiments. Over a decade of continuous improvements of our hybrid-pixel detection technology have materialized in our portfolio of fast and reliable TEM/STEM direct detectors for Materials Science and Life Science. Let’s #makEMcount!

**Delmic B.V.**

**BOOTH 1110**

Kanaalweg 4

Delft  2628 EB

Netherlands

Phone: +31(0)157440158

Email: info@delmic.com

delmic.com

Delmic is a passionate high-tech company based in Delft, Netherlands that develops powerful and user-friendly solutions for electron microscopy, bringing researchers and organizations closer to research insights across diverse application fields.

**DENSSolutions**

**BOOTH 1231**

Informaticalaan 12

Delft  2628 ZD

Netherlands

Phone: +31 (0) 153 030 214

Email: info@denssolutions.com

www.denssolutions.com

DENSSolutions is your dedicated partner for in situ electron microscopy research. We develop and deliver state-of-the-art in situ solutions for heating, biasing, gas and liquid, allowing you to perform meaningful research at the nanoscale with a tremendous impact on a global scale.

**DigiM Solution LLC**

**BOOTH 734**

67 S Bedford St - Ste 400 W

Burlington MA 01803

Phone: 781-369-5602

Fax: 781-957-1266

Email: shawn.zhang@digimsolution.com

www.digimsolution.com

DigiM helps clients to solve challenges in microstructure characterization, design, quantification and optimization. Via innovative artificial intelligence-based image analytics and image-based computational physics simulation, DigiM provides imaging consultancy and image processing cloud software solutions in the most customer-friendly and cost-effective manner, and leads micro-structure applications in pharma, O&G and material industries.

**Digital Surf**

**BOOTH 1032**

16 rue Lavoisier

Besancon  25000

France

Phone: 0033371504800

Email: contact@digitalsurf.com

www.digitalsurf.com

Digital Surf provides software solutions for analyzing data from a wide range of instruments including SEM, AFM and other SPM, 3D confocal and interferometric microscopes/profilers and spectrometers. Mountains® software is offered by the majority of microscope and profilometer manufacturers worldwide, embedded in their equipment or available as an option.
Direct Electron, LP
BOOTH 1312
13240 Evening Creek Dr S - Ste 311
San Diego CA 92128
Phone: 858-384-0291
Email: bmonteverde@directelectron.com
www.directelectron.com

Direct Electron designs, manufactures, and delivers next-generation direct detection cameras for electron microscopy. Our pioneering and award-winning Direct Detection Device (DDD®) sensor technology delivers lower noise, better sensitivity, higher speed, and expanded versatility. Our cameras also deliver full-speed movies to users to enable motion correction, dose filtering, in situ imaging, 4D-STEM data collection and more.

Duniway Stockroom Corp.
BOOTH 1027
48501 Milmont Dr
Fremont CA 94538
Phone: 650-969-8811
Fax: 650-965-0764
Email: info@duniway.com
www.duniway.com

For 47 years, Duniway Stockroom has supplied new and used vacuum equipment to Universities, government laboratories, OEM’s, Fortune 500 corporations and smaller end-users around the world. We manufacture new ion pumps and controllers (Terranova®) as well as new vacuum gauge controllers (Terranova®). Also, hardware, supplies, valves, and rebuilt pumps/pump repairs.

E. Fjeld Co, Inc.
BOOTH 1237
152 Rangeway Rd
N Billerica MA 01862
Phone: 978-667-1416
Fax: 978-667-9059
Email: bfjeld@efjeld.com
www.efjeld.com

SEM image analysis software
Trusted by the manufacturers
Colorization | 3D topography reconstruction | FIB-SEM tomography | Particle analysis | 3D EDS maps

Get your 30-day Free Trial today www.digitalsurf.com
Electron Microscopy Sciences / Quorum Technology / Diatome US

BOOTH 1004
1560 Industry Rd
Hatfield PA 19440
Phone: 215-412-8400
Fax: 215-412-8450
Email: sgkck@aol.com
www.emsdiasum.com

Quorum Technologies/Electron Microscopy Sciences will have on display their complete line of Sputter Coaters and SEM/TEM Carbon Coaters, bench top vacuum evaporators, Cryo-SEM Preparation Systems, Freeze Driers, Glow Discharge Systems and much more. As well as our comprehensive line of supplies for microscopy. Diatome will be exhibiting their Diatome Knives.

EmCrafts Co., Ltd

BOOTH 534
#602, Misadonginexus bldg., 30, Misagangbyeonjungang-ro 3lbeon-gil Hanam-si Gyeonggi-do 12939
Korea (South)
Phone: +82 31 8027 2754
Fax: +82 31 763 4467
Email: sjpark@emcrafts.com
www.emcrafts.com

Since 2010, Emcrafts has designed and manufactured affordable and high performance SEM with source technology. “From Source Technology to Application S/W, All done by our ability” With built up source technology, we developed product line up to offer flexible solutions for a wide range of problems and applications with compactness, friendly interface and high performance.

Euclid TechLabs, LLC

BOOTH 1140
10000 Virginia Manor Rd Ste 330
Beltsville MD 20705
Phone: 301-637-0684
Email: d.leonhardt@euclidtechlabs.com
www.euclidtechlabs.com

Euclid Techlabs is an R&D-to-manufacturing company that supports the EM community with customized sample holders for high frequency applications, laser-free UEM pulsers, and MeV sources for electron microscopes/accelerators. Our retrofittable UltraFast Pulser provides repetition rates up to 10 GHz with adjustable pulse widths for rapid stroboscopic/low-dose imaging.

EXpressLO LLC

BOOTH 839
5483 Lee St. Unit 12
Lehigh Acres FL 33971
Phone: 321-663-3806
Fax: 321-413-0251
Email: info@EXpressLO.com
www.EXpressLO.com

EXpressLO LLC is an expert provider of ex situ lift out and micromanipulation solutions. Check out our patented EXpressLO™ grids, methods and award winning EXpressLO-Z™ grids. Use our Pick&Place™ methods for fibers, particles, CNTs, thin films and more. Prepare x-sections or plan views. Use our patented Praxis™ training samples. Come hear about our cryo-EXLO instrumentation.

Ferrovac

BOOTH 1238
Thurgauerstrasse 72
Zurich 8050
Switzerland
Phone: +41 44 273 16 38
Email: sales@ferrovac.com
www.ferrovac.com

Ferrovac push the boundaries of controlled environment sample transfer. We provide true UHV and cryo transfer solutions, from your glovebox, to your FIB, and onwards to your analysis instrument. Come and see our UHV cryo transfer suitcase at the booth, and speak to us about your sample transfer needs.

Fischione Instruments

BOOTH 1311
9003 Corporate Circle
Export PA 15632
Phone: 724-325-5444
Fax: 724-325-5443
Email: ml_ray@fischione.com
www.fischione.com

For more than 50 years, Fischione Instruments has developed advanced microscopy and nanotechnology devices for the global scientific community. We invite you to stop by our booth to learn about our sample preparation products, which include SEM and TEM ion milling solutions, plasma cleaners, and TEM tomography holders.
Gatan

BOOTH 504
5794 W Las Positas Blvd
Pleasanton CA 94588
Phone: 925-463-0200
Fax: 925-463-0204
Email: jonathan.mcmenamin@ametek.com
www.gatan.com/mm2023

Gatan is the world’s leading manufacturer of instrumentation and software used to enhance and extend electron microscopes—from specimen prep and manipulation to imaging and analysis. EDAX is a leading provider of EDS, WDS, and EBSD systems. EDAX and Gatan are now combined to develop new approaches that uncover insights and explore the boundaries of TEM and SEM research.

Helix Biostructures

BOOTH 1232
1210 Waterway Blvd.
Indianapolis IN 46202
Phone: 317-759-9266
Email: erobinson@helixbiostructures.com
helixbiostructures.com

Helix Biostructures is a structural biology CRO providing structure-based drug design services to pharmaceutical companies. Helix provides gene-to-structure services ranging from expression and purification of structural biology grade protein to X-ray Crystallography (Crystallization & X-ray Data Collection), Bio-SAXS, Cryo-EM, and Micro-ED.

Herzan LLC

BOOTH 924
23042 Alcalde Dr - Ste D
Laguna Hills CA 92653
Phone: 949-363-2905
Fax: 949-340-9751
Email: reid@herzan.com
www.herzan.com

Herzan’s mission is to help researchers maximize the data quality of their instrumentation by removing disruptive environmental noise. To achieve this goal, Herzan designs research-grade acoustic enclosures, active vibration isolation platforms, and magnetic field cancellation systems for any precision instrument sensitive to environmental noise.

Hirox-USA, Inc.

BOOTH 738
100 Commerce Way
Hackensack NJ 07601
Phone: 201-342-2600
Email: info@hirox-usa.com
www.hirox-usa.com

Hirox is the pioneer of 3D Digital Microscope System. Our digital microscope system is a versatile tool for measurement, recording, and see things “as they truly are”. Hirox’s high-quality optical and lighting designs allow a magnification range of 0x-10,000x, live focus, and real-time 2D/3D tiling with an automated XY stage.

Hitachi High-Tech America, Inc.

BOOTH 1204
22610 Gateway Center Dr - Ste 100
Clarksburg MD 20871
Phone: 800-253-3053
Fax: 301-990-0472
Email: elyn.seaman@hitachi-hightech.com
www.hitachi-hightech.com/us

Hitachi provides technologically advanced imaging solutions to meet the needs of Academia and Industry alike. Our innovative and reliability-proven instrumentation includes SEM, TEM, dedicated STEM, FIB, Ion Milling instrumentation, Atomic Force microscopes, tabletop microscopes, Image analysis and reconstruction, correlative microscopy, and sample prep systems.

