

Look inside for:
At-A-Glance Daily Schedule
Exhibitor Directory
Meeting & Venue Information



Onsite Program Guide & Exhibitor Information

M&M 2022

MICROSCOPY & MICROANALYSIS

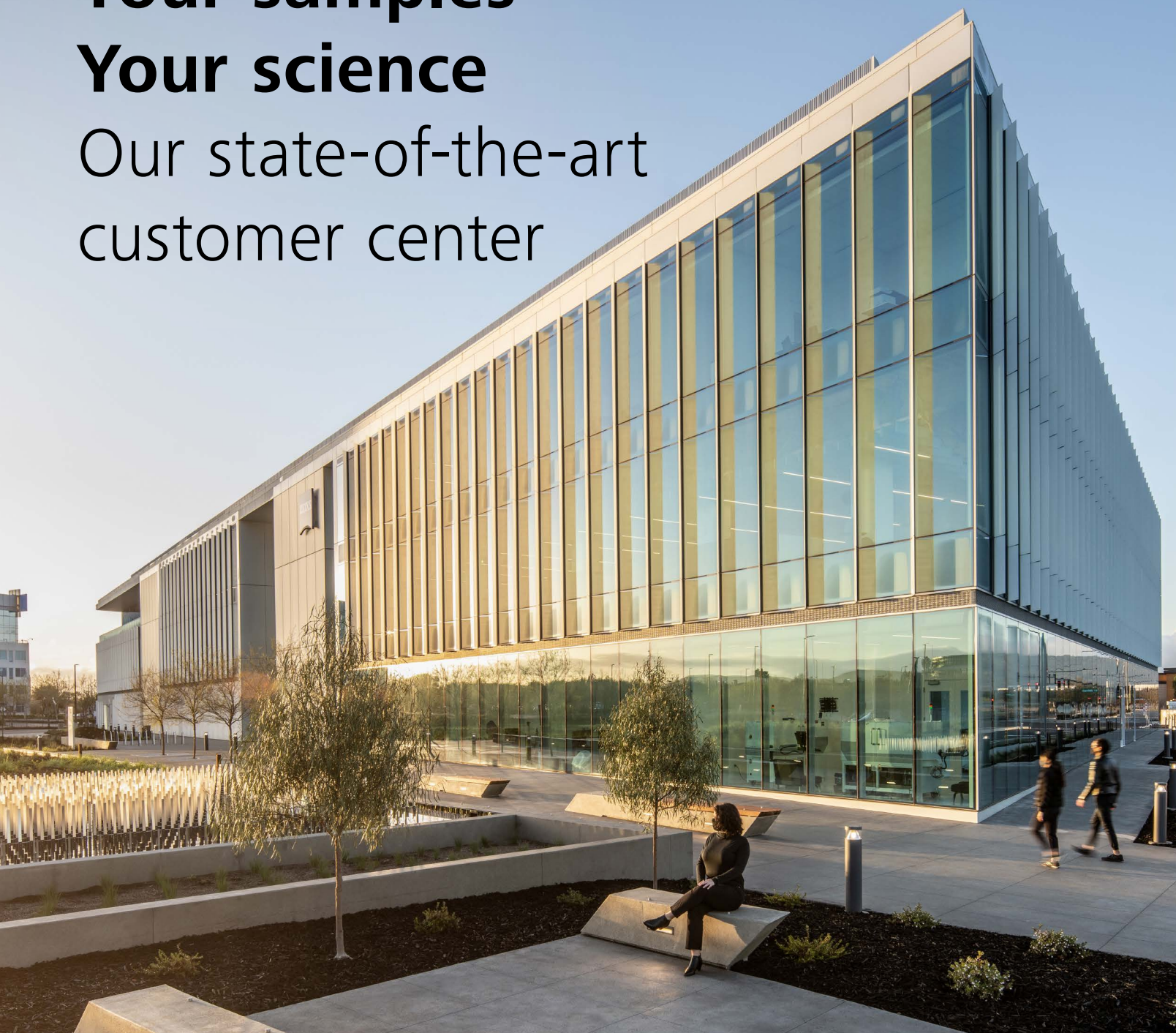
July 31-August 4 • Portland, OR



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Seeing beyond

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Scientific Program

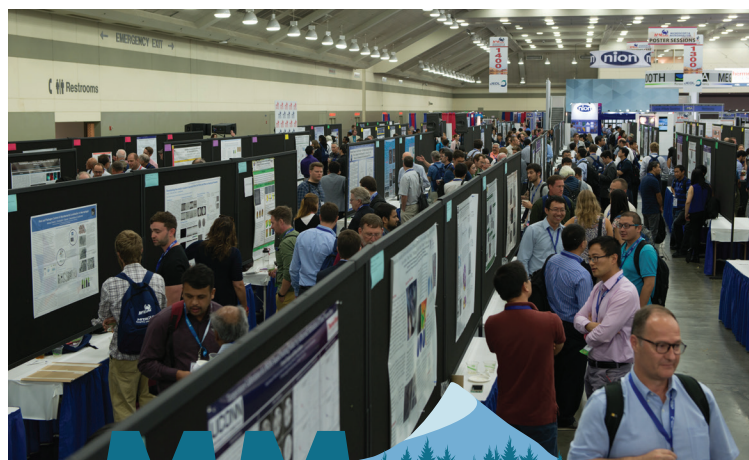
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M&M 2022

MICROSCOPY & MICROANALYSIS

July 31-August 4 • Portland, OR

COVER IMAGES, left to right:

1st Prize, unpublished

Natural Diamond by Nathan Renfro, Gemological Institute of America, Escondido, California

2nd Prize, published

Harpacticoid copepod (possibly Tigriopus) by Håkan Kvarnström, Bromma, Sweden

2nd Prize, unpublished

Feldspars with intergrown graphite by Bernardo Cesare, University of Padova, Padova, Italy

3rd Prize, unpublished

Midge larva by Andrei Savitsky, Independent Microscopist, Cherkasy, Ukraine



QUESTIONS?

TECHNICAL MEETING CONTENT:

2022 Program Chair

Eric Stach, University of Pennsylvania
MM2022ProgramChair@microscopy.org

REGISTRATION:

Registrar

MMRegistration@conferencemanagers.com

EXHIBITS & EXHIBITORS:

Exhibits Manager

doreen@corcexpo.com

SPONSORS & SPONSORSHIPS:

Sponsorship Manager

mary@corcexpo.com

GENERAL:

Meeting Manager

meetingmanager@microscopy.org

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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.



Visit <https://msc-smc.org> to find out the benefits of MSC – SMC membership.

Future Meeting Dates

July 23-27, 2023
MINNEAPOLIS, MN



July 28-August 1, 2024
CLEVELAND, OH



July 27-July 31, 2025
SALT LAKE CITY, UT



August 3-August 7, 2026
MILWAUKEE, WI



On behalf of the Microscopy Society of America (MSA), the Microanalysis Society (MAS), and the Microscopical Society of Canada (MSC – SMC), we welcome you to Microscopy & Microanalysis 2022 and back to Portland, Oregon.



For many of us what's old is new again. It has been a long 36 months since we were last able to meet to network, exchange ideas and the research we are passionate about. During the pandemic we continued to grow and forge ahead, and we met virtually to share and stay connected with our colleagues. But we are now ready to reengage and host our first in-person conference since August of 2019. Everything that you remember or have heard about Portland is still here – wonderful restaurants, microbreweries, distilleries, and wineries. Amazing activities from the mountains to the beach and everything in between. Whether you are an M&M veteran, a first-time attendee or student, this will feel as familiar as an old friend welcoming you back.

The meeting starts with Pre-Meeting Congresses on Saturday and Sunday, Short Courses on Sunday, and our Opening Welcome Reception that evening; an opportunity to reconnect and network with your colleagues. Our plenary session on Monday morning will showcase the awards for the sponsoring societies and the M&M meeting awards. We have also selected an outstanding plenary speaker in Dr. Wendy Garrett and presentation from the Alan Alda Center for Communicating Science hosted by Stony Brook University that we are excited for you to hear.

A return we are equally excited about is the opening of the largest global microscopy/microanalysis instrument exhibition and our vendor partners. For many exhibitors this is their first opportunity to display technology and reconnect with our attendees and members. Plan to spend your breaks on the show floor visiting the more than 100 companies in the exhibit hall and review posters and hear presentations that will culminate with a daily award session.

These are just a few of the highlights of the program and it has been our pleasure to bring it to you. For a complete description of all the symposia, contributed sessions, educational opportunities, and the multiple award possibilities from the three organizing societies, please visit: <https://www.microscopy.org/MandM/2022/>. For the most up to date information be sure to download the M&M 2022 mobile app by scanning the QR code below:



Whether just starting in your career, established, or retired, there is something here to inspire all and we can't wait for you to join us in Portland.

Eric Stach
Program Chair

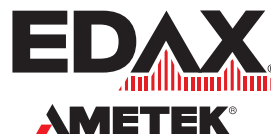
Ru-Ching Hsia
Program Co-Chair

Michelle Thompson
MAS Co-Chair

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M&M 2022 Vendor Tutorial:
Tuesday, August 2nd, 5:45 - 6:45PM
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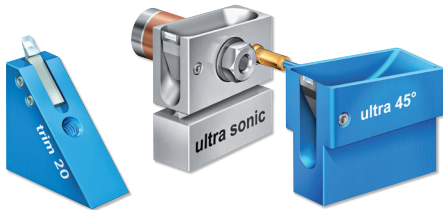
Cressington Coating Systems

Carbon Evaporation & Metal Sputtering
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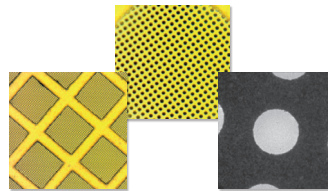
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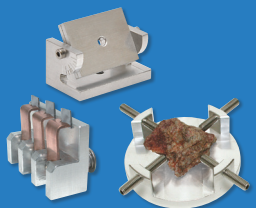
NEW Sizes Available PELCO Tabs™ Carbon Tabs



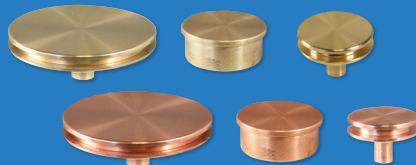
NEW PELCO® Qualitative Cellulose Filter Paper