HORIBA Scientific

BOOTH 631
20 Knightsbridge Road
Piscataway NJ 08854
Phone: 732-494-8660
Fax: 732-549-5125
Email: diane.surine@horiba.com
www.horiba.com/scientific

SMS systems offer turnkey additions of various spectrosopies to most standard microscopes. With its flexibility and modularity, SMS systems enable multimodal performance of spectrosopies such as Raman, PL and Lifetimes on one platform. Extend SMS capabilities with navYX™ package to seamlessly perform correlative measurements such as CL – Raman across different platforms.
Hummingbird Scientific
BOOTH 932
2610 Willamette Dr
Lacey WA 98516
Phone: 360-252-2737
Fax: 360-252-6474
Email: daan_alsem@hummingbirdscientific.com
www.hummingbirdscientific.com

Hummingbird Scientific builds products for electron, X-ray and ion microscopy with an emphasis on transmission electron microscopes (TEM). In close collaboration with our customers, we design and manufacture all aspects of these complex systems, from mechanical, electrical, and software design to fabrication and assembly. We provide pioneering solutions for applications in nanotechnology, materials science, and biology.

ibidi USA, Inc.
BOOTH 633
2935 S. Fish Hatchery Road, Suite 3, #128
Fitchburg WI 53711
Phone: 844-276-6363
Email: ibidiusa@ibidi.com
ibidi.com

ibidi is a leading supplier of functional cell-based assays and advanced products for cellular microscopy. It is our mission to develop, produce, and deliver innovative technologies that enable scientists to tackle the underlying mechanisms of major illnesses such as cancer, cardiovascular conditions, and autoimmune diseases.

ibss Group, Inc.
BOOTH 419
111 Anza Blvd Suite 110
Burlingame CA 94010
Phone: 650-513-1488
Fax: 650-513-1884
Email: admin@ibssgroup.com
www.ibssgroup.com

ibss develops and produces products used successfully in EM and Synchrotron labs around the world. The GV10x Downstream Asher reduces carbon and hydrocarbon contamination 10 to 20x more effectively than traditional methods at vacuum pressure safe for TMP operation. The Mobile Cubic Asher and Chiaro for specimen & in-situ EM cleaning, employ ibss signature GV10x Qwk-Switch source operated via touchscreen panel, fitted into one convenient enclosure.

Instec Inc.
BOOTH T-1508
5485 Conestoga Ct Unit 240
Boulder CO 80301
Phone: 303-444-4608
Email: sales@instec.com
www.instec.com

Instec manufactures precision temperature-controlled scientific instruments for optical measurements. Applications include material science, biology, pharmaceuticals, food science, and more. Instec offers standard models for use with any manufacturer or homebuilt optical system and offers customization to meet any specification.

Integrated Dynamics Engineering
BOOTH 1331
68 Mazzeo Rd
Randolph MA 02368
Phone: 781-326-5700
Fax: 781-326-3004
Email: peter.wilson@idewold.com
www.idewold.com

Integrated Dynamics Engineering IDE has 25+ years experience as a world leader in Active and Passive Vibration Isolation, EMI Cancellation, Acoustic and Environmental Control systems for SEMs and TEMs with major facilities in Europe, the US, Mid-East and Asia. Serving prestigious universities, semiconductor manufacturers, medical facilities and research laboratories globally.

JASCO
BOOTH 740
28600 Marys Ct.
Easton, MD 21601
Phone: 410-822-1220
Email: SALES@JASCOINC.COM
jascoinc.com/

JEOL USA, Inc.
BOOTH 706
11 Dearborn Rd
Peabody MA 01960
Phone: 978-536-2308
Fax: 978-536-2205
Email: salesinfo@jeol.com
www.jeolusa.com

70+ years of microscopy expertise. Full suite of SEMs from benchtop to Field Emission and TEMs from 120kV to 300kV advance life sciences and materials research. Introducing a new cutting edge FIB-SEM for fast sample preparation. Air-isolated workflow for sensitive samples. Unmatched EPMA expertise. All backed by renowned service and support! www.jeolusa.com
Visit JEOL at M&M 2023

Ride the Next Wave of Technology

**JEOL Microscopy Innovations**

To see the latest in SEM, TEM, and FIB-SEM innovations, join us in our booth. We have an exciting week planned with demonstrations, tutorials, and activities.

Want to schedule an on-site demo on the microscope of your choice? Contact us and bring your samples!

Scan for details
Follow us for updates
#MM2023
JH Technologies
BOOTH 409
213 Hammond Avenue
Fremont CA 94539
Phone: 408-640-0773
Email: jh@jhtechnologies.com
www.jhtechnologies.com

Table-top/Compact SEM’s. JH Technologies is the North American distributor and service provider for COXEM table-top and compact SEM’s. See our newest Table-top SEM with EDS & EBSD in one compact system. Expanding SEM capabilities with the most cost-effective and innovative instruments in the industry. See more at https://www.jhtechnologies.com/coxem_sem_new

Ladd Research
BOOTH 732
83 Holly Ct
Williston VT 05495
Phone: 802-658-4961
Fax: 802-660-8859
Email: jd@laddresearch.com
www.laddresearch.com

Ladd is the only US manufacturer of quality aperture discs & strips for electron microscopes, FIBs, satellites & others. Our clean, burr-free holes range from .1um & up, in a variety of materials. We also provide a wide-range of EM supplies, including nitrocellulose strips & solution, Mercox, coated grids, specialty adhesives conductive paints, Glutaraldehyde & crucibles.

Keyence Corporation of America
BOOTH 1131
500 Park Blvd
Itasca IL 60143
Phone: 224-240-5375
Fax: 201-930-1883
Email: tradeshow@keyence.com
www.keyence.com/products/microscope/index.jsp

KEYENCE’s microscope and measurement systems ensure that users can meet quality requirements. High-resolution imaging, ISO-certified roughness, elemental analysis, and 2D/3D measurement combined with easy-to-use interfaces create an elevated inspection experience. We offer on-site demonstrations, training, and short lead times to help improve your processes quickly.

Leica Microsystems
BOOTH 512
10 Parkway North 300
Deerfield IL 60015
Phone: 847-721-1879
Fax: 847-236-3009
Email: vicky.thoene@leica-microsystems.com
www.leica-microsystems.com

Leica Microsystems develops and manufactures microscopes and scientific instruments for the analysis of microstructures and nanostructures. The company is one of the market leaders in compound and stereo microscopy, digital microscopy, confocal laser scanning microscopy, electron microscopy sample preparation, optical coherence tomography, and surgical microscopes.

Kleindiek Nanotechnik
BOOTH 1132
Aspenhauserstr. 25
Reutlingen 72770
Germany
Phone: 49 7121 345 395 0
Fax: 49 7121 345 395 55
Email: andrew.smith@kleindiek.com
www.kleindiek.com

Kleindiek Nanotechnik specializes in high-precision micromanipulators for integration into SEMs and FIB/SEMs (but also for light microscopy). We provide a wide range of applications from TEM sample liftout to electrical and mechanical characterization at the micro and nanoscale. Nano-assembly and cryo-LiftOut are available as well as specialized stages for eucentric tilt - e.g. to remove curtaining effects during FIB milling.

Linkam Scientific Instruments
BOOTH 1420
Unit 9 Perrywood Business Park,
Honeycrock Lane
Salfords Surrey RH1 5DZ
United Kingdom
Phone: 01737 363476
Fax: 01737 363480
Email: info@linkam.co.uk
www.linkam.co.uk/

Linkam develops and manufactures a broad range of high precision temperature and environmental control stages for both OEMs and end users. From high to cryo temperatures as well as humidity, electrical connections, gas purging, vacuum and pressure, add enhanced sample analysis to microscopy, spectroscopy and many other techniques.
MAS: The Microanalysis Society
BOOTH 304
11130 Sunrise Valley Dr
Reston VA 20191
https://the-mas.org/

The Microanalysis Society is a non-profit professional association dedicated to the advancement of microanalytical principles, instrumentation, and applications.

Mel-Build
BOOTH 1023
2-11-36 Ishimaru Nishi-ku, Fukuokashi,
Fukuoka, Japan 8190025
Japan
Phone: +81-92-891-5111
Email: shuhei.ikezawa@melbuild.com
www.melbuild.com/

Japanese manufacturer of TEM holders and SEM stages. We will host a live and virtual booth for the duration of the trade show. Our technical team will be available for questions. We also plan to invite special guests for Q&A sessions with our products. Check the website for more information. https://www.melbuild.com/

Microscopy Innovations, LLC
BOOTH 938
213 Air Park Rd - Ste 101
Marshfield WI 54449-8626
Phone: 715-384-3292
Fax: 608-291-9880
Email: info@microscopyinnovations.com
www.microscopyinnovations.com

Fast, reproducible, easy-to-use EM specimen processing — mPrep™ ASP™ auto-processors! Proven technology for: biological tissue, immunolabeling, grid staining, & volume EM. Walk-away convenience. Uncompromised results. Can reduce protocol times from days to hours. Capsule-based technology reduces specimen handling, controls reagent use, and cuts hands-on time.

Midwest Center for Cryo-Electron Tomography
BOOTH 1037
433 Babcock Drive
Madison WI 53706
Phone: 608-265-0666
Email: cryoem@biochem.wisc.edu
cryoem.wisc.edu

The Midwest Center for Cryo-Electron Tomography (MCCET) is the NIH-sponsored National Cryo-ET Network Hub. Our mission is to work collaboratively with our sister centers: CCET at CU-Boulder, NCITU at the NYSBC, and SCSC at Stanford-SLAC to support the research community with access to and training in cryo-ET.

MSA Mega Booth
BOOTH 1427
11130 Sunrise Valley Dr - Ste 350
Reston VA 20191
Phone: 703-234-4115
Fax: 703-435-4390
Email: AssociationManagement@microscopy.org
www.microscopy.org

The MegaBooth provides MSA membership services to meeting attendees. It is comprised of Membership (including LAS and Sustaining Members), Publications (Microscopy and Microanalysis and Microscopy Today), MSA Committees represented are - Certification Board, Placement Office, Tech Forum, and Education. This includes Educational Outreach, a Book Display, and Vendor Tutorials.

NanoMEGAS USA
BOOTH 731
1095 W Rio Salado Pkwy - #110
Tempe AZ 85281
Phone: 208-867-0142
Fax: 480-320-4066
Email: john-paul@nanomegasusa.com
www.nanomegasusa.com

NanoMEGAS systems for TEM provide nm resolution orientation-phase maps combined with precession electron diffraction. Applications, including strain mapping (Topspin), ab initio structural determination (ADT-3D), grains statistic (ASTAR), and amorphous short range order bond length (e-PDF) characterization, can all be installed on all new or existing TEM microscopes.
Nanoscience Instruments

BOOTH 1112
10008 S. 51st, Ste 110
Phoenix AZ 85044
Phone: 480-758-5400
Fax: 480-758-5401
Email: info@nanoscience.com
www.nanoscience.com

Our booth is your gateway to unlock the full potential of your microscopy research. Stop by for live demonstrations of tabletop SEM/STEM and discover hybrid pixel detectors optimized for 4D-STEM, modular CL detectors, ion mills, sputter coaters, and cryo-EM sample preparation solutions. For over two decades, we have been committed to your success.

NanoSoft

BOOTH T - 1512
1372 Main St.
Coventry RI 02816
Phone: 401-249-0780
Email: info@nanosoftmaterials.com
www.nanosoftmaterials.com

NanoSoft develops, manufactures and sells tools, consumables and instrumentation for sample preparation for cryogenic Electron Microscopy (cryoEM). We offer solutions for all cryoEM techniques, including: Single Particle Analysis, cryoFIB & CLEM, cryoET and microED, with tools for vitrification, sample/autogrid clipping, sample inspection, cryogenic storage, and more.

NenoVision

BOOTH 423
Purkyňova 649/127
Brno 61200
Czech Republic
Phone: +420605287732
Email: info@nenovision.com
www.nenovision.com/

We introduce the game-changing Atomic Force Microscope (AFM) for seamless integration into Scanning Electron Microscope (SEM), which unlocks new possibilities for in-situ correlative microscopy.

Nion Company

BOOTH 1104
11511 NE 118th St
Kirkland WA 98034
Phone: 425-576-9060
Fax: 425-739-0312
Email: info@nion.com
www.nion.com

Nion makes world-leading aberration-corrected STEMs. They excel in spatial resolution (1.07 Å at 30 keV), EELS resolution (<5 meV), efficient EDXS (>0.7 sr solid angle), and UHV at the sample. Powerful, easy-to-use, open-source microscope control software, Nion Swift, puts the power of the Python community in the hands of the microscope user.

Norcada, Inc.

BOOTH 831
4548 99th St NW
Edmonton AB T6E 5H5
Canada
Phone: 780-431-9637
Fax: 780-431-9638
Email: info@norcada.com
www.norcada.com

Norcada is the premier manufacturer of SiNx membranes and other MEMS devices for TEM, SEM and X-Ray microscopy. In-Situ Holders and MEMS solutions such as Heating, Biasing, Liquid Cell and Electrochemistry devices are our specialty. Norcada offers customized products such as Silicon, Silicon Dioxide and Silicon Carbide membranes for various scientific applications.

NT-MDT AMERICA, INC

BOOTH 926
5861 S Kyrene Rd, Ste 19
TEMPE AZ 85283
Phone: 480-493-0093
Email: butyaev@ntmdt-si.us
www.ntmdt-si.com

NT-MDT Spectrum Instruments is a trusted manufacturer of Atomic Force Microscopes (AFM) and integrated AFM systems with various ultrahigh resolution optical techniques: AFM-Raman, TERS, nano-IR. Our team of talented engineers and scientists is committed to provide an excellent service to all of our customers in industry and academia worldwide.
Object Research Systems

BOOTH 425
460 Ste Catherine Street
Montreal QC H3B 1A7
Canada
Phone: 514-843-3861
Fax: 514-543-5475
Email: bhenderson@theobjects.com
www.theobjects.com

Dragonfly by ORS provides all your imaging and analysis needs - from processing acquired images to segmentation and quantification. Powered by a state-of-the-art deep learning engine, Dragonfly workflows utilize AI models for image enhancement and fully automated image segmentation providing the ideal framework for specialized workflows across a range of application areas.

Oxford Instruments

BOOTH 620
300 Baker Ave - Ste 150
Concord MA 01742
Phone: 441-483-7703-31
Fax: 441-483-7271-93
Email: linda.ng@oxinst.com
www.oxford-instruments.com

Oxford Instruments materials analysis solutions enable you to accurately analyse and characterise materials down to the nanoscale level more rapidly, by combining superior detection and analysis instruments with software that interpret the resulting data in the context of your research.

Pace Technologies

BOOTH 833
3601 E 34th St.
Tucson AZ 85713
Phone: 520-882-6598
Email: carlag@metallographic.com
metallographic.com

PACE manufactures metallographic equipment & consumables for material analysis & quality control. Manual/automatic abrasive cutters, mounting presses, grinder/polishers, vibratory polishers, hardness testers, microscopes, image analysis, consumables, & microstructural analysis.

Pacific Northwest CryoEM Center

BOOTH 1039
2730 S. Moody Ave CL-P2M
Portland OR 97201
Phone: 509-372-4382
Email: support@pncc.online
pncc.online

The Pacific Northwest Center for Cryo-EM is an electron microscopy facility funded by the NIH Common Fund and operated jointly by Oregon Health & Science University and Pacific Northwest National Laboratory. We will be showing cryo-EM related services and training to provide users, at no cost, due to NIH funding. This encompasses everything from sample preparation, to TEM operation, to automated data collection, to data processing and analysis.

Panasas

BOOTH 1407
2680 N. First St., Suite 150
San Jose CA 95134
Phone: 650-862-0504
Email: sandres@panasas.com
www.panasas.com/industries/life-sciences/

Physical Electronics

BOOTH 940
18725 Lake Dr E
Chanhassen MN 55317
Phone: 952-828-6100
Fax: 952-828-6176
Email: awilson@phi.com
www.phi.com

Physical Electronics is a subsidiary of ULVAC-PHI, the world’s leading supplier of UHV surface analysis instrumentation used for research & development of advanced materials in technology fields including nanotechnology, microelectronics, storage media, bio-medical, & thin film coatings. PHI’s innovative XPS, AES and SIMS technologies provide solutions to any challenge.
PNDetector GmbH
BOOTH 432
Otto Hahn Ring 6
81739 Munich
Germany
Phone: 49 89 309087172
Fax: 49 89 309087112
Email: sales@pndetector.de
www.pndetector.de

PNDetector develops and manufactures advanced radiation detectors for X-ray fluorescence or microanalysis, materials science and quality assurance since 2007. The sensors are fabricated in PNDetector’s own silicon production and packaging line. The emphasis is on Silicon Drift Detectors (SDDs), Backscattered Electron Detectors (BSD) and Charged Coupled Devices (pnCCDs).

Point Electronic GmbH
BOOTH 431
Erich-Neuss-Weg 15
Halle D-06120
Germany
Phone: 0049 345 472256-22
Email: cs@pointelectronic.de
www.pointelectronic.com

Point electronic GmbH is an independent supplier of detectors, acquisition and control systems for SEM, TEM and micro analysers. The company is an established leader in development of electronics and software for advanced techniques, and is a leading supplier of quantitative systems for 3D surface reconstruction, electrical characterisation and failure analysis.

Protochips, Inc.
BOOTH 410
3800 Gateway Centre Blvd - Ste 306
Morrisville NC 27560
Phone: 919-377-0800
Email: karin.seaman@protochips.com
www.protochips.com

Protochips, Inc. develops and manufactures advanced radiation detectors for X-ray fluorescence or microanalysis, materials science and quality assurance since 2007. The sensors are fabricated in Protochips’ own silicon production and packaging line. The emphasis is on Silicon Drift Detectors (SDDs), Backscattered Electron Detectors (BSD) and Charged Coupled Devices (pnCCDs).

Quantum Design, Inc.
BOOTH 537
10307 Pacific Center Court
San Diego CA 92121
Phone: 858-481-4400
Fax: 858-481-7410
Email: melissa@qdusa.com

Quantum Design manufactures automated cryomagnetic material characterization systems and distributes SPM and Raman solutions for these platforms. They distribute thermal scanning probe and e-beam nano-lithography for SEM/FIB systems, and a leading-edge AFM solution for seamless integration into SEM/FIB, adding 3D topography, mechanical, electric and magnetic characterization at nanometer scales.

Quantum Detectors
BOOTH 1031
R103 RAL
Harwell Oxford OX11 0QX
United Kingdom
Phone: 44 1235 632047
Email: zoltan@quantumdetectors.com
quantumdetectors.com/

For the optimum result, your TEM research needs reliable, high-performance, easy-to-use direct electron detection solutions. Sensitivity, resolution, acquisition speed and efficiency, without compromise, that’s what Quantum Detectors brings you.

Queensgate/Prior Scientific
BOOTH T - 1514
80 Reservoir Park Drive
Rockland MA 02370
Phone: 781-878-8442
Email: info@prior.com
www.nanopositioning.com

Prior Scientific is a leader in designing & manufacturing precision positioning devices, optical systems, automation solutions & components. Queensgate produces high-speed, high-precision piezo stages & capacitive sensors with low picometer resolutions for demanding nanopositioning applications. We specialize in customized solutions for microscopy & nanopositioning OEMs.
Raith America, Inc.

**BOOTH 837**
1377 Long Island Motor Parkway  Suite 101
Islandia NY 11749
Phone: 631-738-9500
Fax: 631-738-2055
Email: joseph.klingfus@raithamerica.com
www.raith.com

Raith is a leading precision instrument manufacturer for large area SEM, electron beam lithography, focused ion beam nanofabrication and nanoengineering. Reverse engineering of semiconductor devices strongly benefits from the large area SEM imaging enabled by the automation and stability of a professional lithography system architecture, ultra-precise image calibrations, and the nanoscale accuracy of the laser interferometer stage.

Scientific Bridge

**BOOTH 413**
4737 Reed Rd #220
Columbus OH 43220
Phone: 614-696-0322
Email: info@ScientificBridgeSolutions.com
scientificbridgesolutions.com/

Refeyn

**BOOTH 1139**
4640 SW Macadam Ave  Suite 200A
Portland OR 97239
Phone: 971-341-9168
Email: gabriella.kiss@refeyn.com
www.refeyn.com

Refeyn pioneers mass photometry technology, producing a disruptive new generation of analytical instruments. The instruments quickly and simply measure the mass of individual molecules directly in solution without needing labels. Refeyn is transforming scientists’ abilities to characterise the function, structural composition and dynamics of biomolecules.

Shuimu BioSciences

**BOOTH 1133**
1 Broadway, 14th floor
Cambridge MA 02142
Phone: 650-680-9305
Email: dongtianci@shuimubio.com
shuimubio.com

Sigray, Inc.

**BOOTH 1007**
5750 Imhoff Dr. Ste. I
Concord CA 94520
Phone: 925-446-4183
Email: jgelb@sigray.com
www.sigray.com

Sigray, Inc. is an SF Bay Area company founded to accelerate scientific progress by providing powerful, synchrotron-grade research capabilities in its laboratory x-ray systems (micro-CT, nano-CT, XAS, and micro-XRF). The breakthrough performance of these systems are uniquely enabled by Sigray’s patented innovations in x-ray source, optics, and detector technologies.

RMC Boeckeler

**BOOTH 1003**
4650 S Butterfield Dr
Tucson AZ 85714
Phone: 520-745-0001
Fax: 520-745-0004
Email: marianne.mai@boeckeler.com
www.boeckeler.com

Boeckeler Instruments, Inc., has been proudly manufacturing sample preparation products for decades for EM and LM sample preparation. Under the RMC Boeckeler brand, solutions for nano-scale research include ultramicrotomes and array tomography systems, manufactured, sold and maintained by a team of passionate people, dedicated to research, development and customer support.

SEC Co. Ltd.