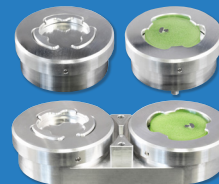
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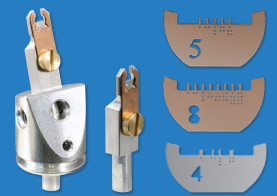
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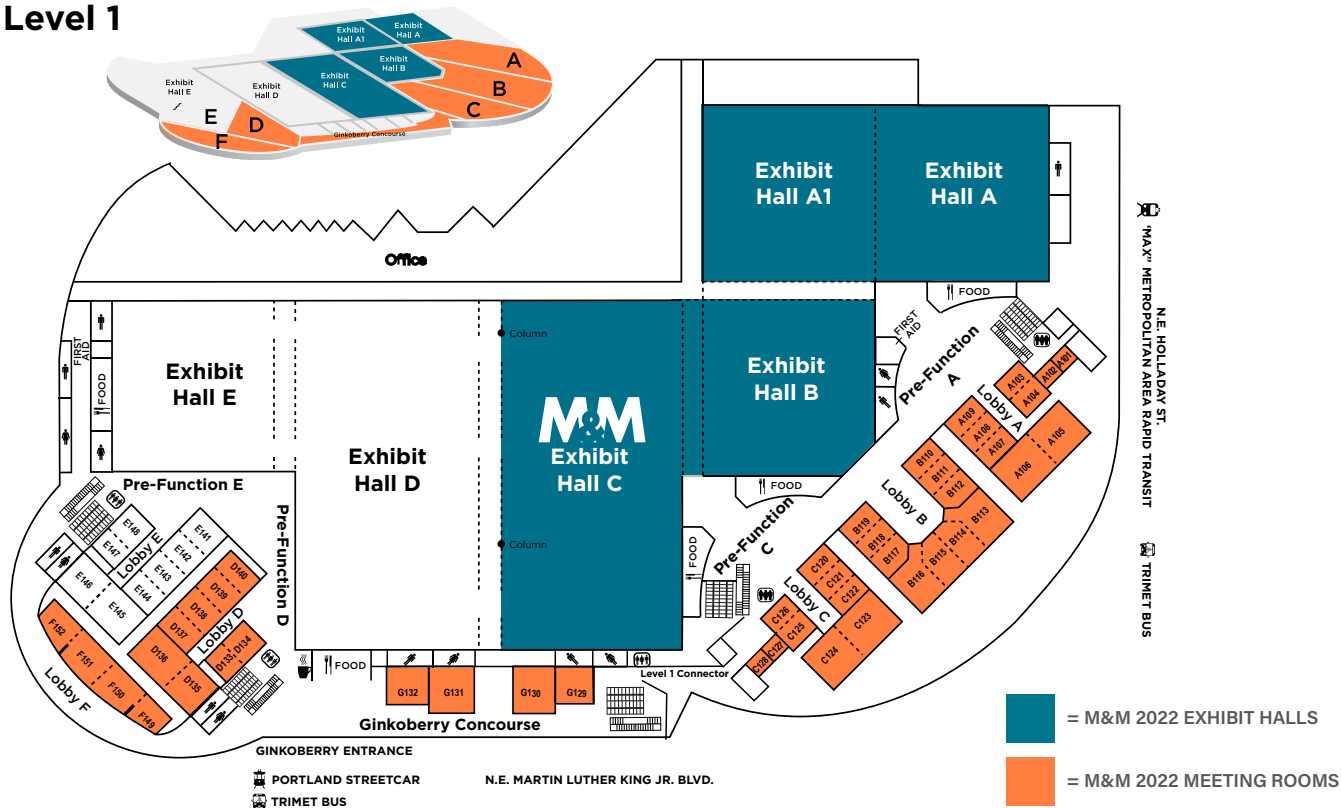
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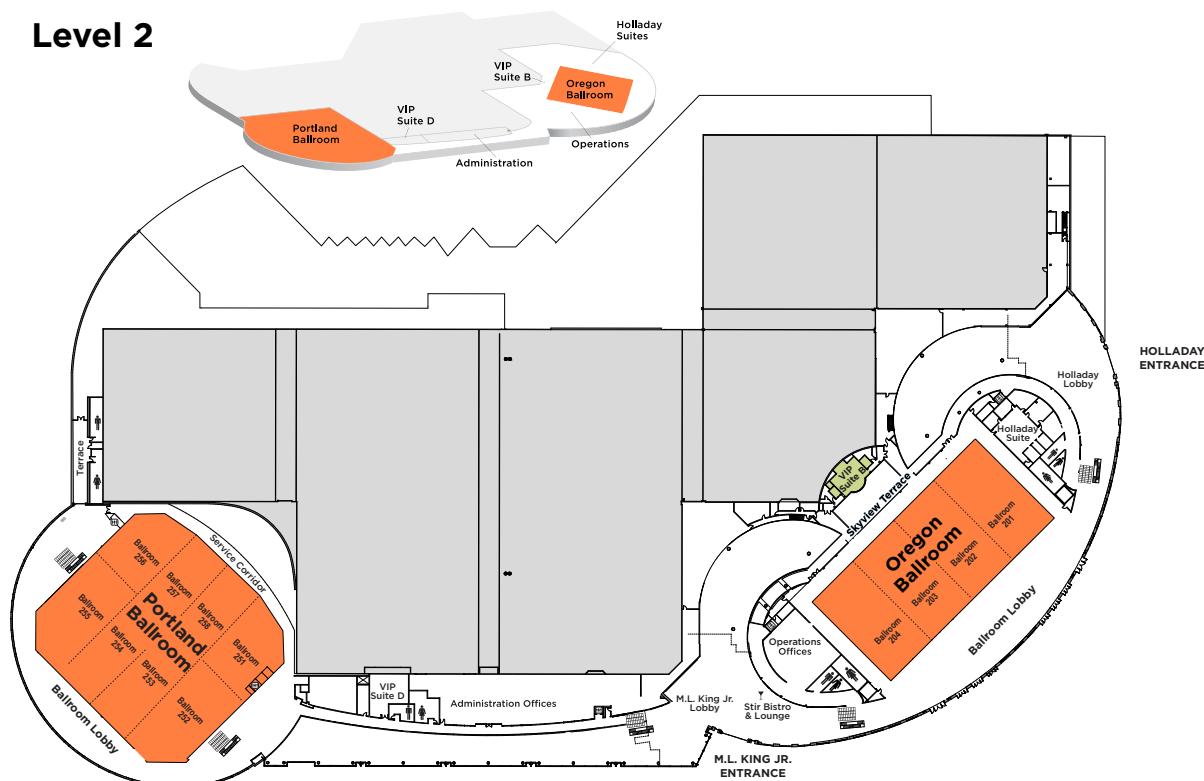
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Unless indicated otherwise, all official conference events are being held at the Oregon Convention Center, located on the east side (Convention Center District) of downtown Portland, Oregon.

Level 1



Level 2



Online registration will remain open throughout the meeting. We encourage you to register in advance!

- For the most up-to-date registration information, visit <https://www.microscopy.org/MandM/2022/>
- Registration can be done either online at: <https://www.microscopy.org/MandM/2022/registration/> or on-site at the meeting registration desk. We encourage you to register in advance and as early as possible.
- Member rates apply to all members (MSA, MAS, MSC - SMC). Membership will be verified.

Onsite Registration Desk

Oregon Convention Center

Pick up your badge and materials at the Registration desk according to the schedule below. The Sunday Welcome Reception starts at 6:30 PM in the Portland Ballroom (upper level of the Oregon Convention Center).

Registration Hours:

Friday, July 29*	8:00 am – 1:00 pm
Friday, July 29	1:00 pm – 6:00 pm
Saturday, July 30	8:00 am – 6:00 pm
Sunday, July 31	7:00 am – 7:30 pm
Monday, August 1	7:00 am – 6:00 pm
Tuesday, August 2	7:30 am – 5:00 pm
Wednesday, August 3	7:30 am – 5:00 pm
Thursday, August 4	7:30 am – 3:00 pm

*Exhibitors Only

Commercial Exhibition Hours:

Monday, August 1	12:00 pm – 5:30 pm
Tuesday, August 2	10:00 am – 5:30 pm
Wednesday, August 3	10:00 am – 5:30 pm
Thursday, August 4	10:00 am – 2:00 pm

Exhibitor Move-In:

Thursday, July 28*	8:00 am – 4:30 pm
Friday, July 29	8:00 am – 4:30 pm
Saturday, July 30	8:00 am – 4:30 pm
Sunday, July 31	8:00 am – 4:30 pm

*Targeted Island Booths Only

Exhibitor Move-Out:

Thursday, August 4	2:00 pm – 7:00 pm
Friday, August 5	8:00 am – 5:00 pm

M&M 2022
plenary sessions begin
on Monday, August 1
at 8:30 AM. Symposia
end on Thursday, August
4 at 5:00 PM. Please
plan your travel
accordingly!



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M&M 2022 Social Events

M&M 2022 Sunday Evening Welcome Reception

Oregon Convention Center

Portland | Ballroom (Upper Level)

Sunday, July 21, 2022 | 6:30 PM - 9:00 PM

One ticket is included with most registrations (see Registration Page for details). Additional tickets: \$50 each for adults; \$25 each for children 12 and under. **PLEASE NOTE:** *Onsite availability of tickets is not guaranteed.* Register for the meeting and buy extra tickets early to be sure that you're able to attend. This year's welcome event at the Oregon Convention Center will be a reunion—a chance to celebrate gathering for the first time since 2019. Enjoy a delicious Northwest inspired supper buffet and local brews; and catch up with friends and colleagues. After the reception, continue to catch up with old and new friends and head out to one of Portland's numerous pubs, microbreweries, or wine bars to extend the fun!



MAS Business Meeting and Social Event

for MAS Members Only!

WEDNESDAY, AUGUST 3, 2022
5:30 PM - 8:30 PM

Stop by the MAS booth in the lobby to check your membership status and pick up your ticket to the MAS Business Meeting and Social Event, starting on Wednesday, August 3, at 5:30 PM. The social event will be held in an offsite venue, away from the convention center.



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.



Microscopy Today Innovation Awards

WEDNESDAY, AUGUST 3, 2022
4:00 PM

Poster Awards Stage, Exhibit Hall

M&M 2022 Meeting Schedule

All events to be held at the Oregon Convention Center unless otherwise noted.

Friday, July 29, 2022

8:30 AM	MSA Council	Deschutes A/B
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Saturday, July 30, 2022

8:30 AM	MSA Council	Deschutes A/B
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Sunday, July 31, 2022

3:00 PM	<i>Microscopy Today</i> Editors	G132
6:30 PM	Opening Reception	Portland Ballroom

Monday, August 1, 2022

7:15 AM	MSA Awards Committee	G132
7:15 AM	Technologists' Forum Board	G130
7:15 AM	M&M Meeting Award Committee	G131
12:15 PM	MAS Meal with a Mentor	C124
12:15 PM	FIG: Pharmaceuticals	G130
12:15 PM	FIG: Diagnostic & Biomedical Microscopy	
12:15 PM	FIG: Focused Ion Beam	G131
12:15 PM	FIG: Atom Probe Field Ion Microscopy	C120
12:15 PM	FOM FIG Roundtable	A104
12:15 PM	International Committee	G132
3:30 PM	Technologists' Forum Business Meeting	G130
3:30 PM	3D EM in the Biological Sciences FIG	B110
5:30-7 PM	MSA Student Council Meeting and Student Mixer	G131
5:45-6:45 PM	Vendor Tutorials (<i>Sign Up at MSA MegaBooth</i>)	



Meeting Schedule cont.

All events to be held at the Oregon Convention Center unless otherwise noted.

Tuesday, August 2, 2022

7:15 AM	MSA Local Affiliated Societies & MAS Affiliated Regional Societies	G131
7:15 AM	<i>Microscopy Today</i> – Editorial Board Breakfast	G130
10:00 AM	M&M 2023 – Program Planning Meeting for Symposia Organizers	C121
12:15 PM	FOM FIG Lunch Meeting	G131
12:15 PM	MSA Distinguished Scientist Awardee Lectures	C124
12:15 PM	FIG: Cryo-Preparation	G130
12:15 PM	FIG: Electron Microscopy in Liquids and Gases	C120
12:15 PM	FIG: Electron Crystallography	G132
12:15 PM	FIG: MicroAnalytical Standards	D140
3:30 PM	FIG Business Meeting	C120
3:30 PM	MSA Education Committee	G132
3:30 PM	MSA Education Outreach Committee Meeting	G130
5:30 PM	Post-Doctoral Researchers' Reception	A104
5:45–6:45 PM	Vendor Tutorials (<i>Sign Up at MSA MegaBooth</i>)	
6:30–8:30 PM	Presidents' Reception (<i>Offsite, Invitation Only</i>)	

Wednesday, August 3, 2022

7:15 AM	MaM Editorial Board	G131
7:15 AM	MSA Certification Board	G132
7:15 AM	MSA Membership Committee	G130
12:15 PM	MSA Members' Meeting	C124
3:30 PM	FIG: Operation-Corrected Microscopy	C122
5:15 PM	MAS Business Meeting	C124
5:30 PM	Diversity and Inclusion Meet-up	G131
5:45–6:45 PM	Vendor Tutorials (<i>Sign Up at MSA MegaBooth</i>)	
6:30 PM	MAS Members' Social (<i>See MAS Booth for Details</i>)	

Thursday, August 4, 2022

8:30 AM	M&M Sustaining Members Meeting	G131
12:15 PM	MSA Standards/MAS - ANSI Committee Meeting	G130

Safe Meeting Guidelines



As of June 1, 2022

MSA & MAS continue to monitor official Centers for Disease Control COVID-19 safety protocols working closely with our partners at the Oregon Convention Center, the city of Portland and Multnomah County, and the state of Oregon. Guidelines are changing constantly across the United States and we are working to create the safest environment possible for this event. Participant well-being is our first priority. Here's what we're doing to protect your health and peace of mind so you can focus on getting the most from this event.

- **Vaccine Verification:** All registered, in-person attendees must provide proof of full vaccination status. No exceptions. Any individual attending M&M 2022—including all attendees, exhibitors, staff and service partners—will be verified as fully vaccinated.
- **Masks Required:** Masks will be required within the event space, hotels and all special function venues in accordance with the City of Portland mask requirement.
 - **Speakers will be permitted to remove their masks when actively giving their presentations, if they wish.**
 - Attendees will be permitted to remove their masks **briefly** while actively eating or drinking at official M&M 2022 functions.

Access to Live Conference and Exhibition

M&M will adhere to venue meeting procedures and guidelines and will follow strict CDC guidance for meetings and events while allowing guests to come together safely.

M&M will require proof of full vaccination to enter this event. There are no exceptions. Any individual attending the M&M 2022 in-person events including: registered attendees, guests, exhibitors and M&M staff, OCC staff, and service partners must be fully vaccinated in order to gain access to this event.

▪ **Proof of Vaccination:**

Proof of a CDC-issued vaccination card, WHO-approved vaccination card, or vaccination record from your physician is required. Your proof of vaccination must include the type of vaccination provided and the date that the last dose was administered. A digital photo of a CDC-issued vaccination card stored on a phone or electronic device, or a printed photo of a CDC-issued vaccination card are acceptable in addition to the original card or record.

- **Defining Fully Vaccinated:** A person is considered fully vaccinated 14-days after their final dose of a two-dose vaccine series, such as the Pfizer and Moderna vaccines or any World Health Organization approved vaccine.

No Vaccine Exemptions:

If an attendee, exhibitor, or M&M staff member does not meet the vaccine requirements outlined on this page, they are NOT considered fully vaccinated and will not be permitted to attend M&M 2022 in-person.

Patience, Please

As has been the case for the past two years, the situation is changing constantly, and guidelines are fluid. M&M reserves the right to change these guidelines at any time and to deny entry to this event to any participant not in compliance with these guidelines. Please be patient with event organizers, facility partners, and your fellow event participants, and please operate with kindness and understanding.

M&M will continue to evaluate what is best for event participants to ensure we meet safely and that every attendee and member of the staff and service communities are comfortable.

Additional questions can be directed to meetingmanager@microscopy.org.



MegaBooth in the EXHIBIT HALL

Open during all exhibit hall hours.

The **MSA MEGABOOTH** showcases all that MSA membership has to offer. Stop by to learn about MSA and our mission and receive information about the memberships available—Regular, Sustaining (corporate), and Student levels. If you are currently a member, stop by to catch up on all the new society developments and network with your colleagues.

Sign up for **VENDOR TUTORIALS** here! These popular sessions are presented on Monday, Tuesday, and Wednesday evenings after the exhibit hall has closed for the day. Don't miss out – advance registration is required!

The **TECHNOLOGISTS' FORUM (TF)**: Attention Technologists! Stop by to find out how you can grow and develop your skills, your professional career, and your network by joining the Forum!

The **PLACEMENT OFFICE** is MSA's job-listing service. Post a job, peruse job listings, post a resume, and/or find that perfect candidate for your job opening. All for **FREE** during the meeting!

The Microscopy Society of America offers several programs to help its **LOCAL AFFILIATED SOCIETIES** hold successful meetings through the Tour Speaker and Meeting Funding programs. For more information on programs and participating societies visit <http://microscopy.org>.

The logo for the M&M 2022 Microscopy & Microanalysis meeting features the letters "M&M" in a large, bold, blue font, with the year "2022" in a large, bold, orange font. To the right of the text is a stylized graphic of a mountain range with evergreen trees. Below the main text is the title "MICROSCOPY & MICROANALYSIS" in a bold, blue, sans-serif font.

M&M 2022 MICROSCOPY & MICROANALYSIS

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

MICROSCOPY and MICROANALYSIS and **MICROSCOPY TODAY** 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 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 **PROJECT MICRO** display located in the MSA MegaBooth to learn about this organization's education and outreach goals. Learn how to set up different stations in a classroom and share your fun microscopy outreach classroom experiences! See different microscope systems in action for use in a classroom and peruse a selection of books suitable for elementary school-age children.

Join other MSA members to engage in topics of shared interest and promote specific disciplines relevant to microscopy and microanalysis by becoming a member of a **Focused Interest Group (FIG)**.

Meet with **MSA Student Council** officers and learn about the growing community of students, postdocs, and early-career professionals in microscopy and microanalysis. Build your professional network, share experiences, discuss research, and find out how to get more involved with the most dynamic group of young professionals that microscopy and microanalysis has to offer.

Thank you

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As of May 20, 2022

Visit **www.microscopy.org/MandM/2022** for

M&M 2022 Week At-A-Glance

Exhibitor and Sponsor Listings

Pre-Meeting Congresses

Full Symposium Descriptions

Microscopy Outreach

Sunday Short Courses

Tutorials

Technologists' Forum

... and more!



MSA PAST PRESIDENTS

1942	G.L. Clark	1975	Gareth Thomas	2008	William T. Gunning
1943	R. Bowling Barnes	1976	Etienne de Harven	2009	David J. Smith
1944	R. Bowling Barnes	1977	Thomas E. Everhart	2010	David W. Piston
1945	James Hillier	1978	Myron C. Ledbetter	2011	Nestor J. Zaluzec
1946	David Harker	1979	John Silcox	2012	Janet H. Woodward
1947	William G. Kinsinger	1980	Michael Beer	2013	Ernest L. Hall
1948	Perry C. Smith	1981	John J. Hren	2014	Jeanette Killius
1949	F.O. Schmitt	1982	Lee Peachey	2015	John F. Mansfield
1950	Ralph W.G. Wyckoff	1983	David B. Wittry	2016	Michael Marko
1951	Robley C. Williams	1984	J. David Robertson	2017	Ian M. Anderson
1952	R.D. Heidenreich	1985	Dale E. Johnson	2018	Robert L. Price
1953	Cecil E. Hall	1986	Robert M. Glaeser	2019	Paul Kotula
1954	Robert G. Picard	1987	Linn W. Hobbs	2020	Esther Bullitt
1955	Thomas F. Anderson	1988	Jean Paul Revel	2021	Peter Crozier
1956	William L. Grube	1989	Ray W. Carpenter		
1957	John H.L. Watson	1990	Keith R. Porter		
1958	Max Swerdlow	1991	Charles E. Lyman		
1959	John H. Reisner	1992	Patricia Calarco		
1960	D. Gordon Sharp	1993	Michael S. Isaacson		
1961	D. Maxwell Teague	1994	Robert R. Cardell		
1962	Keith R. Porter	1995	Terence E. Mitchell		
1963	Charles Schwartz	1996	Margaret Ann Goldstein		
1964	Sidney S. Breese	1997	C. Barry Carter		
1965	Virgil G. Peck	1998	Ralph M. Albrecht		
1966	Walter Frajola	1999	David C. Joy		
1967	Joseph J. Comer	2000	Kenneth H. Downing		
1968	John H. Luft	2001	Ronald M. Anderson		
1969	Wilbur C. Bigelow	2002	Stanley L. Erlandsen		
1970	Russell Steere	2003	J. Alwyn Eades		
1971	Robert M. Fisher	2004	Sara E. Miller		
1972	Daniel C. Pease	2005	M. Grace Burke		
1973	Benjamin Siegel	2006	W. Gray (Jay) Jerome		
1974	Russell J. Barnett	2007	Michael A. O'Keefe		

2022 COUNCIL - OFFICERS AND DIRECTORS

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Director (Local Affiliated Societies)	Ru-Ching Hsia
Director	Masashi Watanabe
Director	Cheri Hampton
Director	Donovan Leonard
Director	Feng-Xia (Alice) Liang
Director	Peter Ercius

APPOINTED OFFICERS

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By-Lays Committee Chair	Peter Crozier
Certification Board Chair	Rudy Alvarado
Educational Outreach Committee Chair	Josh Silverstein
Educational Outreach Committee Vice Chair(s)	Isabel Boona
Educational Resources Chair	Miaofang Chi
Fellows Committee Chair	Andrew Minor
Finance	
International Committee	David Bell
Membership Committee Chair	Joe Mowry
Nominating Committee Chair	Peter Crozier
Placement Office Chair	Joe Patterson
Sustaining Members Chair	Stephen Mick
Standards Committee	Nestor Zaluzec
Student Council President	Aubrey Penn
Technologists' Forum Chair	Page Baluch
Volunteer Coordinator	I-Wei Chu
Diversity, Equity and Inclusion Task Force Chair	Treva Brown

FOCUSED INTEREST GROUPS

Focused Interest Group Chair	Katie Jungjohann
3D Electron Microscopy in the Biological Sciences	Bill Rice
Aberration-Corrected Electron Microscopy	Robert Klie
Atom Probe Field Ion Microscopy	David Diercks
Cryo-preparation	Kim Rensing
Diagnostic Microscopy	Claudia Lopez
Electron Crystallography and Automated Mapping Techniques	Roberto dos Reis
EM Data Analysis and Management	Alex Rakowski
Electron Microscopy in Liquids and Gas (EMLG)	Katie Jungjohann
Facilities Operation & Management (FOM)	Luisa Amelia Dempere
Focused Ion Beam	Josh Sugar
Pharmaceuticals	Daniel Skomski
MicroAnalytical Standards	Will Nachlas

SOCIETY & MEETING MANAGEMENT

Association Management	Virtual Inc.
Managing Director	Ashley Carey
Communications Manager/ Program Specialists	Courtney Eiland, Caitlin McAuslin
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	Deborah Stokes, Alex Napier, Shelly Su, Heather Seasholtz, Melanie Hardcastle
Meeting & Registration Managers	
Exhibition Management	CorcoranExpositons, Inc.
Exhibits & Sponsorship Management	Doreen Bonnema, Mary Michalik

2022 STUDENT COUNCIL

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Past President	Abinash Kumar
President - Elect	Louisa Mezache
Secretary	Jackson Spurling
Treasurer	Piyush Haluai

PUBLICATIONS

Microscopy and Microanalysis Editor in Chief	John F. Mansfield
Scientific Program Editor (Elements Editor)	Beth Dickey
M&M 2022 Proceedings Editor	Gail Celio
Microscopy Today Editor In Chief	Robert Price
M&M 2022 Annual Meeting Program Chair	Eric Stach

2022

Miaofang Chi
Stig Helveg
Cynthia S. Goldsmith

2021

Sergei Kalinin
Robert Klie
Paul Kotula
Pamela Lloyd
Rhonda Stroud
Chongmin Wang

2020

Ian M. Anderson
Elizabeth C. Dickey
J. Bernard Heymann
Masashi Watanabe

2019

Wilbur C. Bigelow
Edward D. Boyes
Pratibha L. Gai
Ronald Gronsky
Maximilian Haider
Michael Marko
David W. McComb
Karren L. More

2018

Wen-An Chiou
Linn W. Hobbs
Elaine C. Humphrey
Kazuo Ishizuka
David J. Larson
Guillermo Solórzano-Naranjo
Judith C. Yang
Jian Min Zuo

2017

David Bell
Paul Fischione
Chris Kiely
Jeanette Killius
Laurie Marks
Peter Rez
Phil Russell
Heide Schatten

2016

Helmut Gnaegi
Ernie Hall
David Mastronarde
Stuart McKernan
Renu Sharma
Ken Taylor
Jim Wittig

2015

Rafal Dunin-Borkowski
Ann Ellist†
Miguel José-Yacamán
Kent McDonald
Frank Platek
Mike Postek
Susanne Stemmer
Mike Treacy

2014

Gianluigi Botton
Abhaya Datye
Marija Gajdardziska-Josifovska
Lucille Giannuzzi
Tom Kelly
John Mansfield
Molly McCartney
Xiaoqing Pan
Dave Piston

2013

Nigel Browning
Hamish Fraser
David Muller
Michael Radermacher
Dave Smith
Eric Stach