**BOOTH 1304**
4900 Hopyard Rd - Ste 100
Pleasanton CA 94588
Phone: 805-708-1354
Email: jlechich@nanoimages.com
www.nanoimages.com

Sigray, Inc. is an SF Bay Area company founded to accelerate scientific progress by providing powerful, synchrotron-grade research capabilities in its laboratory x-ray systems (micro-CT, nano-CT, XAS, and micro-XRF). The breakthrough performance of these systems are uniquely enabled by Sigray’s patented innovations in x-ray source, optics, and detector technologies.
**SiriusXT Ltd**

**BOOTH 532**  
9A Holly Ave.  Stillorgan Ind. Park  
Blackrock  Dublin  A94 XY47  
Ireland  
Phone: +353 1 9056340  
Email: info@siriusxt.com  
www.siriusxt.com  

SiriusXT introduces its SXT-100 Laboratory Soft X-ray Microscope (SXM) - the only commercially available lab-scale SXM. It produces high-resolution, high natural contrast, 3-D images of the whole internal structure of intact biological cells. Cells are cryo-fixed on TEM grids or in glass capillaries and images can be correlated with fluorescence and electron microscopy.

**SPT Labtech | Quantifoil**

**BOOTH 1138**  
Melbourn Science Park, Cambridge Road  
Melbourn  SG8 6HB  
United Kingdom  
Phone: +447957485507  
Email: hannah.barrett@sptlabtech.com  
www.sptlabtech.com/  

Focused on sample preparation for cryo-electron microscopy, our experts create state of the art solutions that researchers can trust. Encompassing SPT Labtech chameleon® automated sample preparation and market-leading QUANTIFOIL® supports, we drive innovation with developments including revolutionary HexAuFoil and UltrAuFoil holey gold grids for reduced specimen movement.

**Spellman High Voltage Electronics Corp.**

**BOOTH 1011**  
475 Wireless Blvd,  
Hauppauge  NY  11788  
Phone: 631-630-3071  
Email: sales@spellmanhv.com  
www.spellmanhv.com  

Spellman High Voltage Electronics, the world’s leading manufacturer of custom high voltage power supplies and x-ray sources, will be exhibiting a selection of standard and customized solutions specifically designed for the unique demands of analytical and biotechnology instrumentation, adopted by many OEM system manufacturers in the areas of microscopy and microanalysis.

**Ted Pella Inc.**

**BOOTH 904**  
PO Box 492477  
Redding  CA  96049-2477  
Phone: 530-243-2200  
Fax: 530-243-3761  
Email: sales@tedpella.com  
www.tedpella.com  

Ted Pella, Inc. is a premier supplier of consumables & specimen preparation tools and accessories for microscopy applications. We carry a wide range of SEM mounts & sample holders, TEM Grids & support films, calibration standards & Cressington sample coating systems. We manufacture & distribute many of our own instruments for sample preparation under our PELCO brand name.

**Springer Nature**

**BOOTH 634**  
One New York plaza  
New York  NY  10004  
Phone: 212-726-9636  
Email: exhibits@springernature.com  
www.springernature.com/gp  

Springer Nature is one of the world’s leading global research, educational and professional publishers, home to an array of respected and trusted brands providing quality content through a range of innovative products and services. Springer Nature is the world’s largest academic book publisher and numbers almost 13,000 staff in over 50 countries.  
www.springernature.com  

**TESCAN**

**BOOTH 819**  
765 Commonwealth Drive  Ste 101  
Warrendale  PA  15086-7520  
Phone: 724-772-7433  
Email: info@tescan.com  
www.tescan.com/  

TESCAN is a trusted source of innovative and disruptive technologies for science and industries such as SEM, FIB-SEM, 4D-STEM, and micro-CT systems. Our mission is to enable scientists and engineers to address global and sustainability challenges with innovative instrumentation that discovers the secrets of matter at the micro and nanoscale.
Providing Microscopy Supplies and Specimen Preparation Equipment to Our Valued Customers for Over Half a Century

VISIT US AT M&M 2023 • JULY 24 – 27 • MINNEAPOLIS, MN • BOOTH #904

PELCO® Scribing & Cleaving Solutions
PELCO® LatticeAx® 420, PELCO® FlipScribe® & PELCO® FlexScribe™

NEW PELCO® Precision Lapping Fixtures

Cressington Coating Systems
Carbon Evaporation & Metal Sputtering Accessories & Targets

Extensive Selection of PELCO® Modular Holders & Mounts for SEM

NEW PELCO® Precision Lapping Fixtures

DiATOME®
Now Available from Ted Pella, Inc.
Highest Quality Diamond Knives Available for All Applications

NEW Grid Storage Boxes & Cryo-EM Tweezers

PELCO easiGlow™ Cryo-EM Glow Discharge

NEW Clipping Station, Clipping Tools, AutoGrid Rings & C-Clips

NEW & BESTSELLING CRYO-EM TOOLS, INSTRUMENTS & ACCESSORIES

SEE YOU AT OUR M&M 2023 VENDOR TUTORIAL
Tuesday, July 25 | Booth #904
5:45pm – 6:45pm
Tissue Clearing and Other Applications Using the PELCO BioWave® Pro+

GET A FREE FUZZY FRIEND
Visit us at M&M Booth #904, like or follow us on social media, and get a free critter!

Free critter while supplies last.

TED PELLA, INC.
Microscopy Products for Science and Industry

www.tedpella.com sales@tedpella.com 800-237-3526
Theia Scientific

BOOTH 1040
2907 9th St N
Arlington VA 22201
Phone: 217-840-4537
Email: info@theiascientific.com
www.theiascientific.com

Thermo Fisher Scientific

BOOTH 1119
5350 NW Dawson Creek
Hillsboro OR 33708
Phone: 753-401-3705
Email: jennifer.buick@thermofisher.com
www.thermofisher.com/em

Thermo Fisher Scientific supplies innovative solutions for electron microscopy and microanalysis. We provide SEMs, TEMs and DualBeam™ FIB/SEMs combined with software suites to take customers from questions to usable data by combining high-resolution imaging with physical, elemental, chemical, and electrical analysis across scales and modes—through the broadest sample types.

TMC

BOOTH 404
15 Centennial Drive
Peabody MA 01960
Phone: 978-532-6330
Fax: 978-531-8682
Email: tmc.sales@ametek.com
www.techmfg.com

TMC provides environmental control solutions for microscopy: from industry-leading floor vibration isolation tables and active benchtop platforms for optical microscopes to high-performance active vibration cancellation systems for SEMs and TEMs. We also offer advanced active magnetic field cancellation systems and acoustic enclosures, as well as environmental surveys.

Tousimis

BOOTH 928
2211 Lewis Ave
Rockville MD 20851
Phone: 301-881-2450
Fax: 301-881-5374
Email: trc@tousimis.com
www.tousimis.com

Tousimis is a globally recognized manufacturer of highly reliable CPD systems based in the USA with global sales and service support. Our 45 years of CPD experience in both designing and fabricating reliable CPD systems will benefit your work! Our process reproducibly preserves Micro & Nano 3D structures. Current applications include: Biological, Bio-MEMS, Aerogel, MEMS, Graphene, MOF and others... Please visit us to see what is new this year!

TVIPS GmbH / Simple Origins

BOOTH 1019
Ferdinand-Porsche-Str. 3
Gilching 82205
Germany
Phone: +498105779000
Email: anette.blankenburg@tvips.com
www.tvips.com

TVIPS manufactures high-performance camera systems for Transmission Electron Microscopy with resolutions up to 64 megapixel. Image processing software packages allow seamless integration into any type of microscope. Our TEM cameras are based on custom designed CMOS technology with active pixel sensors, featuring high dynamic range and exceptional acquisition speed.

United Mineral and Chemical Corp.

BOOTH 1240
160 Chubb Avenue, Suite 206
Lyndhurst NJ 07071
Phone: 201-507-3300
Email: jbraun@umccorp.com
www.umccorp.com

Ferrovac is a market leader in ultimately controlled sample handling solutions. We establish UHV & cryo transfer of samples between independent analytical & preparation instruments. Ferrovac has 25 yrs of experience in UHV technology & systems engineering. Our magnetically driven manipulators define the benchmark for precise & durable manipulation of samples in UHV systems.
Voxa

BOOTH 840
1001 26th Ave E
Seattle WA 98112
Phone: 415-858-0393
Email: admin@vox.co
www.projectvox.co

Voxa offers the world’s smallest and most portable SEM, Mochii™. So small, it’s operating in space on the ISS! Bring award-winning Mochii with EDS in your carry-on and boot up with its iPad UI over coffee. Voxa also provides industrial automation: Blade™ ultra-high-throughput TEM with Voxa’s GridStage™ conveyer sample autoloader. Come see Blade and Mochii @ booth 840!

Xallent, Inc.

BOOTH T-1504
95 Brown Road, MS 1035, STE 271
Ithaca, NY 14850
Phone: 424-262-0515
Email: kwame.amponsah@xallent.com

XCI Scientific, Inc.

BOOTH 1013
1755 E Bayshore Rd - Ste 17
Redwood City CA 94061
Phone: 650-369-0133
Fax: 650-363-1659
Email: meggie@evactron.com
www.evactron.com

Evactron® De-Contaminators by XCI Scientific can make vacuum chambers pristinely clean of most hydrocarbons with Turbo Plasma Cleaning done at turbo molecular pump pressures. The new Evactron E16, E50 and U50 De-Contaminators for chambers large or small outperform other remote plasma cleaners and are easy to use, reliable, and compact: perfect for your SEM or FIB.

Find Hidden Treasure with Evactron® Plasma Cleaning*

Materials and Methods
Sample: semiconductor epilayers with region of interest
20nm beneath the sample surface
Specimen Prep: standard cylindrical FIB/SEM but with Sharpie® ink forming protective carbon cap
Atom Probe Microscope: CAMECA LEAP® 4000X Si

Results
Evactron plasma cleaning removes the protective carbon capping layer to reveal delicate surface features of interest. Use routine plasma cleaning to eliminate hydrocarbon contamination and improve atom probe specimen yield.

WWW.EVACTRON.COM
1-650-369-0133

*Supple et al. 2022, Microsc. Microanal. 28 (Suppl 1): 744
STEM done right!