2012

Ann Goldstein
Moon Kim
Bill Landis
Jimmy Liu
Bev Maleeff
Bob Price
Frances Ross
Dave Seidman
Debbie Sherman
Nan Yao

2011

Phil Batson
Pat Calarco
Peter Crozier
Alwyn Eades
Brendan Griffin
Bill Gunning
Jay Jerome
Richard Leapman
Charlie Lyman
Mike O'Keefe
George Perry
Bob Simmons
Janet Woodward

2010

Ralph Albrecht
Larry Allard
Ken Downing
Joe Goldstein†
Mike Miller
Steve Pennycook
John Petrali
Z.L. Wang
Dave Williams

2009

Ron Anderson
Jim Bentley
Gracie Burke
Ray Carpenter
Barry Carter
Mark DeGraef
Vinayak David
Raymond Hart
David Joy
Joe Michael
Sara Miller
Dale Newbury
Caroline Schooley
Nestor Zaluzec
Yimei Zhu

2022 Distinguished Scientist Awards

PHYSICAL SCIENCES

Rudolf Tromp

IBM Yorktown Heights &
University of Leiden

Rudolf Tromp is a scientist at the New York IBM T.J. Watson Research Center and professor of physics at Leiden University. In 1989, after working with Medium Energy Ion Scattering and Scanning Tunneling Microscopy, he jumped into the then fledgling field of Low Energy Electron Microscopy (LEEM) and designed and built the second operational LEEM instrument in the world (1991). Continuing improvements culminated in an aberration-corrected instrument (available through SPECS Instruments GmbH in Berlin) with ~1.5 nm resolution, about two times the wavelength of the 3.5 eV electrons used for imaging. He has applied LEEM to a range of topics in surface and interface science, including phase transitions, epitaxial growth, formation of quantum dots and nanowires, organic semiconductors, low energy electron beam exposure and lithography, electronic structure of 3D and 2D materials, etc. Tromp is the (co)author of about 280 publications, and holder of 47 US and International Patents. He is a fellow of APS, AVS, and MRS, and the recipient of the Wayne B. Nottingham Prize, the APS Davisson-Germer Prize, the APS Distinguished Lectureship Award on the Applications of Physics, the MRS Medal, and the AVS Medard W. Welch Award. He is also a member of the US National Academy of Engineering.



BIOLOGICAL SCIENCES

Kenneth A. Taylor

Florida State University

Professor Kenneth A. Taylor received his Ph.D. degree in Biophysics in 1975 from the University of California at Berkeley. His Ph.D. research demonstrated the feasibility of obtaining high resolution image data from unstained protein crystals embedded in ice. He then spent 4 years at the MRC Laboratory of Molecular Biology in Cambridge, England where he learned 3-D image reconstruction and started a 48-year career working on muscle structure and function. There followed a research faculty appointment in the Anatomy Department at Duke University Medical Center and then in 1995 a faculty appointment at Florida State University where he is currently employed.



	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES
1975	Keith R. Porter	Robert Heidenreich
1976	L.L. Marton	Albert V. Crewe
1977	Robley C. Williams	James Hillier
1978	Thomas Anderson	Vernon E. Cosslett
1979	Daniel C. Pease	John M. Cowley
1980	George E. Palade	Gareth Thomas
1981	Sanford L. Palay	Vladimir K. Zworykin
1982	Richard M. Eakin	Benjamin M. Siegel
1983	Hans Ris	Otto Scherzer
1984	Cecil E. Hall	Charles W. Oatley
1985	Gaston Dupouy	Ernst Ruska
1986	F. O. Schmitt	Peter B. Hirsch
1987	Marilyn G. Farquhar	Jan B. LePoole
1988	Morris J. Karnovsky	Hatsujiro Hashimoto
1989	Don W. Fawcett	Elmar Zeitler
1990	Audrey M. Glauret	Gertrude F. Rempfer
1991	Hugh E. Huxley	Archibald Howie
1992	Fritiof Sjöstrand	Oliver C. Wells
1993	Jean-Paul Revel	Kenneth C.A. Smith
1994	Andrew P. Somlyo	Dennis McMullan
1995	Shinya Inoué	David B. Wittry
1996	Myron C. Ledbetter	John Silcox
1997	S. J. Singer	Peter R. Swann
1998	Avril V. Somlyo	Michael J. Whelan

	BIOLOGICAL SCIENCES	PHYSICAL SCIENCES
1999	Sir Aaron Klug	Takeo Ichinokawa
2000	K. Tokuyasu	S. Amelinckx
2001	Patrick Echlin	Thomas Mulvey
2002	Marc Adrian	Ryuichi Shimizu
2003	Joachim Frank	Harald Rose
2004	Robert M. Glaeser	Raymond F. Egerton
2005	Richard Henderson	Sumio Iijima
2006	Joseph S. Wall	John C.H. Spence
2007	Nigel Unwin	Terence E. Mitchell
2008	Alasdair C. Steven	Ondrej L. Krivanek
2009	Jacques Dubochet	Robert Sinclair
2010	George Papas	Michael S. Isaacson
2011	Ueli Aebi	Hannes Lichte
2012	Timothy S. Baker	Ulrich Dahmen
2013	David J. DeRosier	C. Barry Carter
2014	Wah Chiu	David J. Smith
2015	Michael W. Davidson	Peter W. Hawkes
2016	Kenneth H. Downing	George W. Smith
2017	David W. Piston	Nestor J. Zaluzec
2018	Richard Leapman	Yimei Zhu
2019	Bridget Carragher	Philip E. Batson
2020	Xiaowei Zhuang	David N. Seidman
2021	David Agard	Maximilian Haider
		Knut W. Urban

BURTON MEDAL PHYSICAL AWARD

Colin Ophus

Lawrence Berkeley National Laboratory

Colin Ophus received his BSc in Engineering Physics in 2005, and his PhD in Materials Engineering in 2010, both from the University of Alberta in Canada. He is now a staff scientist at the National Center for Electron Microscopy, part of the Molecular Foundry at Lawrence Berkeley National Lab, where he runs both a user program and independent research group. His research focuses on data science methods, algorithms, and codes for simulation, analysis, and design of transmission electron microscopy experiments.



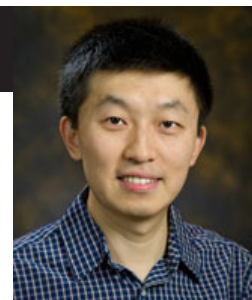
BURTON MEDAL BIOLOGICAL AWARD

Yuan He

Northwestern University

Dr. He obtained his Ph.D. in Biochemistry and Biophysics from Northwestern University. After doing a post-doctoral training with Eva Nogales at Berkeley, California, Dr.

He returned to Northwestern University as an assistant professor to set up his independent lab. His lab is interested in studying the molecular mechanisms by which large, multi-subunit complexes engage in DNA-centric processes. Current research topics include two main areas: (1) how eukaryotic gene transcription is regulated at different stages and (2) how various types of DNA damage are repaired and why deficiencies in these repair pathways lead to pathology of cancer predisposition or accelerated aging.



YEAR RECIPIENT

1975	James Lake
1976	Michael S. Isaacson
1977	Robert Sinclair
1978	David C. Joy
1979	Norton B. Gilula
1980	John C.H. Spence
1981	Barbara J. Panessa-Warren
1982	Nestor J. Zaluzec
1983	Ronald Gronsky
1984	David B. Williams
1985	Richard D. Leapman
1986	J. Murray Gibson
1987	Ron A. Milligan
1988	A.D. Romig, Jr.
1989	Laurence D. Marks
1990	W. Mason Skiff
1991	Joseph R. Michael
1992	Kannan M. Krishnan
1993	Joseph A.N. Zasadzinski
1994	Jan M. Chabala
1995	Joanna L. Batstone
1996	Vinayak P. Dravid
1997	P.M. Ajayan
1998	Ian M. Anderson

1999	Zhong Lin Wang
2000	Eva Nogales
2001	Jian Min Zuo
2002	Nigel D. Browning
2003	Frances M. Ross
2004	Z. Hong Zhou
2005	David J. Larson
2006	David A. Muller
2007	Peter D. Nellist
2008	Steven J. Ludtke
2009	Eric A. Stach
2010	Sergei V. Kalinin
2011	Radostin Danev
2012	David S. Ginger
2013	John L. Rubinstein
2014	Maria Varela
2015	Andrew M. Minor
2016	Miaofang Chi
2017	Christopher J. Russo
2018	Lena F. Kourkoutis
2019	Hari Shroff
2020	James M. LeBeau (Physical winner)
	Brent L. Nannenga (Biological winner)
2021	Huolin Xin (Physical winner)
	Reto Fiolka (Biological winner)

2022 Major Society Awards

MORTON D. MASER DISTINGUISHED SERVICE AWARD

Edward Patrick Calomeni

The Ohio State University Medical Center

Edward Calomeni earned a B.S. in Medical Technology and a B.S. in Microbiology 1980 from Michigan State University, where he learned transmission electron microscopy. In 1981, Edward moved to Baylor College of Medicine, Houston, Texas to work in the Department of Virology. The majority of his endeavors involved rotavirus research but was part of the very early HIV research. In 1991, Edward moved to a human clinical EM lab at the Medical College of Ohio (now the University of Toledo Health Science Center). Edward is currently at Wexner Medical Center Ohio State University. He became a member of MSA's Certification Board in 1993 and remains active on the Board today.



YEAR	RECIPIENT		
1992	Ronald M. Anderson	2002	Beverly E. Maleeff
	G. W. Bailey	2003	M. Grace Burke
	Frances L. Ball	2004	Ralph M. Albrecht
	M. Blair Bowers	2005	W. Gray (Jay) Jerome
	Deborah L. Clayton	2006	Jeanette Killius
	Joseph Harb	2007	Robert L. Price
	Kenneth R. Lawless	2008	Stuart McKernan
	Morton D. Maser	2010	Pamela F. Lloyd
	Caroline Schooley	2011	Janet H. Woodward
	John H.L. Watson	2012	Gina E. Sosinsky
1993	E. Laurence Thurston	2013	Caroline A. Miller
1994	Richard F.E. Crang	2014	Michael Marko
1995	Raymond K. Hart	2015	JoAn Hudson
1996	José A. Mascorro	2016	Amanda Lawrence
1997	William T. Gunning III	2017	David W. Tomlin
1998	Nestor J. Zaluzec	2018	Donovan N. Leonard
1999	Charles E. Lyman	2019	<i>Not Awarded</i>
2000	Barbara A. Reine	2020	John Shields
	Hildegard H. Crowley	2021	Leona Cohen-Gould

ALBERT CREWE AWARD

Jordan Adam Hachtel

Oak Ridge National Laboratory

Jordan Hachtel is a staff scientist at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory. He received his Ph.D. in Physics from Vanderbilt University and performed his postdoctoral research at Oak Ridge as well. Throughout his research career Hachtel has specialized in nanoscale spectroscopy of novel quasiparticles in the electron microscope, with a special focus on monochromated electron energy-loss spectroscopy. At ORNL, Hachtel focuses on frontier experimental development and advanced analyses for EELS spectroscopy onn ultralow-energy excitations, such as phonons, polaritons, plasmons, molecular vibrations, excitons, and shallow electronic states, with nanoscale spatial localizations.

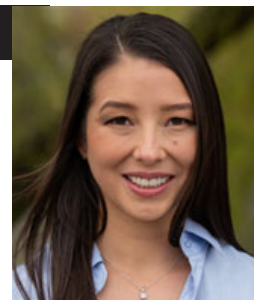


GEORGE PALADE AWARD

Melody G. Campbell

Fred Hutchinson Cancer Research Center

Melody Campbell received a BS in Biochemistry from the University of Michigan and earned a PhD in Biophysics from the Scripps Research Institute under the supervision of Bridget Carragher and Clinton S. Potter where she developed novel methodologies to characterize and correct for biological specimen movement and boost resolution in cryo-electron microscopy using direct electron detectors. Concurrently, she developed processing workflows to untangle heterogeneous populations of proteins and map out their conformational trajectories using single-particle analysis, which she continued to do as a post-doc in Yifan Cheng's lab at the University of California, San Francisco. As an assistant professor at the Fred Hutchinson Cancer Center, she is now leveraging this expertise to uncover the structural basis of bidirectional signal transduction across the cell membrane.



YEAR RECIPIENT

2012	Wu Zhou
2013	Lena Fitting-Kourkoutis
2014	Jinwoo Hwang
2015	Meng Gu
2016	Ryo Ishikawa
2017	Pinshane Y. Huang
2018	Timothy Pennycook
2019	Layla Mehdi
2020	Andrew B. Yankovich
2021	Wenpei Gao

YEAR RECIPIENT

2012	Gabriel C. Lander
2013	Peng Ge
2014	Ricardo C. Guerrero-Ferreira
2015	Alexey Amunts
2016	Dmitry Lyumkis
2017	Rengasayee Veeraraghavan
2018	<i>Not awarded</i>
2019	Alex Noble
2020	<i>Not awarded</i>
2021	Yong Zi Tan

2022 Major Society Awards

HILDEGARD H. CROWLEY OUTSTANDING TECHNOLOGIST AWARD FOR BIOLOGICAL SCIENCES

Janice Green Pennington
University of Wisconsin-Madison



Janice has 40 years of experiences as an electron microscopist and has a bachelor's degree in Biology and a master's degree in Botany from Oklahoma State University (OSU). She spent her first eleven years as a microscopist in the core EM Facility at OSU becoming in the last three years, the core manager and instructor of the laboratory portion of an electron microscopy course. She has held positions as a research electron microscopist at the University of Kentucky, IU School of Medicine in Indianapolis and Purdue University. While working at the Purdue Cryo-EM Facility she learned approaches for single particle analysis for the study of virus particles and prepared high pressure frozen samples in resin, to study the replication complexes of Dengue virus in S2 cells. The past nine years she has worked with Dr. Paul Ahlquist at the Institute for Molecular Virology at the University of Wisconsin and was instrumental in resolving the crown structure in the mitochondrial replication complex of a Nodavirus using cryo-electron tomography. During this time, she also worked with Dr. Marisa Otegui using high pressure freezing, immunolabeling, and electron tomography to study endomembrane trafficking in plants. Janice was the Chair of the MSA Technologists' Forum between 2018 and 2020 and has been a member of various Local Affiliate Societies. She is currently the Manager of the 3D Cell Microscopy Facility in the Center for Quantitative Cell Imaging at the University of Wisconsin, Madison.

CHUCK FIORI OUTSTANDING TECHNOLOGIST AWARD FOR PHYSICAL SCIENCES

Hendrik O. Colijn
The Ohio State University



Hendrik O. Colijn is currently the Assistant Director for Operations at the OSU Center for Microscopy & Analysis (CEMAS). Since joining The Ohio State University in 1982, he has assisted researchers and taught students in the areas of TEM, SEM, Auger, FIB, XRD, and microCT.

YEAR RECIPIENT

1993	Ben O. Spurlock	2009	Mary Morphew
1994	<i>not awarded</i>	2010	E. Ann Ellis
1995	Kai Chien	2011	Robert Grassucci
1996	<i>not awarded</i>	2012	Kunio Nagashima
1997	John P. Benedict	2013	Robyn Roth
1998	Hilton H. Mollenhauer	2014	Hong Yi
1999	John M. Basgen	2015	Norman Olson
2000	Nancy Crise Smith	2016	Frank Macaluso
2001	<i>not awarded</i>	2017	Patricia S. Connelly
2002	José A. Mascorro	2018	Anchi Cheng
2003	<i>not awarded</i>	2019	Matthew S. Joens
2004	<i>not awarded</i>	2020	Joseph D. Mowery
2005	John J. Bozzola	2021	Trace A. Christensen
2008	Thomas Deerinck		

YEAR RECIPIENT

1993	<i>not awarded</i>	2009	Lynne Gignac
1994	Bernard J. Kestel	2010	<i>not awarded</i>
1995	<i>not awarded</i>	2011	<i>not awarded</i>
1996	David W. Ackland	2012	<i>not awarded</i>
1997	Stanley J. Klepeis	2013	K. Shawn Reeves
1998	Charles J. Echer	2014	Eddy Garcia-Meitin
1999	John C. Wheatley	2015	Masahiro Kawasaki
2000	<i>not awarded</i>	2016	<i>not awarded</i>
2001	Conrad G. Bremer	2017	Richard L. Martens
2002	<i>not awarded</i>	2018	Chengyu Song
2003	Edward A. Ryan	2019	Dmitri Zakharov
2004	Mark C. Reuter	2020	Lijun Wu
2005	Chris Nelson	2021	Karen Bustillo
2008	<i>not awarded</i>		

MAS 2022 COUNCIL - OFFICERS

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Treasurer	Dave Tomlin

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William Bowman
Angela Halfpenny
Joshua Taillon
Assel Aitkaliyeva
Thomas Lam

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Education	Mary Scott
Fellows Committee	Donovan Leonard
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International Liaison	Heather Lowers
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Microscopy and Microanalysis Editorial Board	Donovan Leonard
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Social Media	Daniel M. Ruscitto, Ph.D.
Strategic Planning	Vincent S. (Vin) Smentkowski
Sustaining Membership & Corporate Liaison	Pat Camus
Topical Conferences	Yoosuf Picard

PAST PRESIDENTS

1968	L.S. Birks
1969	K.F.J. Heinrich
1970	R.E. Ogilvie
1971	A.A. Chodos
1972	K. Keil
1973	D.R. Beaman
1974	P. Lublin
1975	J.E. Colby
1976	E. Lifshin
1977	J.I. Goldstein
1978	J.D. Brown
1979	D.F. Kyser
1980	O.C. Wells
1981	J.R. Coleman
1982	R.L. Myklebust
1983	R. Bolon
1984	D.C. Joy
1985	D.E. Newbury
1986	C.G. Cleaver
1987	C.E. Fiori
1988	W.F. Chambers
1989	D.B. Wittry
1990	A.D. Romig, Jr
1991	J.T. Armstrong
1992	D.B. Williams
1993	T.G. Huber
1994	J.A. Small
1995	J.J. McCarthy
1996	D.E. Johnson
1997	J.R. Michael
1998	R.B. Marinenko
1999	J.J. Friel
2000	C.E. Lyman
2001	R.W. Linton
2002	G.P. Meeker
2003	E.S. Etz
2004	P.K. Carpenter
2005	I.H. Musselman
2006	R. Gauvin
2007	P.G. Kotula
2008	I.M. Anderson
2009	C. Johnson
2010	E.P. Vicenzi
2011	J.H.J. Scott
2012	J.F. Mansfield
2013-14	K.L. Bunker
2015-16	T.F. Kelly
2017-18	M. Watanabe
2019-20	Rhonda Stroud

2022 MAS FELLOWS

Larry Allard
Greg Meeker
Rhonda Stroud

2021 MAS FELLOWS

Alan O. Sanborg
Vincent S. Smentkowski

2020 MAS FELLOWS

Christopher Kiely
Lothar Strüder
Yimei Zhu

2019 MAS FELLOWS (INAUGURAL CLASS):

Ian Anderson	Cathy Johnson
Phil Batson	Thomas Kelly
Paul Carpenter	Paul Kotula
Bill Chambers	Charles Lyman
John Donovan	John Mansfield
Vinayak David	Joseph Michael
Ray Egerton	Inga Musselman
John Fournelle	Nicholas Ritchie
Hamish Fraser	John Henry Scott
Raynald Gauvin	John Small
Paul Hlava	Ed Vicenzi
Thomas Huber	Masashi Watanabe
Michael Jercinovic	Valerie Woodward

Microscopical Society of Canada - Société de Microscopie du Canada (MSC-SMC)

The Microscopy Society of Canada (previously the Microscopical Society of Canada) is an association dedicated to the promotion of all areas of microscopy research in Canada. Joined together under a common national organization, members gain access to a greater international network.



MSC·SMC

Promoting microscopy since 1972

President - Kathryn Grandfield

Past President - Marek Malac

1st Vice President - Nadi Braidy

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Secretary - Jeff Fraser

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Liza-Anastasia DiCecco

Industry Representative - David Polcari

Extraordinary Councilor - Samantha Stambula

Bulletin Editor - Sara Makaremi

Webmaster - Zhengyu (Brian) Li

CANADIAN FOUNDATION FOR DEVELOPMENT OF MICROSCOPY BURSARY WINNERS (2022)

(winner, university, academic adviser)

Liza-Anastasia DiCecco, McMaster University,
Kathryn Grandfield

Chiara Micheletti, McMaster University,
Kathryn Grandfield

Alyssa Williams, McMaster University,
Nabil Bassim and Kathryn Grandfield

Daniel J. Buss, McGill University, Marc D. McKee
and Natalie Reznikov

MAJOR SOCIETY AWARDS

Early Career Investigator Award (2022)

Maureen Joel Lagos, Assistant Professor,
McMaster University

Student Leadership Award (2022)

Liza-Anastasia DiCecco, McMaster University

Frances W. Doane Award (2022)

Alan Maigné, Previous: University of British
Columbia, Present: Technical Director -
Transmission Electron Microscopy - ScopeM -
ETH Zürich

Impact Award (2022)

Alex Kiepas, McGill University



Society Awards



Major Society Award Winners

BURTON MEDAL—BIOLOGICAL

Yuan He, Northwestern University

BURTON MEDAL—PHYSICAL

Colin Ophus, Lawrence Berkeley National Laboratory

ALBERT CREWE AWARD

Jordan Adam Hachtel, Oak Ridge National Laboratory

HILDEGARD H. CROWLEY AWARD FOR OUTSTANDING TECHNOLOGIST, BIOLOGICAL SCIENCES

Janice Green Pennington, University of Wisconsin-Madison

CHUCK FIORI AWARD FOR OUTSTANDING TECHNOLOGIST, PHYSICAL SCIENCES

Hendrik Colijn, The Ohio State University

MORTON D. MASER DISTINGUISHED SERVICE AWARD

Edward Patrick Calomeni, The Ohio State University Medical Center

GEORGE PALADE AWARD

Melody G. Campbell, Fred Hutchinson Cancer Research Center

DISTINGUISHED SCIENTIST - PHYSICAL SCIENCES

Rudolf Tromp, IBM Yorktown Heights & University of Leiden

DISTINGUISHED SCIENTIST - BIOLOGICAL SCIENCES

Kenneth A. Taylor, Florida State University



Major Society Award Winners

PRESIDENTIAL SCIENCE AWARD

John Panitz, University of New Mexico

PRESIDENTIAL SERVICE AWARD

Kerry Siebein, National Institute of Standards and Technology

PETER DUNCUMB AWARD FOR EXCELLENCE IN MICROANALYSIS

Colin MacRae, CSIRO Mineral Resources

KURT F.J. HEINRICH AWARD

Jordan Hachtel, Oak Ridge National Laboratory

BEST PAPER AWARDS M&M 2021

BIRKS AWARD—BEST CONTRIBUTED

Sponsored by JEOL

Aaron Torpy, CSIRO Mineral Resources

COSSLETT AWARD—BEST INVITED

Sponsored by MAS

Timmons Erickson, Jacobs Technology

CASTAING AWARD—BEST STUDENT

Sponsored by Cameca

Dara Laczniaik, Purdue University

MACRES AWARD—BEST INSTRUMENTATION/SOFTWARE

Sponsored by Oxford Instruments

Aleksander Mosberg, SuperSTEM Daresbury

M&M 2022 Meeting Awards

M&M Student Scholar Awards

Nishkarsh Agarwal — University of Michigan
Nicolas Bonmassar — Max Planck Institute for Solid State Research
Michael Colletta — Cornell University
Oana Condurache — Jozef Stefan Institute
Sanduni Fernando — University of Utah
Jordi Ferrer Orri — University of Cambridge
John Gaida — Max Planck Institute for Multidisciplinary Sciences
Emma Hedley — University of Oxford
Jessica Heebner — Penn State University College of Medicine
Jennifer Jiang — Rutgers University, New Brunswick
**Raleigh & Clara Miller Scholarship*
Mads Larsen — Technical University of Denmark
Ka Yin Lee — McMaster University
Talya Levitz — Massachusetts Institute of Technology
Arthur McCray — Argonne National Laboratory
Saran Pidaparthi — University of Illinois at Urbana-Champaign
Frances Quigley — Trinity College Dublin
**Eric Samuel Scholarship*
Kate Reidy — Massachusetts Institute of Technology
Rajat Sainju — University of Connecticut
Marcel Schloz — Humboldt Universität zu Berlin
Madeline Van Winkle — University of California, Berkeley
Aram Yoon — UNIST/IBS Center for Multidimensional Carbon Materials
Yue Yu — Cornell University
Xiyue Zhang — Cornell University
Menglin Zhu — The Ohio State University