TESCAN TENSOR

Integrated, Precession-Assisted, Analytical 4D-STEM

Visit us and learn more about our TESCAN TENSOR info.tescan.com/stem

Visit us at booth 819
### Exhibitor Product Categories

#### Accessories (miscellaneous)

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectomX Ltd</td>
<td>1239</td>
</tr>
<tr>
<td>Electron Microscopy Sciences / Quorum Technology / Diatome US</td>
<td>1004</td>
</tr>
<tr>
<td>Ferrovac</td>
<td>1238</td>
</tr>
<tr>
<td>Herzan LLC</td>
<td>924</td>
</tr>
<tr>
<td>ibidi USA, Inc.</td>
<td>633</td>
</tr>
<tr>
<td>ibidi Group, Inc.</td>
<td>419</td>
</tr>
<tr>
<td>Ladd Research</td>
<td>732</td>
</tr>
<tr>
<td>Linkam Scientific Instruments</td>
<td>1420</td>
</tr>
<tr>
<td>Microscopy Innovations, LLC</td>
<td>938</td>
</tr>
<tr>
<td>NanoMEGAS USA</td>
<td>731</td>
</tr>
<tr>
<td>NanoSoft</td>
<td>T - 1512</td>
</tr>
<tr>
<td>Norcada, Inc.</td>
<td>831</td>
</tr>
<tr>
<td>Pace Technologies</td>
<td>833</td>
</tr>
<tr>
<td>United Mineral and Chemical Corp.</td>
<td>1240</td>
</tr>
<tr>
<td>XEI Scientific, Inc.</td>
<td>1013</td>
</tr>
</tbody>
</table>

#### AFM / STM Accessories

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herzan LLC</td>
<td>924</td>
</tr>
<tr>
<td>Instec Inc.</td>
<td>T - 1508</td>
</tr>
<tr>
<td>NenoVision</td>
<td>423</td>
</tr>
<tr>
<td>NT-MDT AMERICA, INC</td>
<td>926</td>
</tr>
<tr>
<td>Oxford Instruments</td>
<td>620</td>
</tr>
<tr>
<td>Quantum Design, Inc.</td>
<td>537</td>
</tr>
<tr>
<td>Queensgate/Prior Scientific</td>
<td>T - 1514</td>
</tr>
<tr>
<td>Ted Pella Inc.</td>
<td>904</td>
</tr>
</tbody>
</table>

#### Anti-Contamination Systems

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ibidi Group, Inc.</td>
<td>419</td>
</tr>
<tr>
<td>XEI Scientific, Inc.</td>
<td>1013</td>
</tr>
</tbody>
</table>

#### Atom Probe

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D-Micromac AG</td>
<td>1212</td>
</tr>
<tr>
<td>CAMECA</td>
<td>404</td>
</tr>
<tr>
<td>Ferrovac</td>
<td>1238</td>
</tr>
</tbody>
</table>

#### Atomic Force Microscopes

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angstrom Scientific Inc.</td>
<td>632</td>
</tr>
<tr>
<td>attocube systems Inc.</td>
<td>1137</td>
</tr>
<tr>
<td>Bruker Corporation</td>
<td>832</td>
</tr>
<tr>
<td>Digital Surf</td>
<td>1032</td>
</tr>
<tr>
<td>Hitachi High-Tech America, Inc.</td>
<td>1204</td>
</tr>
<tr>
<td>Kleindiek Nanotechnik</td>
<td>1132</td>
</tr>
<tr>
<td>NenoVision</td>
<td>423</td>
</tr>
<tr>
<td>NT-MDT AMERICA, INC</td>
<td>926</td>
</tr>
</tbody>
</table>

#### Atomic Force Microscopes cont.

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantum Design, Inc.</td>
<td>537</td>
</tr>
<tr>
<td>Queensgate/Prior Scientific</td>
<td>T - 1514</td>
</tr>
<tr>
<td>RMC Boeckeler</td>
<td>1003</td>
</tr>
</tbody>
</table>

#### Auger Microscopes

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>JEOL USA, Inc.</td>
<td>706</td>
</tr>
<tr>
<td>Physical Electronics</td>
<td>940</td>
</tr>
</tbody>
</table>

#### Backscatter Detectors

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNDetector GmbH</td>
<td>432</td>
</tr>
<tr>
<td>Point Electronic GmbH</td>
<td>431</td>
</tr>
<tr>
<td>TESCAN</td>
<td>819</td>
</tr>
</tbody>
</table>

#### Calibration and Reference Standards / Reference Materials

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point Electronic GmbH</td>
<td>431</td>
</tr>
<tr>
<td>RMC Boeckeler</td>
<td>1003</td>
</tr>
</tbody>
</table>

#### Camera / Digital Camera Systems - CDC, CMOS, Megapixel

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Microscopy Techniques Corp.</td>
<td>920</td>
</tr>
<tr>
<td>Angstrom Scientific Inc.</td>
<td>632</td>
</tr>
<tr>
<td>Dectris Ltd</td>
<td>1012</td>
</tr>
<tr>
<td>Direct Electron, LP</td>
<td>1312</td>
</tr>
<tr>
<td>Gatan</td>
<td>504</td>
</tr>
<tr>
<td>HORIBA Scientific</td>
<td>631</td>
</tr>
<tr>
<td>PNDetector GmbH</td>
<td>432</td>
</tr>
<tr>
<td>Quantum Detectors</td>
<td>1031</td>
</tr>
<tr>
<td>TVIPS GmbH / Simple Origins</td>
<td>1019</td>
</tr>
<tr>
<td>Voxa</td>
<td>840</td>
</tr>
</tbody>
</table>

#### Chemicals

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladd Research</td>
<td>732</td>
</tr>
</tbody>
</table>

#### Cold Sputtering Equipment

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ted Pella Inc.</td>
<td>904</td>
</tr>
</tbody>
</table>

#### Confocal Microscopes

<table>
<thead>
<tr>
<th>Company</th>
<th>Booth Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>attocube systems Inc.</td>
<td>1137</td>
</tr>
<tr>
<td>Barnett Technical Services</td>
<td>1038</td>
</tr>
<tr>
<td>Carl Zeiss Microscopy, LLC</td>
<td>519</td>
</tr>
<tr>
<td>Digital Surf</td>
<td>1032</td>
</tr>
<tr>
<td>HORIBA Scientific</td>
<td>631</td>
</tr>
<tr>
<td>Exhibitor Product Categories</td>
<td>Exhibitor Name</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td><strong>Exhibitor Product Categories</strong></td>
<td><strong>ibidi USA, Inc.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Keyence Corporation of America</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Leica Microsystems</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Linkam Scientific Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NT-MDT AMERICA, INC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Oxford Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Queensgate/Prior Scientific</strong></td>
</tr>
<tr>
<td><strong>Consulting</strong></td>
<td><strong>DigiM Solution LLC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Euclid TechLabs, LLC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>EXpressLO LLC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Helix Biostructures</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Herzan LLC</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Object Research Systems</strong></td>
</tr>
<tr>
<td><strong>Courses / Workshops</strong></td>
<td><strong>Object Research Systems</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Pacific Northwest CryoEM Center</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RMC Boeckeler</strong></td>
</tr>
<tr>
<td><strong>Critical Point Dryers</strong></td>
<td><strong>Tousimis</strong></td>
</tr>
<tr>
<td><strong>CryoEM Sample Handling</strong></td>
<td><strong>Ferrovac</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Fischione Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Midwest Center for Cryo-Electron Tomography</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NanoSoft</strong></td>
</tr>
<tr>
<td></td>
<td>**SPT Labtech</td>
</tr>
<tr>
<td></td>
<td><strong>TVIPS GmbH / Simple Origins</strong></td>
</tr>
<tr>
<td><strong>CryoEM Sample Preparations</strong></td>
<td><strong>Delmic B.V.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Midwest Center for Cryo-Electron Tomography</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Nanoscience Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NanoSoft</strong></td>
</tr>
<tr>
<td></td>
<td>**SPT Labtech</td>
</tr>
<tr>
<td></td>
<td><strong>Thermo Fisher Scientific</strong></td>
</tr>
<tr>
<td><strong>CryoEM Sample Storage</strong></td>
<td><strong>Ferrovac</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Midwest Center for Cryo-Electron Tomography</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NanoSoft</strong></td>
</tr>
<tr>
<td><strong>Cryoequipment</strong></td>
<td><strong>Advanced Microscopy Techniques Corp.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Angstrom Scientific Inc.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>attocube systems Inc.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>CAMECA</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Delmic B.V.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Ferrovac</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Fischione Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Instec Inc.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Linkam Scientific Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Mel-Build</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RMC Boeckeler</strong></td>
</tr>
<tr>
<td></td>
<td><strong>United Mineral and Chemical Corp.</strong></td>
</tr>
<tr>
<td><strong>Crystallographic Mapping</strong></td>
<td><strong>Advanced Microscopy Techniques Corp.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>NanoMEGAS USA</strong></td>
</tr>
<tr>
<td><strong>Databases</strong></td>
<td><strong>DigiM Solution LLC</strong></td>
</tr>
<tr>
<td><strong>Detectors</strong></td>
<td><strong>Advanced Microscopy Techniques Corp.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>DECTRIS Ltd</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Delmic B.V.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Gatan</strong></td>
</tr>
<tr>
<td></td>
<td><strong>HORIBA Scientific</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Nanoscience Instruments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>PNDetector GmbH</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Point Electronic GmbH</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Quantum Detectors</strong></td>
</tr>
<tr>
<td><strong>Diamond Knives</strong></td>
<td><strong>ConnectomX Ltd</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Electron Microscopy Sciences / Quorum Technology / Diatome US</strong></td>
</tr>
<tr>
<td></td>
<td><strong>RMC Boeckeler</strong></td>
</tr>
<tr>
<td>Exhibitor Product Categories</td>
<td>Company Name</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Digital Archiving / Data Storage</td>
<td>DigiM Solution LLC</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Beam FIB/SEM</td>
<td>Carl Zeiss Microscopy, LLC</td>
</tr>
<tr>
<td></td>
<td>Clark-MXR Inc.</td>
</tr>
<tr>
<td></td>
<td>DigiM Solution, LLC</td>
</tr>
<tr>
<td></td>
<td>EXpressLO, LLC</td>
</tr>
<tr>
<td></td>
<td>Hitachi High-Tech America, Inc.</td>
</tr>
<tr>
<td></td>
<td>JEOL USA, Inc.</td>
</tr>
<tr>
<td></td>
<td>Object Research Systems</td>
</tr>
<tr>
<td></td>
<td>Raith America, Inc.</td>
</tr>
<tr>
<td></td>
<td>TESCAN</td>
</tr>
<tr>
<td></td>
<td>Thermo Fisher Scientific</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>E Beam Lithography</td>
<td>JEOL USA, Inc.</td>
</tr>
<tr>
<td></td>
<td>Quantum Design, Inc.</td>
</tr>
<tr>
<td></td>
<td>Raith America, Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EDS Detectors &amp; Systems</td>
<td>Angstrom Scientific Inc.</td>
</tr>
<tr>
<td></td>
<td>Bruker Corporation</td>
</tr>
<tr>
<td></td>
<td>COXEM</td>
</tr>
<tr>
<td></td>
<td>Gatan</td>
</tr>
<tr>
<td></td>
<td>JEOL USA, Inc.</td>
</tr>
<tr>
<td></td>
<td>JH Technologies</td>
</tr>
<tr>
<td></td>
<td>Nanoscience Instruments</td>
</tr>
<tr>
<td></td>
<td>Oxford Instruments</td>
</tr>
<tr>
<td></td>
<td>Physical Electronics</td>
</tr>
<tr>
<td></td>
<td>PNDetector GmbH</td>
</tr>
<tr>
<td></td>
<td>Thermo Fisher Scientific</td>
</tr>
<tr>
<td></td>
<td>Voxa</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Characterization</td>
<td>Angstrom Scientific Inc.</td>
</tr>
<tr>
<td></td>
<td>Barnett Technical Services</td>
</tr>
<tr>
<td></td>
<td>Kleindiek Nanotechnik</td>
</tr>
<tr>
<td></td>
<td>Point Electronic GmbH</td>
</tr>
<tr>
<td></td>
<td>Quantum Design, Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron Backscattered Diffraction (EBSD)</td>
<td>Bruker Corporation</td>
</tr>
<tr>
<td></td>
<td>COXEM</td>
</tr>
<tr>
<td></td>
<td>Direct Electron, LP</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron Backscattered Diffraction (EBSD) cont.</td>
<td>Fischione Instruments</td>
</tr>
<tr>
<td></td>
<td>Gatan</td>
</tr>
<tr>
<td></td>
<td>JH Technologies</td>
</tr>
<tr>
<td></td>
<td>Oxford Instruments</td>
</tr>
<tr>
<td></td>
<td>Physical Electronics</td>
</tr>
<tr>
<td></td>
<td>TESCAN</td>
</tr>
<tr>
<td></td>
<td>Thermo Fisher Scientific</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron Microprobes / EPMA</td>
<td>JEOL USA, Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure Analysis</td>
<td>3D-Micromac AG</td>
</tr>
<tr>
<td></td>
<td>Angstrom Scientific Inc.</td>
</tr>
<tr>
<td></td>
<td>Barnett Technical Services</td>
</tr>
<tr>
<td></td>
<td>Delmic B.V.</td>
</tr>
<tr>
<td></td>
<td>DigiM Solution LLC</td>
</tr>
<tr>
<td></td>
<td>Fischione Instruments</td>
</tr>
<tr>
<td></td>
<td>Gatan</td>
</tr>
<tr>
<td></td>
<td>Hirox-USA, Inc.</td>
</tr>
<tr>
<td></td>
<td>Keyence Corporation of America</td>
</tr>
<tr>
<td></td>
<td>Kleindiek Nanotechnik</td>
</tr>
<tr>
<td></td>
<td>Leica Microsystems</td>
</tr>
<tr>
<td></td>
<td>NenoVision</td>
</tr>
<tr>
<td></td>
<td>Object Research Systems</td>
</tr>
<tr>
<td></td>
<td>Pace Technologies</td>
</tr>
<tr>
<td></td>
<td>Physical Electronics</td>
</tr>
<tr>
<td></td>
<td>Quantum Design, Inc.</td>
</tr>
<tr>
<td></td>
<td>Raith America, Inc.</td>
</tr>
<tr>
<td></td>
<td>TESCAN</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>FIB Accessories</td>
<td>3D-Micromac AG</td>
</tr>
<tr>
<td></td>
<td>Bruker Corporation</td>
</tr>
<tr>
<td></td>
<td>DENSsolutions</td>
</tr>
<tr>
<td></td>
<td>EXpressLO LLC</td>
</tr>
<tr>
<td></td>
<td>Ferrovac</td>
</tr>
<tr>
<td></td>
<td>Herzan LLC</td>
</tr>
<tr>
<td></td>
<td>Kleindiek Nanotechnik</td>
</tr>
<tr>
<td></td>
<td>Mel-Build</td>
</tr>
<tr>
<td></td>
<td>Oxford Instruments</td>
</tr>
<tr>
<td></td>
<td>Protochips, Inc.</td>
</tr>
<tr>
<td></td>
<td>Scientific Bridge</td>
</tr>
<tr>
<td></td>
<td>Ted Pella Inc.</td>
</tr>
<tr>
<td></td>
<td>XEI Scientific, Inc.</td>
</tr>
</tbody>
</table>
**Exhibitor Product Categories**