M&M Student Scholar Awards

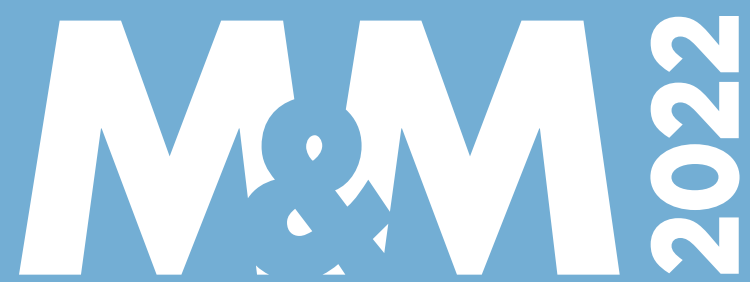
Benjamín Arredondo-Tamayo - Instituto Politécnico Nacional
JoAnn Ballor - Michigan State University
Adham Basha - Tel Aviv University
Daniel Durham - University of California Berkeley
James McFadden - Purdue University
Mehrpada Monajem - Friedrich-Alexander-Universität Erlangen-Nürnberg
Mehdi Mosayebi - McMaster University
Claudia-Tatiana Santos Maldonado - Imperial College London
Sang Bum Yi - University of Toronto
Dasol Yoon - Cornell University

M&M Postdoctoral Scholar Awards

Jonathan Bouvette — NIEHS
Jiadong Dan — National University of Singapore
James Hart — Cornell University
Christoph Hofer — University of Antwerp
Blanka Janicek — Lawrence Berkeley National Laboratory
Alex Lin — Lawrence Berkeley National Laboratory
Joydeep Munshi — Argonne National Laboratory
Katerina Naydenova — MRC LMB
Adrián Pedraza-Tardajos - University of Antwerp
Alexandre Pofelski - Brookhaven National Laboratory
Rekha Rao - University of Alabama
Sandhya Susarla — Lawrence Berkeley National Laboratory
Angel Valdez - McGill University
Chunyang Wang — University of California, Irvine
Yao Yang - University of California Los Angeles
Yingjie Yang — University of Illinois, Chicago
Aram Yoon — Fritz Haber Institut der Max Planck Gesellschaft
Yichao Zhang — University of Illinois at Urbana-Champaign

M&M Professional Technical Staff Awards

Kashyap Maruthi — New York Structural Biology Center
Jae Yang — University of Wisconsin-Madison



Week At-A-Glance

Friday, July 29

8:30 AM

MSA Council

Saturday, July 30

8:30 AM

MSA Council

8:30 AM – 5:00 PM

Pre-Meeting Congress

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

Sunday, July 31

8:30 AM – 5:00 PM

Sunday Short Courses

X10 High Resolution Structure Determination by Cryo-EM

X11 Explaining the New World Order of Biological Fluorescence Microscopy

X12 Guidelines for Performing 4-D STEM Characterization from the Atomic to >Micrometer Scales: Experimental Considerations, Data Analysis and Simulation

X13 SerialEM for EM Data Acquisition

X14 *In situ* and *Operando* Approaches to TEM

X15 Cryo-STEM and EELS for Material Sciences

X16 Data Analysis in Materials Science

X17 Biological EM Sample Processing

8:30 AM – 5:00 PM

Pre-Meeting Congress

X61 Pharmaceutical, Biopharmaceutical, and Medical Health Products

X62 Real-World Data Analytics and Quantitative Liquid and Gas Environmental Electron Microscopy

12:00 PM

MSC-SMC Council Meeting

3:00 PM

Microscopy Today Editors

6:30 PM

Opening Reception

Monday, August 1

7:15 AM

MSA Awards Committee

7:15 AM

Technologists' Forum Board

7:15 AM

M&M Meeting Award Committee

8:30 AM – 12:00 PM

M&M 2022 Plenary Sessions

Opening Welcome

Plenary Talk #1:

Stony Brook University | Alan Alda Center for Communicating Science
Alda Science Communication Experience

MAS Awards Presentation

MSC-SMC Awards Presentation

Coffee Break

MSA Awards Presentation

M&M Meeting Awards Presentation

Monday, August 1 (Cont'd.)

8:30 AM – 12:00 PM	M&M 2022 Plenary Sessions cont'd. Plenary Talk #2: Wendy Garrett, MD PhD Harvard School of Public Health, Boston, MA <i>Health Versus Disease: The Facts in the Case of the Microbiota</i>
12:00 PM – 1:30 PM	Lunch Break in the Exhibit Hall
12:00 PM – 5:30 PM	Exhibit Hall Open
12:15 PM	MAS Meal with a Mentor
12:15 PM	FIG: Pharmaceuticals
12:15 PM	FIG: Diagnostic & Biomedical Microscopy
12:15 PM	FIG: Focused Ion Beam
12:15 PM	FIG: Atom Probe Field Ion Microscopy
12:15 PM	FIG: Facilities Operation and Management
12:15 PM	International Committee
1:30 PM – 3:00 PM	P.M. Symposia & Sessions A01.1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences A03.1 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science A05.1 Quantitative and Qualitative Mapping of Materials B02.1 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG) B07.1 3D Volume Electron Microscopy in Biology Research C03.1 Facilities Management Crucial Skills and Strategies C04.1 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis P01.1 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys P02.1 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices P05.1 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing P07.1 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments P08.1 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-Beam Sample Interactions P09.1 Insights into Phase Transitions in Functional Materials by <i>in situ/operando</i> TEM: Experiment Meets Theory P10.1 Advanced Imaging and Spectroscopy for Nanoscale Materials P12.1 Memorial Symposium: John C. H. Spence
3:00 PM – 5:00 PM	Monday Poster Presentations A01.P1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences A02.P1 Beyond Visualization with <i>in situ</i> and <i>operando</i> TEM A03.P1 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science A05.P1 Quantitative and Qualitative Mapping of Materials

Monday, August 1 (Cont'd.)

3:00 PM – 5:00 PM	Monday Poster Presentations cont'd. <i>All Post-Deadline Posters will be presented on this day.</i>
	B02.P1 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG)
	C03.P1 Facilities Management Crucial Skills and Strategies
	C04.P1 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis
	P08.P1 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-Beam Sample Interactions
	P10.P1 Advanced Imaging and Spectroscopy for Nanoscale Materials
	P12.P1 Memorial Symposium: John C.H. Spence
3:30 PM	Technologists' Forum Business Meeting
3:30 PM	3D EM in the Biological Sciences FIG
5:00 PM	Student Poster Awards
5:30 PM	MSA Student Council Meeting and Student Mixer
5:45 PM	Vendor Tutorials <i>(Sign Up at MSA MegaBooth)</i>

Tuesday, August 2

7:15 AM	MSA Local Affiliated Societies & MAS Affiliated Regional Societies
7:15 AM	Microscopy Today - Editorial Board Breakfast
8:30 AM – 10:00 AM	A.M. Symposia & Sessions
	A01.2 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences
	A02.1 Beyond Visualization with in situ and operando TEM
	A03.2 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science
	A05.2 Quantitative and Qualitative Mapping of Materials
	B02.2 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG)
	B07.2 3D Volume Electron Microscopy in Biology Research
	C04.2 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis
	P01.2 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys
	P02.2 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices
	P05.2 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing
	P07.2 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments
	P08.2 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-Beam Sample Interactions
	P09.2 Insights into Phase Transitions in Functional Materials by in situ/operando TEM: Experiment Meets Theory
	P10.2 Advanced Imaging and Spectroscopy for Nanoscale Materials
	P12.2 Memorial Symposium: John C.H. Spence
	X94 STEM Roundtable: Building Skills for the Future
10:00 AM – 10:30 AM	Coffee Break in the Exhibit Hall
10:00 AM – 5:30 PM	Exhibit Hall Open
10:00 AM	M&M 2023 Program Planning Meeting

Tuesday, August 2 (cont'd.)

10:30 AM – 12:00 PM	A.M. Symposia & Sessions
	A01.3 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences
	A02.2 Beyond Visualization with in situ and operando TEM
	A03.3 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science
	A05.3 Quantitative and Qualitative Mapping of Materials
	A06.1 Expanding the Limits of Atom Probe Tomography
	B01.1 Microcrystal Electron Diffraction (MicroED)
	B02.3 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG)
	B07.3 3D Volume Electron Microscopy in Biology Research
	B09.1 Memorial Symposium: Shinya Inoué
	C04.3 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis
	P01.3 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys
	P02.3 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices
	P05.3 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing
	P07.3 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments
	P08.3 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-Beam Sample Interactions
	P09.3 Insights into Phase Transitions in Functional Materials by in situ/operando TEM: Experiment Meets Theory
	P10.3 Advanced Imaging and Spectroscopy for Nanoscale Materials
	P12.3 Memorial Symposium: John C.H. Spence
11:00 AM – 12:00 PM	A.M. Symposia & Sessions (Cont'd.)
	X41 Biological Sciences Tutorial - Applying CryoAPEX in the Cell Biology of RNA Viruses; A Question-Based Evolution of the Methodology
12:00 PM – 1:30 PM	Lunch Break in the Exhibit Hall
12:15 PM	Microscopy Today Editorial Board Meeting
12:15 PM	FOM FIG Lunch Meeting
12:15 PM	MSA Distinguished Scientist Awardee Lectures
12:15 PM	FIG: Cryo-Preparation
12:15 PM	FIG: Electron Microscopy in Liquids and Gases
12:15 PM	FIG: Electron Crystallography
12:15 PM	FIG: MicroAnalytical Standards
1:30 PM – 3:00 PM	P.M. Symposia & Sessions
	A01.4 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences
	A02.3 Beyond Visualization with in situ and operando TEM
	A03.4 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science
	A04.1 Developments of 4D-STEM Imaging - Enabling New Materials Applications
	A05.4 Quantitative and Qualitative Mapping of Materials
	A06.2 Expanding the Limits of Atom Probe Tomography
	B01.2 Microcrystal Electron Diffraction (MicroED)
	B03.1 Technical Advances in Cryo-EM
	B07.4 3D Volume Electron Microscopy in Biology Research

Tuesday, August 2 (Cont'd.)