**Filaments and Filament Rebuilding—Field Emission Sources, Lab6 Sources**
- Applied Physics Technologies 1214
- Clark-MXR Inc 1009

**Fixatives**
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Tosimis 928

**Fluorescence Microscopy**
- Carl Zeiss Microscopy, LLC 519
- Delmic B.V. 1110
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- HORIBA Scientific 631
- ibidi USA, Inc. 633
- Instec Inc. T - 1508
- Keyence Corporation of America 1131
- Leica Microsystems 512
- Linkam Scientific Instruments 1420
- Quantum Design, Inc. 537
- Queensgate/Prior Scientific T - 1514
- SiriusXT Ltd 532

**Focused Ion Beam Systems / Workstations**
- Clark-MXR Inc 1009
- Delmic B.V. 1110
- EXpressLO LLC 839
- Hitachi High-Tech America, Inc. 1204
- Leica Microsystems 512
- Raith America, Inc. 837
- TESCAN 819

**FT-IR Microscopy**
- attocube systems Inc. 1137
- Digital Surf 1032
- Instec Inc. T - 1508
- Linkam Scientific Instruments 1420

**Glow Discharge Cleaning**
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Ted Pella Inc. 904

**Image Analysis and Processing**
- Bruker Corporation 832
- Carl Zeiss Microscopy, LLC 519
- DigiM Solution LLC 734
- Digital Surf 1032
- Direct Electron, LP 1312
- Gatan 504
- Helix Biostructures 1232
- Hirox-USA, Inc. 738
- Hitachi High-Tech America, Inc. 1204
- HORIBA Scientific 631
- ibidi USA, Inc. 633
- Keyence Corporation of America 1131
- Object Research Systems 425
- Oxford Instruments 620
- Pace Technologies 833
- Refeyn 1139

**Immuno-Labeling**
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Microscopy Innovations, LLC 938

**Ion Pumps New and Rebuilding**
- Duniway Stockroom Corp. 1027

**Knife Resharpening / Resharpening Services**
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004

**Knives**
- RMC Boeckeler 1003
- Ted Pella Inc. 904

**Light Microscopes**
- Carl Zeiss Microscopy, LLC 519
- COXEM 409
- EXpressLO LLC 839
- Hirox-USA, Inc. 738
- Instec Inc. T - 1508
- JH Technologies 409
- Keyence Corporation of America 1131
- Leica Microsystems 512
- Linkam Scientific Instruments 1420
- Queensgate/Prior Scientific T - 1514
- SiriusXT Ltd 532

---

www.microscopy.org/MandM/2023 for up-to-date meeting information
### Metallography Equipment
- COXEM 409
- Pace Technologies 833
- Ted Pella Inc. 904

### Micro-CT Scanning
- DigiM Solution LLC 734
- Object Research Systems 425
- Sigray, Inc. 1007
- SiriusXT Ltd 532
- TESCAN 819

### Micromanipulators
- Barnett Technical Services 1038
- EXpressLO LLC 839
- Kleindiek Nanotechnik 1132

### Microprobes
- Instec Inc. T - 1508

### Microtome and Ultramicrotome Repair
- ConnectomX Ltd. 1239
- RMC Boeckeler 1003

### Microtomes and Ultramicrotomes
- Angstrom Scientific Inc. 632
- ConnectomX Ltd. 1239
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Leica Microsystems 512
- RMC Boeckeler 1003

### Microwave Tissue Processing
- Ladd Research 732
- Ted Pella Inc. 904

### Nano Indentation
- Angstrom Scientific Inc. 632
- Bruker Corporation 832
- Mel-Build 1023
- NenoVision 423

### Nanopositioners & Stages
- attocube systems Inc. 1137
- Kleindiek Nanotechnik 1132
- Oxford Instruments 620
- Queensgate/Prior Scientific T - 1514
- Voxa 840

### Nanoprobes / Mechanical Microprobes
- 3D-Micromac AG 1212
- Angstrom Scientific Inc. 632
- Barnett Technical Services 1038
- Hitachi High-Tech America, Inc. 1204
- Physical Electronics 940
- Sigray, Inc. 1007

### New and Used Equipment
- Advanced Microscopy Techniques Corp. 920
- Duniway Stockroom Corp. 1027
- ibidi USA, Inc. 633
- SPT Labtech Quantifoil 1138

### Optical Filters, Fluorescence Filters
- Hirox-USA, Inc. 738

### Other
- ConnectomX Ltd 1239
- Helix Biostructures 1232
- ibidi USA, Inc. 633
- Microscopy Innovations, LLC 938
- MAS: The Microanalysis Society
- MSA Mega Booth 1427
- Pacific Northwest CryoEM Center 1039
- Refeyn 1139
- Spellman High Voltage Electronics Corp. 1011

### Phase Identification
- NanoMEGAS USA 731
- Oxford Instruments 620
- Sigray, Inc. 1007

### Plasma Cleaners
- Fischione Instruments 1311
- ibss Group, Inc. 419
- XEI Scientific, Inc. 1013
Publishers
Springer Nature 634

Raman Spectroscopy / Microscopy
attocube systems Inc. 1137
Barnett Technical Services 1038
Clark-MXR Inc 1009
HORIBA Scientific 631
Instec Inc. T - 1508
Linkam Scientific Instruments 1420
NT-MDT AMERICA, INC 926
Oxford Instruments 620
Quantum Design, Inc. 537
Queensgate/Prior Scientific T - 1514

Scanning Electron Microscopes (SEM)
Carl Zeiss Microscopy, LLC 519
ConnectomX Ltd 1239
COXEM 409
Delmic B.V. 1110
Digital Surf 1032
EmCrafts Co., Ltd 534
Euclid TechLabs, LLC 1140
Hitachi High-Tech America, Inc. 1204
Integrated Dynamics Engineering 1331
JEOL USA, Inc. 706
JH Technologies 409
Nanoscience Instruments 1112
Norcada, Inc. 831
Point Electronic GmbH 431
Raith America, Inc. 837
Scientific Bridge 413
SiriusXT Ltd 532
TESCAN 819
Thermo Fisher Scientific 1119
Voxa 840

Scanning Transmission Electron Microscopes (STEM)
Clark-MXR Inc 1009
DECTRIS Ltd 1012
Hitachi High-Tech America, Inc. 1204
Hummingbird Scientific 932
JEOL USA, Inc. 706
Nanoscience Instruments 1112
Nion Company 1104
Point Electronic GmbH 431
Quantum Detectors 1031
TESCAN 819
Thermo Fisher Scientific 1119

Scanning Tunneling Microscopes
3D-Micromac AG 1212
Digital Surf 1032
NT-MDT AMERICA, INC 926

Secondary Ion Mass Spectrometer (SIMS)
Physical Electronics 940

SEM / STEM Digital Imaging Systems
JH Technologies 409
Object Research Systems 425
PNDetector GmbH 432
Point Electronic GmbH 431
Quantum Detectors 1031
Raith America, Inc. 837
Thermo Fisher Scientific 1119
Voxa 840

SEM Accessories
3D-Micromac AG 1212
Advanced Microscopy Techniques Corp. 920
Bruker Corporation 832
ConnectomX Ltd 1239
Delmic B.V. 1110
DENSsolutions 1231
EmCrafts Co., Ltd 534
Ferrovac 1238
Gatan 504
Herzan LLC 924
HORIBA Scientific 631
### SEM Accessories cont.