2:00 PM – 3:15 PM	P.M. Symposia & Sessions (Cont'd.)
	B09.2 Memorial Symposium: Shinya Inoué
	C04.4 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis
	P01.4 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys
	P02.4 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices
	P05.4 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing
	P07.4 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments
	P08.4 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-Beam Sample Interactions
2:00 PM – 3:00 PM	P09.4 Insights into Phase Transitions in Functional Materials by <i>in situ/operando</i> TEM: Experiment Meets Theory
	P10.4 Advanced Imaging and Spectroscopy for Nanoscale Materials
3:00 PM – 5:00 PM	P.M. Symposia & Sessions (Cont'd.)
	X42 Biological Sciences Tutorial - Indirect Correlative Light and Electron Microscopy (iCLEM)
3:00 PM – 5:00 PM	Tuesday Poster Presentations
	A01.P2 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences
	A02.P2 Beyond Visualization with <i>in situ</i> and <i>operando</i> TEM
	A03.P2 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science
	A04.P1 Developments of 4D-STEM Imaging - Enabling New Materials Applications
	A05.P2 Quantitative and Qualitative Mapping of Materials
	A06.P1 Expanding the Limits of Atom Probe Tomography
	B02.P2 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG)
	B07.P1 3D Volume Electron Microscopy in Biology Research
	C04.P2 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis
	P01.P1 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys
	P02.P1 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices
	P05.P1 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing
	P07.P1 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments
	P08.P2 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions
	P09.P1 Insights into Phase Transitions in Functional Materials by <i>in situ/operando</i> TEM: Experiment Meets Theory
3:30 PM	FIG Business Meeting
3:30 PM	MSA Education Committee
5:00 PM	Student Poster Awards
5:30 PM	Post-Doctoral Researchers' Reception
5:45 PM	Vendor Tutorials (<i>Sign Up at MSA MegaBooth</i>)
6:30 PM	Presidents' Reception (<i>Invitation Only</i>)

Wednesday, August 3

7:15 AM	MaM Editorial Board
7:15 AM	MSA Certification Board
7:15 AM	MSA Membership Committee
8:30 AM – 10:00 AM	A.M. Symposia & Sessions A02.4 Beyond Visualization with in situ and operando TEM A04.2 Developments of 4D-STEM Imaging - Enabling New Materials Applications A05.5 Quantitative and Qualitative Mapping of Materials A06.3 Expanding the Limits of Atom Probe Tomography A09.1 Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions A10.1 Advanced Imaging and Spectroscopy for Nanoscale Materials B03.2 Technical Advances in Cryo-EM B05.1 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and B08.1 From Images to Insights: Working with Large Multi-Modal Data in Cell Biological Imaging B10.1 Development, Challenges and Biomedical Applications of Tissue Clearing, Expansion Microscopy and Volumetric Imaging C04.5 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis C05.1 Vendor Symposium P02.5 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices P05.5 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing P07.5 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments P09.5 Insights into Phase Transitions in Functional Materials by in situ/operando TEM: Experiment Meets Theory P10.5 Advanced Imaging and Spectroscopy for Nanoscale Materials
9:00 AM – 10:00 AM	A.M. Symposia & Sessions (Cont'd.) X43 Physical Sciences Tutorial - A Multi-Modal Approach for Characterizing Battery Materials
10:00 AM – 10:30 AM	Coffee Break in the Exhibit Hall
10:00 AM – 5:30 PM	Exhibit Hall Open
10:30 AM – 12:00 PM	A.M. Symposia & Sessions (Cont'd.) A02.5 Beyond Visualization with in situ and operando TEM A04.3 Developments of 4D-STEM Imaging - Enabling New Materials Applications A05.6 Quantitative and Qualitative Mapping of Materials A09.2 Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions A10.2 Advanced Imaging and Spectroscopy for Nanoscale Materials B03.3 Technical Advances in Cryo-EM B05.2 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals B08.2 From Images to Insights: Working with Large Multi-Modal Data in Cell Biological Imaging B10.2 Development, Challenges and Biomedical Applications of Tissue Clearing, Expansion Microscopy and Volumetric Imaging C04.6 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis C05.2 Vendor Symposium P02.6 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices P05.6 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

Wednesday, August 3 (cont'd.)

10:30 AM – 12:00 PM	A.M. Symposia & Sessions (Cont'd.) P07.6 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments P09.6 Insights into Phase Transitions in Functional Materials by <i>in situ/operando</i> TEM: Experiment Meets Theory P10.6 Advanced Imaging and Spectroscopy for Nanoscale Materials
11:00 AM – 12:00 PM	A.M. Symposia & Sessions (Cont'd.) X44 Physical Sciences Tutorial - Precession Electron Diffraction: A Little Bit of History, Basics, and Recent Developments in Projected Crystal Symmetry Quantifications
12:00 PM – 1:30 PM	Lunch Break in the Exhibit Hall
12:15 PM	MAS - ANSI Meeting – <i>not confirmed</i>
12:15 PM	MSA Members' Meeting
1:30 PM – 3:00 PM	P.M. Symposia & Sessions A02.6 Beyond Visualization with <i>in situ</i> and <i>operando</i> TEM A04.4 Developments of 4D-STEM Imaging - Enabling New Materials Applications A10.3 Advanced Imaging and Spectroscopy for Nanoscale Materials B03.4 Technical Advances in Cryo-EM B05.3 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals B10.3 Development, Challenges and Biomedical Applications of Tissue Clearing, Expansion Microscopy and Volumetric Imaging C01.1 Microscopy Infrastructures: Architectures, Avenues and Access C05.3 Vendor Symposium P02.7 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices P06.1 Nanoscale Optics with Electrons and Photons P10.7 Advanced Imaging and Spectroscopy for Nanoscale Materials P11.1 Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis
3:00 PM – 5:00 PM	Wednesday Poster Presentations A04.P2 Developments of 4D-STEM Imaging - Enabling New Materials Applications A05.P3 Quantitative and Qualitative Mapping of Materials A09.P1 Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions B03.P1 Technical Advances in Cryo-EM B05.P1 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals C04.P1 Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis P05.P2 <i>In situ</i> TEM Characterization of Dynamic Processes During Materials Synthesis and Processing P03.1 Imaging Chemical Reactions Using High Speed Electron Microscopy (EM) P07.P2 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments P09.P2 Insights into Phase Transitions in Functional Materials by <i>in situ/operando</i> TEM: Experiment Meets Theory P10.P1 Advanced Imaging and Spectroscopy for Nanoscale Materials
5:00 PM	Student Poster Awards
5:15 PM	MAS Business Meeting
5:30 PM	Diversity and Inclusion Meet-up
5:45 PM	Vendor Tutorials (<i>Sign Up at MSA MegaBooth</i>)
6:30 PM	MAS Members' Social (<i>See MAS Booth for Details</i>)

Thursday, August 4

8:30 AM	M&M Sustaining Members Meeting
8:30 AM – 10:00 AM	A.M. Symposia & Sessions A04.5 Developments of 4D-STEM Imaging - Enabling New Materials Applications A07.1 Science of Metrology with Electrons A08.1 From <i>operando</i> Microcell Experiments to Bulk Devices A10.4 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens B03.5 Technical Advances in Cryo-EM B04.1 Correlative and Multimodal Microscopy and Analysis B06.1 Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products—Research, Development, Analysis, Regulation, and Commercialization C01.2 Microscopy Infrastructures: Architectures, Avenues and Access of Cryo-EM P03.2 Imaging Chemical Reactions Using High Speed Electron Microscopy (EM) P06.2 Nanoscale Optics with Electrons and Photons P10.8 Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens P11.2 Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis X30 Technologists' Forum Roundtable: Image Data Analysis Software Review X91 Microscopy Explorations for Families and Kids of All Ages
10:00 AM – 12:00 PM	Coffee Break and Poster Session in the Exhibit Hall
10:00 AM – 2:00 PM	Exhibit Hall Open
1:00 PM – 2:30 PM	Thursday Poster Presentations A03.P1 Impact of Recent Advancement in Instrumentation/Detectors on Electron Energy Loss Spectroscopy for Physical and Biological Sciences A09.P2 Advanced Imaging and Spectroscopy for Nanoscale Materials A14.P1 Vendor Symposium B02.P1 The Promise of Cryo-Electron Tomography B05.P1 Microbes in Focus B06.P1 Correlative and Multimodal Microscopy and Imaging of Physical, Environmental, and Biological Sciences B08.P1 Biological Soft X-Ray Tomography P03.P2 Energy and Soft Materials and the Development of Cryogenic Techniques for Studying Them P05.P1 Advances in Microscopy for Quantum Information Sciences P10.P1 Call of the Wild: Advances in Microanalysis and Microscopy of Geological and Extraterrestrial Materials P12.P1 Collaborative Analysis Using Atom Probe Tomography Including TEM/APT Characterization of Metal Alloys and Other Material Systems
12:00 PM	Student Poster Awards
12:00 PM – 1:30 PM	Lunch Break in the Exhibit Hall
12:15 PM	MSA Standards Committee
12:15 PM	MSC-SMC Business Meeting
1:30 PM – 3:00 PM	P.M. Symposia & Sessions A04.6 Developments of 4D-STEM Imaging—Enabling New Materials Applications A07.2 Science of Metrology with Electrons A08.2 From <i>operando</i> Microcell Experiments to Bulk Devices

Thursday, August 4 (Cont'd.)

1:30 PM – 3:00 PM	P.M. Symposia & Sessions
	A10.5 Advanced Imaging and Spectroscopy for Nanoscale Materials
	B03.6 Technical Advances in Cryo-EM
	B04.2 Correlative and Multimodal Microscopy and Analysis
	B06.2 Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products—Research, Development, Analysis, Regulation, and Commercialization
	P06.3 Nanoscale Optics with Electrons and Photons
	P10.9 Advanced Imaging and Spectroscopy for Nanoscale Materials
	P11.3 Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis
	C01.3 Microscopy Infrastructures: Architectures, Avenues and Access of Cryo-EM
	X31 Technologists' Forum Symposia: 3D SEM Techniques
	X92 Project MICRO
3:00 PM – 3:30 PM	Coffee Break in B/D Foyer
3:30 PM – 5:30 PM	Late P.M. Symposia & Sessions
	A08.3 From <i>operando</i> Microcell Experiments to Bulk Devices
	A10.6 Advanced Imaging and Spectroscopy for Nanoscale Materials
	B03.7 Technical Advances in Cryo-EM
	B04.3 Correlative and Multimodal Microscopy and Analysis
	P06.4 Nanoscale Optics with Electrons and Photons
	P10.10 Advanced Imaging and Spectroscopy for Nanoscale Materials
	X32 Technologists' Forum Workshop—Tissue Clearing Tips and Techniques

M&M 2022

Scientific Program

M&M 2022 Plenary Session Speakers

Plenary Session

MONDAY, AUGUST 1, 2022 | 8:30 AM | OREGON BALLROOM - OREGON CONVENTION CENTER

James Rea - Instructor

Stony Brook University | Alan Alda Center for Communicating Science

Alda Science Communication Experience Science is complex. It shouldn't be exclusive.

For more than 20 years, James has rooted around in dense thickets of scientific and public policy content, searching for the stories that shine. He found this calling in 1996 at the US Environmental Protection Agency, where he translated vital scientific research into language the public would understand and remember. James further honed his skills as an independent reporter for National Public Radio, crafting stories most often for WAMU 88.5 FM in Washington, DC. As the 21st century dawned, James founded the production firm Site Stories to help technical organizations share their stories through web videos. By 2011, James had interviewed countless experts. He knew how to find the gold in their stories and wanted to help them do the same. He now follows this passion through his own firm Experts/Clearly, and as an instructor with the Alan Alda Center for Communicating Science.

The Alda Science Communication Experience is the Center's signature professional development program. Scientists will explore strategies to engage their audiences in ways that build trust and inspire. Because all people understand the world through their individual experiences, this program will help researchers invite their audiences into their work. Through active listening and close attention to non-verbal communication, participants will learn to build connections between their research and other people's backgrounds and experiences.



Wendy Garrett, MD, PhD

Harvard T.H. Chan School of Public Health

Health Versus Disease: The Facts in the Case of the Microbiota

Wendy Garrett is the Irene Heinz Given Professor of Immunology and Infectious Diseases at the Harvard T. H. Chan School of Public Health and a Professor of Medicine at Dana-Farber Cancer Institute and Harvard Medical School. She is co-director and co-founder of the Harvard Chan Microbiome in Public Health Center. Dr. Garrett's team explores interactions between the gut microbiome and the immune system, both in physiological and pathological conditions, with a focus on inflammatory bowel diseases and colorectal cancer. Her team has identified microbial species, functions, and metabolites influencing host health and disease by using an interdisciplinary approach bridging meta'omics, microbiology, cellular immunology, biochemistry, cell biology, and cancer biology. The mission of Dr. Garrett's lab is to identify basic biologic mechanisms to be applied to precision medicine.



All M&M 2022 symposia, workshops, meetings, and official events are held at the Oregon Convention Center unless otherwise indicated.