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth</th>
</tr>
</thead>
<tbody>
<tr>
<td>ibss Group, Inc.</td>
<td>419</td>
</tr>
<tr>
<td>Instec Inc.</td>
<td>T - 1508</td>
</tr>
<tr>
<td>Integrated Dynamics Engineering</td>
<td>1331</td>
</tr>
<tr>
<td>Kleindiek Nanotechnik</td>
<td>1132</td>
</tr>
<tr>
<td>Ladd Research</td>
<td>732</td>
</tr>
<tr>
<td>Mel-Build</td>
<td>1023</td>
</tr>
<tr>
<td>Nanoscience Instruments</td>
<td>1112</td>
</tr>
<tr>
<td>NenoVision</td>
<td>423</td>
</tr>
<tr>
<td>Norcada, Inc.</td>
<td>831</td>
</tr>
<tr>
<td>Oxford Instruments</td>
<td>620</td>
</tr>
<tr>
<td>Pace Technologies</td>
<td>833</td>
</tr>
<tr>
<td>PNDetector GmbH</td>
<td>432</td>
</tr>
<tr>
<td>Point Electronic GmbH</td>
<td>431</td>
</tr>
<tr>
<td>Quantum Design, Inc.</td>
<td>537</td>
</tr>
<tr>
<td>XEI Scientific, Inc.</td>
<td>1013</td>
</tr>
</tbody>
</table>

### SEM Stages, Mounts and Holders

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectomX Ltd</td>
<td>1239</td>
</tr>
<tr>
<td>DENSsolutions</td>
<td>1231</td>
</tr>
<tr>
<td>EmCrafts Co., Ltd</td>
<td>534</td>
</tr>
<tr>
<td>EXpressLO LLC</td>
<td>839</td>
</tr>
<tr>
<td>Hitachi High-Tech America, Inc.</td>
<td>1204</td>
</tr>
<tr>
<td>Hummingbird Scientific</td>
<td>932</td>
</tr>
<tr>
<td>Kleindiek Nanotechnik</td>
<td>1132</td>
</tr>
<tr>
<td>Mel-Build</td>
<td>1023</td>
</tr>
<tr>
<td>Norcada, Inc.</td>
<td>831</td>
</tr>
<tr>
<td>Protochips, Inc.</td>
<td>410</td>
</tr>
<tr>
<td>Quantum Design, Inc.</td>
<td>537</td>
</tr>
<tr>
<td>Queensgate/Prior Scientific</td>
<td>T - 1514</td>
</tr>
<tr>
<td>Ted Pella Inc.</td>
<td>904</td>
</tr>
<tr>
<td>Tousimis</td>
<td>928</td>
</tr>
</tbody>
</table>

### Service & Repair

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carl Zeiss Microscopy, LLC</td>
<td>519</td>
</tr>
<tr>
<td>Duniway Stockroom Corp.</td>
<td>1027</td>
</tr>
<tr>
<td>RMC Boeckeler</td>
<td>1003</td>
</tr>
</tbody>
</table>

### Service Laboratories

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth</th>
</tr>
</thead>
<tbody>
<tr>
<td>COXEM</td>
<td>409</td>
</tr>
<tr>
<td>Helix Biоструктуры</td>
<td>1232</td>
</tr>
<tr>
<td>JH Technologies</td>
<td>409</td>
</tr>
<tr>
<td>Nanoscience Instruments</td>
<td>1112</td>
</tr>
<tr>
<td>Pacific Northwest CryoEM Center</td>
<td>1039</td>
</tr>
</tbody>
</table>
### Exhibitor Product Categories

#### Stage Automation
- Point Electronic GmbH 431
- Queensgate/Prior Scientific T - 1514
- Voxa 840

#### SQUID / Superconduction Quantum Interference Devices
- Quantum Design, Inc. 537

#### Stereoscopic Viewing Systems
- COXEM 409
- JH Technologies 409

#### Supplies
- Duniway Stockroom Corp. 1027
- ibidi USA, Inc. 633
- Ladd Research 732
- Microscopy Innovations, LLC 938
- NanoSoft T - 1512

#### Surface Analysis
- Barnett Technical Services 1038
- Clark-MXR Inc 1009
- Digital Surf 1032
- Hirox-USA, Inc. 738 738
- HORIBA Scientific 631
- Keyence Corporation of America 1131
- NenoVision 423
- NT-MDT AMERICA, INC 926
- Object Research Systems 425
- Physical Electronics 940
- Sigray, Inc. 1007
- TESCAN 819

#### Surface Profiling
- Clark-MXR Inc 1009
- COXEM 409
- Hirox-USA, Inc. 738
- JH Technologies 409
- Keyence Corporation of America 1131
- NenoVision 423

#### Tabletop SEM/TEM
- Angstrom Scientific Inc. 632
- Clark-MXR Inc 1009
- COXEM 409
- EmCrafts Co., Ltd 534
- Hitachi High-Tech America, Inc. 1204
- JEOL USA, Inc. 706
- JH Technologies 409
- Nanoscience Instruments 1112
- Voxa 840

#### TEM Accessories
- 3D-Micromac AG 1212
- Advanced Microscopy Techniques Corp. 920
- Barnett Technical Services 1038
- Bruker Corporation 832
- DECTRIS Ltd 1012
- DENSsolutions 1231
- Direct Electron, LP 1312
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Euclid TechLabs, LLC 1140
- EXpressLO LLC 839
- Gatan 504
- Herzan LLC 924
- Hummingbird Scientific 932
- ibss Group, Inc. 419
- Integrated Dynamics Engineering 1331
- Ladd Research 732
- Mel-Build 1023
- NanoMEGAS USA 731
- NanoSoft T - 1512
- Norcada, Inc. 831
- Oxford Instruments 620
- PNDetector GmbH 432
- Quantum Detectors 1031
- SPT Labtech / Quantifoil 1138
- Ted Pella Inc. 904
- Tousimis 928
- XEI Scientific, Inc. 1013

---

[www.microscopy.org/MandM/2023](http://www.microscopy.org/MandM/2023) for up-to-date meeting information
Exhibitor Product Categories

TEM Specimen Holders
- DENSsolutions 1231
- Euclid TechLabs, LLC 1140
- EXpressLO LLC 839
- Fischione Instruments 1311
- Hummingbird Scientific 932
- Mel-Build 1023
- NanoSoft T 1512
- Norcada, Inc. 831
- Protochips, Inc. 410
- Tousimis 928
- Voxa 840

Testing Equipment
- Barnett Technical Services 1038
- Herzan LLC 924
- Hirox-USA, Inc. 738
- ibidi USA, Inc. 633
- Instec Inc. T 1508

Transmission Electron Microscopes (TEM)
- Advanced Microscopy Techniques Corp. 920
- Clark-MXR Inc 1009
- DECTRIS Ltd 1012
- Euclid TechLabs, LLC 1140
- Hitachi High-Tech America, Inc. 1204
- Hummingbird Scientific 932
- Integrated Dynamics Engineering 1331
- JEOL USA, Inc. 706
- Midwest Center for Cryo-Electron Tomography 1037
- NanoMEGAS USA 731
- NanoSoft T 1512
- Norcada, Inc. 831
- Pacific Northwest CryoEM Center 1039
- Point Electronic GmbH 431
- Quantum Detectors 1031
- Scientific Bridge 413
- SiriusXT Ltd 532
- Thermo Fisher Scientific 1119
- Voxa 840

Vacuum Equipment
- Duniway Stockroom Corp. 1027
- Electron Microscopy Sciences / Quorum Technology / Diatome US 1004
- Ferrovac 1238
- Mel-Build 1023
- Norcada, Inc. 831
- Physical Electronics 940
- United Mineral and Chemical Corp. 1240

Vacuum Evaporators
- JEOL USA, Inc. 706
- Ladd Research 732

Vibration Isolation Systems
- Herzan LLC 924
- Integrated Dynamics Engineering 1331
- TMC 404

WDS Detectors & Systems
- Bruker Corporation 832
- Gatan 504
- Oxford Instruments 620
- PNDetector GmbH 432
- Thermo Fisher Scientific 1119

X-ray Analysis Equipment
- 3D-Micromac AG 1212
- Bruker Corporation 832
- Carl Zeiss Microscopy, LLC 519
- DECTRIS Ltd 1012
- HORIBA Scientific 631
- Linkam Scientific Instruments 1420
- Object Research Systems 425
- Oxford Instruments 620
- Physical Electronics 940
- PNDetector GmbH 432
- Scientific Bridge 413
- Sigray, Inc. 1007
- SiriusXT Ltd 532
- Spellman High Voltage Electronics Corp. 1011
- TESCAN 819
Stay up to Date
WITH THE INDUSTRY'S LEADING CONTENT
Subscribe today!
www.photonics.com/subscribe
<table>
<thead>
<tr>
<th>COMPANY</th>
<th>BOOTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D-Micromac AG</td>
<td>1212</td>
</tr>
<tr>
<td>Abberior Instruments America</td>
<td>538</td>
</tr>
<tr>
<td>Advanced Microscopy Techniques Corp.</td>
<td>920</td>
</tr>
<tr>
<td>Advanced Research Corporation</td>
<td>1337</td>
</tr>
<tr>
<td>Alemmis AG/Angstrom Scientific Inc.</td>
<td>632</td>
</tr>
<tr>
<td>Applied Physics Technologies</td>
<td>1214</td>
</tr>
<tr>
<td>attocube systems Inc.</td>
<td>1137</td>
</tr>
<tr>
<td>Barnett Technical Services</td>
<td>1038</td>
</tr>
<tr>
<td>BlueQuartz Software, LLC</td>
<td>433</td>
</tr>
<tr>
<td>Bruker Corporation</td>
<td>832</td>
</tr>
<tr>
<td>Cameca</td>
<td>404</td>
</tr>
<tr>
<td>Carl Zeiss Microscopy, LLC</td>
<td>519</td>
</tr>
<tr>
<td>Clark-MXR Inc</td>
<td>1009</td>
</tr>
<tr>
<td>ConnectomX Ltd</td>
<td>1239</td>
</tr>
<tr>
<td>COXEM</td>
<td>409</td>
</tr>
<tr>
<td>DECTRIS Ltd</td>
<td>1012</td>
</tr>
<tr>
<td>Delmic B.V.</td>
<td>1110</td>
</tr>
<tr>
<td>DENSsolutions</td>
<td>1231</td>
</tr>
<tr>
<td>DigiM Solution LLC</td>
<td>734</td>
</tr>
<tr>
<td>Digital Surf</td>
<td>1032</td>
</tr>
<tr>
<td>Direct Electron, LP</td>
<td>1312</td>
</tr>
<tr>
<td>Duniway Stockroom Corp.</td>
<td>1027</td>
</tr>
<tr>
<td>E. Fjeld Co. Inc.</td>
<td>1237</td>
</tr>
<tr>
<td>Electron Microscopy Sciences / Quorum Technology / Diatome US</td>
<td>1004</td>
</tr>
<tr>
<td>EmCrafts Co., Ltd.</td>
<td>534</td>
</tr>
<tr>
<td>Euclid TechLabs, LLC</td>
<td>1140</td>
</tr>
<tr>
<td>EXpressLO LLC</td>
<td>839</td>
</tr>
<tr>
<td>Ferrovac</td>
<td>1238</td>
</tr>
<tr>
<td>Fischione Instruments</td>
<td>1311</td>
</tr>
<tr>
<td>Gatan, Inc. / Edax</td>
<td>504</td>
</tr>
<tr>
<td>Helix Biostructures</td>
<td>1232</td>
</tr>
<tr>
<td>Herzan LLC</td>
<td>924</td>
</tr>
<tr>
<td>Hiros-USA, Inc.</td>
<td>738</td>
</tr>
<tr>
<td>Hitachi High-Tech America, Inc.</td>
<td>1204</td>
</tr>
<tr>
<td>HORIBA Scientific</td>
<td>631</td>
</tr>
<tr>
<td>Hummingbird Scientific</td>
<td>932</td>
</tr>
<tr>
<td>ibidi USA, Inc.</td>
<td>633</td>
</tr>
<tr>
<td>ibss Group, Inc.</td>
<td>419</td>
</tr>
<tr>
<td>Instec Inc.</td>
<td>T-1508</td>
</tr>
<tr>
<td>Integrated Dynamics Engineering</td>
<td>1331</td>
</tr>
<tr>
<td>JASCO</td>
<td>740</td>
</tr>
<tr>
<td>JEOL USA, Inc.</td>
<td>706</td>
</tr>
<tr>
<td>JH Technologies</td>
<td>409</td>
</tr>
<tr>
<td>Keyence Corporation of America</td>
<td>1131</td>
</tr>
<tr>
<td>Kleindiek Nanotechnik</td>
<td>1132</td>
</tr>
<tr>
<td>Ladd Research</td>
<td>732</td>
</tr>
<tr>
<td>Leica Microsystems</td>
<td>512</td>
</tr>
<tr>
<td>Linkam Scientific Instruments</td>
<td>1420</td>
</tr>
<tr>
<td>MAS: The Microanalysis Society</td>
<td>304</td>
</tr>
<tr>
<td>Mel-Build Corporation</td>
<td>1023</td>
</tr>
<tr>
<td>Microscopy Innovations, LLC</td>
<td>938</td>
</tr>
<tr>
<td>Midwest Center for Cryo-Electron Tomography</td>
<td>1037</td>
</tr>
<tr>
<td>MSA Mega Booth</td>
<td>1427</td>
</tr>
<tr>
<td>NanoMEGAS USA</td>
<td>731</td>
</tr>
<tr>
<td>Nanoscience Instruments</td>
<td>1112</td>
</tr>
<tr>
<td>NanoSoft, LLC.</td>
<td>T-1512</td>
</tr>
<tr>
<td>NenoVision</td>
<td>423</td>
</tr>
<tr>
<td>Nion Company</td>
<td>1104</td>
</tr>
<tr>
<td>Norcada, Inc.</td>
<td>831</td>
</tr>
<tr>
<td>NT-MDT AMERICA, INC</td>
<td>926</td>
</tr>
<tr>
<td>Object Research Systems</td>
<td>425</td>
</tr>
<tr>
<td>Oxford Instruments</td>
<td>620</td>
</tr>
<tr>
<td>Pace Technologies</td>
<td>833</td>
</tr>
<tr>
<td>Pacific Northwest CryoEM Center</td>
<td>1039</td>
</tr>
<tr>
<td>Panasas</td>
<td>1407</td>
</tr>
<tr>
<td>Physical Electronics</td>
<td>940</td>
</tr>
</tbody>
</table>

**COMPANY** | **BOOTH** |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PNDetector GmbH</td>
<td>432</td>
</tr>
<tr>
<td>Point Electronic GmbH</td>
<td>431</td>
</tr>
<tr>
<td>Prior Scientific</td>
<td>T-1514</td>
</tr>
<tr>
<td>Protochips, Inc.</td>
<td>410</td>
</tr>
<tr>
<td>Quantum Design, Inc.</td>
<td>537</td>
</tr>
<tr>
<td>Quantum Detectors</td>
<td>1031</td>
</tr>
<tr>
<td>Raith America, Inc.</td>
<td>837</td>
</tr>
<tr>
<td>Refeyn</td>
<td>1139</td>
</tr>
<tr>
<td>RMC Boeckeler</td>
<td>1003</td>
</tr>
<tr>
<td>Scientific Bridge</td>
<td>413</td>
</tr>
<tr>
<td>SEC Co. Ltd.</td>
<td>1304</td>
</tr>
<tr>
<td>Shuimu BioSciences</td>
<td>1133</td>
</tr>
<tr>
<td>Sigray, Inc.</td>
<td>1007</td>
</tr>
<tr>
<td>SiriusXT Ltd</td>
<td>532</td>
</tr>
<tr>
<td>Spellman High Voltage Electronics Corp.</td>
<td>1011</td>
</tr>
<tr>
<td>Springer Nature</td>
<td>634</td>
</tr>
<tr>
<td>SPT Labtech</td>
<td>1138</td>
</tr>
<tr>
<td>Ted Pella Inc.</td>
<td>904</td>
</tr>
<tr>
<td>TESCAN</td>
<td>819</td>
</tr>
<tr>
<td>Theia Scientific</td>
<td>1040</td>
</tr>
<tr>
<td>Thermo Fisher Scientific</td>
<td>1119</td>
</tr>
<tr>
<td>TMC / Cameca</td>
<td>404</td>
</tr>
<tr>
<td>Tousimis</td>
<td>928</td>
</tr>
<tr>
<td>TVIPS GmbH.</td>
<td>1019</td>
</tr>
<tr>
<td>United Mineral and Chemical Corp.</td>
<td>1240</td>
</tr>
<tr>
<td>VEC</td>
<td>1320</td>
</tr>
<tr>
<td>Vitrotem B.V.</td>
<td>1234</td>
</tr>
<tr>
<td>Voxxa</td>
<td>840</td>
</tr>
<tr>
<td>Xallent, Inc.</td>
<td>T-1504</td>
</tr>
<tr>
<td>XEI Scientific, Inc.</td>
<td>1013</td>
</tr>
<tr>
<td>ZoNexus LLC 1333</td>
<td>1333</td>
</tr>
</tbody>
</table>
# Index to Advertisers

<table>
<thead>
<tr>
<th>Company</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Micromac AG</td>
<td>page 4</td>
</tr>
<tr>
<td>Diatome</td>
<td>page 133</td>
</tr>
<tr>
<td>Digital Surf</td>
<td>page 121</td>
</tr>
<tr>
<td><strong>Electron Microscopy Sciences</strong></td>
<td>Back cover (page 154)</td>
</tr>
<tr>
<td>Gatan / EDAX</td>
<td>pages 152-153</td>
</tr>
<tr>
<td>ibss Group</td>
<td>page 16</td>
</tr>
<tr>
<td>Jeol</td>
<td>page 127</td>
</tr>
<tr>
<td>Linkam</td>
<td>page 118</td>
</tr>
<tr>
<td>NION</td>
<td>page 15</td>
</tr>
<tr>
<td><strong>Oxford Instruments NanoAnalysis</strong></td>
<td>page 31</td>
</tr>
<tr>
<td>Photonics Media</td>
<td>page 146</td>
</tr>
<tr>
<td>Ted Pella</td>
<td>page 134</td>
</tr>
<tr>
<td><strong>TESCAN</strong></td>
<td>page 136</td>
</tr>
<tr>
<td>XEI Scientific</td>
<td>page 135</td>
</tr>
<tr>
<td>Zeiss</td>
<td>Inside front cover (page 2)</td>
</tr>
</tbody>
</table>
Make the Most of Your Conference Experience with the Mobile App!

1. Search, Install and Open:
Go to the Apple App Store or Google Play and search for M&M 2023.

2. Login to the App
Use your registration ID as your password to login to the M&M 2023 app.

3. App Tips
Download the app before you go! Wi-Fi connection onsite can affect the functionality of the app.

Browse event information and create a personal schedule by tapping on the star next to the presentation titles.

- Receive Up-to-the-Minute Meeting & Presenter Info
- Multi-Device Sync
- Receive Alerts
- See Exhibitors
- Make Your Schedule
- View Maps & Floor Plans
- Connect with Colleagues & Friends
- Join in on Social Media with #MM2023
- And much, much more!

Available for download on or after Thursday, July 13
Gatan and EDAX are now combined to develop new approaches that uncover insights and explore the boundaries of your transmission and scanning electron microscopy (TEM and SEM) research. Under the Gatan name, customers will receive reliable, cutting-edge products of the highest quality while maintaining the responsive customer care that you expect.

Now together, let's discover how to achieve your next breakthrough.

Join Gatan at M&M 2023, booth 504, www.gatan.com/mm2023
Gatan and EDAX are now combined to develop new approaches that uncover insights and explore the boundaries of your transmission and scanning electron microscopy (TEM and SEM) research. Under the Gatan name, customers will receive reliable, cutting-edge products of the highest quality while maintaining the responsive customer care that you expect.

Now together, let’s discover how to achieve your next breakthrough.

Join Gatan at M&M 2023, booth 504, www.gatan.com/mm2023
More research, less prep...

The Prepmaster™ 5100 is a fully automated system that uses advanced robotics and liquid handling to prepare biological specimens for TEM. Simply select your protocol and let the robot perform your repetitive tasks for you. Transform your lab with automation. With reduced hands-on time you’ll see increased reliability and repeatability, giving you confidence in your results and efficiency in your workflows.

Features:
- Continuously heated sample dock
- Continuously heated or cooled reagent reservoirs
- Extremely effective hydraulic (aspirate/dispense) mixing
- Gentle and effective agitation with the 300–3000 RPM Agitation Station™
- Eight specimens processed in parallel
- Remote monitoring and control

SEE THE ROBOT IN ACTION  M&M 2023, BOOTH 1004