ORGANIZER:

Donovan Leonard, TBD

- These full-day courses run from 8:30 AM to 5:00 PM on Sunday, July 31, 2022.
- A certificate of participation will be issued to each requesting participant, following the conclusion of the M&M 2022 meeting.
- Two (2) Continuing Microscopy Education Units are available (registration fee \$10 for members; sign up at Registration Desk).
- Morning and afternoon coffee breaks are included (breakfast and lunch are on your own).
- Separate registration with additional fees is required (visit Registration Desk to sign up).

X-11 Explaining The New World Order of Biological Fluorescence Microscopy

Room B117

LEAD INSTRUCTORS:

Bob Price, University of South Carolina School of Medicine
Bob.Price@uscmed.sc.edu

Jay Jerome, Vanderbilt University
jay.jerome@Vanderbilt.edu

- Basics of fluorescence
- Basics of confocal microscopy
- New fluorescence imaging modes
- Selection of appropriate imaging modes

Fluorescence microscopy is a primary method for visualizing structure in three dimensions. Since our Basic Confocal Microscopy short course more than 10 years ago, tremendous advances in hardware and software have been made that have led to improved imaging depth/3D reconstruction technology and super-resolution imaging techniques such as PALM, STORM, SIM and several variations of these. We will review the basic principles of fluorescence and confocal imaging, provide information on how these principles relate to several new modes of fluorescence imaging, and discuss/compare how these new imaging modes have improved our understanding of fluorescence applications in biological/biomedical research.

X-12 Guidelines for Performing 4D-STEM Characterization from the Atomic to >Micrometer Scales: Experimental Considerations, Data Analysis and Simulation

Room B113

LEAD INSTRUCTORS:

David Muller, Cornell University, david.a.muller@cornell.edu

Colin Ophus, Lawrence Berkeley National Lab, clophus@lbl.gov

- Electron detector technology suitable for 4D-STEM experiments.
- List of possible 4D-STEM experimental configurations and references.
- Analysis software for characterizing large numbers of STEM diffraction pattern images and visualization of the results.
- Software and tutorial for simulating 4D-STEM datasets

With modern electron detector technology, it is now possible to record full images of a converged STEM probe while scanning it over the sample surface, resulting in a 4D-STEM dataset. Because the atomic-scale scattering information contained in an atomic-scale STEM probe is decoupled from the step size between STEM probe positions, 4D-STEM can be used for experiments ranging from sub-Angstrom resolution phase contrast imaging to statistical characterization of functional materials over large length scales. In this course, we will give tutorials on how to perform 4D-STEM experiments, analyze the (potentially very large!) resulting datasets, and perform 4D-STEM simulations.

Sunday Short Courses (Cont'd.)

X-13 SerialEM for EM Data Acquisition

Room B115

LEAD INSTRUCTORS:

Cindi Schwartz, Rocky Mountain Laboratories/NIAID/NIH
cindi.schwartz@nih.gov

Guenter Resch, Nexperion, Vienna, Austria
guenter.resch@nexperion.net

- Installation, calibration, and operating concept of SerialEM
- Image acquisition techniques such as for tilt-series, single-particle, and micro-ED
- Ancillary hardware such as direct-electron detectors, energy filters, and phase plates
- Scripting to extend SerialEM

Developed by David Mastronarde at the University of Colorado, SerialEM is open-source and widely used in automated TEM data acquisition on a multitude of microscope platforms and detectors. The course will be of interest to both beginners and advanced users in both biological and materials sciences. Installation and calibration of SerialEM will include use of direct-electron detectors and imaging energy filters. Imaging techniques such as tilt-series acquisition, low-dose imaging, single-particle acquisition, montaging, and mapping, as well as use of scripts (macros) and working with the navigator file or image data to extend SerialEM beyond its native capabilities will be covered.

X-14 In-situ and Operando Approaches to TEM

Room B110-111

LEAD INSTRUCTORS:

Robert Sinclair, Stanford University
bobsinc@stanford.edu

Peter Crozier, Arizona State University
CROZIER@asu.edu

This course will introduce the fundamental concepts for in situ electron microscopy. It will include topic such as:

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

In situ and operando transmission electron microscopy are becoming increasingly important in advanced materials characterization. Being able to observe materials in state that are similar to real world applications is now recognize as vital for relating structure to functionality. The ability to perform atomic level analysis while the sample is exposed to different stimuli/environments such as heat, strain, gas, liquids, electric field, magnetic field, light, etc. ... is a key part of the in-situ approach. Operando approach require simultaneous measurement of some technologically relevant functionality such as current flow, deformation or catalysis.

X-15 Cryo-STEM and EELS for Materials Sciences

Room B116

LEAD INSTRUCTORS:

Ismail El Baggari, Harvard University

Myung-Geun Han, Brookhaven National Laboratory

Michael Zachman, Oak Ridge National Laboratory

While cryogenic TEM has revolutionized the research in biological science, its applications in materials sciences have been relatively limited. The major challenges lie in realizing reliable cryogenic specimen preparation, and atomic-scale imaging and spectroscopy at a wide range of cryogenic temperatures. Though still in its infancy, recent advancements in cryo-EM, especially in cryo-FIB and new TEM stages, have brought us the promises.

This short course will focus on the fundamentals of cryo-EM and primarily benefit those new to the field. We will highlight historical developments, current state, and future perspectives of cryo-EM for materials science. We will cover critical steps involved in a successful cryogenic microscopy study, including specimen preparation, specimen transfer, cryogenic FIB, new cryo-TEM stages, imaging, spectroscopy at low temperatures, and data analysis methods that can potentially be used to assist cryo-EM data acquisition and data analysis.

X-16 Data Analysis in Materials Science

Room B114

LEAD INSTRUCTORS:

Eric Prestat, University of Manchester and SuperSTEM Laboratory, UK

Joshua Taillon, National Institute of Standards and Technology, Boulder, US

- Introduction to HyperSpy and related Python libraries for multi-dimensional image and spectra processing and analysis.
- Curve fitting of multi-dimensional datasets.
- Machine learning.
- Big data analysis strategies.
- EELS and EDS analysis.
- Optional: application to the analysis of atomic resolution images, scanning electron diffraction and 4D STEM datasets.

This short course will introduce the use of HyperSpy and related Python libraries (atomap, pixStem, pyXem) for analysis of microscopy datasets. No prior Python knowledge is required. Attendees will learn how to perform basic machine learning, multi-dimensional curve fitting for EELS and EDS quantification, atomic resolution image analysis and big data processing (such as 4D STEM) on desktop computers. For this hands-on and interactive short course, attendees will need to install software on their own laptop in advance and bring it with them to the short course (instructions will be provided).

X-17 Biological EM Sample Processing

Room B118-119

LEAD INSTRUCTORS:

Ru-ching Hsia, Carnegie Institution for Science

Alice Liang, NYU Langone's Microscopy Laboratory

Kirk Czymmek, Donald Danford Plant Science Center

- Basic biological EM sample processing, conventional workflow and basic reagents
- Particulate biological sample processing, agarose enrobing, negative staining
- Ultramicrotomy: Instrumentation, techniques and tips and tricks
- Special considerations for common biological EM specimen, specimen orientation, location of ROI, etc.
- Conventional biological EM sample processing for scanning electron microscope
- Rapid EM sample processing workflow, instrument assisted and automated sample processing and others

This course is the first installment of a two-part series of biology EM courses designed to introduce the principles and workflow of EM sample processing for animal and plant tissues, cultured cells, microorganisms and other particulate specimens. Participants do not need to have prior EM sample processing experience. The second installment (Part 2) of this course will be offered in 2023 and will include more advanced EM sample processing techniques.

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

From Metals to Mice: Building Collaborations and Sharing Best Practices in Microscopy and Microanalysis

Saturday, July 30, 2022 • 8:20 AM–5:00 PM • Oregon Convention Center • Room A105 – 106

Organized by



PROGRAM CHAIR:

Helen Donelick, University of Utah

BIOLOGICAL SCIENCES CO-CHAIR:

Joseph Kim, University of Wisconsin - Madison

PHYSICAL SCIENCES CO-CHAIR:

Stephanie Ribet, Northwestern University

POST-DOC LIASION

Neerja Zambare, Pacific Northwestern National Laboratory

The PMCx60 is organized by, and tailored to, students, post-docs and early-career professionals, however all are welcome to attend. The PMCx60 offers a highly interactive forum for participants to discuss their cutting-edge research, and to network and engage with peers ahead of the main meeting. This year's symposium will feature plenary talks from faculty in both biological and physical sciences. Invited speakers are selected from the awardees to be honored at M&M, giving attendees a unique opportunity to learn about the best research from their peers in biological sciences, physical sciences, analytical sciences, and instrumentation. Contributed posters also give attendees an opportunity to share their work with peers in an intimate and casual setting.

Additional professional development activities include a career panel, poster sessions, and a Saturday night banquet where our sponsors will be present. The PMCx60 and M&M are wonderful opportunities for students (undergraduate and graduate), postdocs, and early-career professionals to network with peers, members of academia and industry, as well as vendors from a variety of top companies who are invited to exhibit their latest developments during the PMCx60 poster and networking sessions.

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X61

Pharmaceutical, Biopharmaceutical, and Medical Health Products

Sunday, July 31, 2022 • 8:30 AM–5:00 PM
Oregon Convention Center, A107-108

INCLUDED IN REGISTRATION FEE: AM Break, Lunch

****Organized by the MSA Pharmaceutical Focused
Interest Group****

PROGRAM CHAIR: Daniel Skomski, PhD, Merck & Co. Inc.

All individuals are welcome to the congress (industrial scientists, academics, students, governmental representatives, vendors, etc.). Interact with scientists working to advance exciting medicines and treatments for COVID, cancer, and many other diseases. Registration for this congress is an optional item appearing during M&M conference registration or can be done on-site by consulting with conference representatives.

INVITED SPEAKERS:

Daniel Skomski, Merck & Co. Inc.
Somya Singh, Merck & Co. Inc.
Eric Bushong, Nanolmaging Services
Shawn Zhang, DigiM Solution
Kelly Parker, Northwestern University

X62

Real-World Data Analytics & Quantitative Liquid and Gas Environmental Electron Microscopy

Sunday, July 31, 2022 • 8:30 AM - 5:00 PM

INCLUDED IN REGISTRATION FEE:
Breakfast, AM Break, Lunch, PM Break

ORGANIZERS:

Katherine Jungjohann, Group Manager, National
Renewable Energy Laboratory
Grace Burke, Director, University of Manchester
Stephen House, Staff Scientist, University of Pittsburgh
Kinga Unocic, Staff Scientist, Oak Ridge National
Laboratory
Wei-Chang David Yang, Materials Research Engineer,
National Institute of Standards and Technology
Piyush Haluai, Graduate Student, Arizona State University

****Organized by the MSA Electron Microscopy in Liquids
and Gases Focused Interest Group****

This PMC will focus on the use of quantitative liquid and gas environmental electron microscopy tools and methods to understand 'real-world' mechanisms, structures, and properties of materials. The value of controlled environmental electron microscopy is the ability to create in-situ and operando conditions for observing a diverse set of reactions including catalysis, assembly/dynamics of biological and materials structures/processes, corrosion, electrochemical processes, phase transformations, redox reactions, etc. all with high spatial resolution observation for an informed atomic-level mechanistic understanding. New approaches in experimental design, data processing, instrumentation, and automation are enhancing the usefulness of these experiments in real-world applications to solve some of the most challenging and longstanding problems in materials science and nanoscience. Topics covered within this PMC include:

- Data-driven approaches towards measuring the dynamics in liquid-phase electron microscopy
- Quantitative in-situ and operando environmental measurements of small-scale ensemble physics and chemistry
- Practicalities/design/best practices of extracting quantitative in-situ environmental datasets
- In-depth in-situ environmental S/TEM data analysis
- Automation of liquid and gas phase environmental electron microscopy experiments
- Phase-contrast at low electron fluence — a paradigm shift in instrument development

All symposia are held in the Oregon Convention Center.

A01

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

Room D138

ORGANIZERS:

Suzy Vitale, Carnegie Institution for Science
 Frances Allen, University of California, Berkeley
 Joshua Sugar, Sandia National Laboratories
 Matthew Thorseth, Dow

The objective of this symposium is to provide an overview of recent developments in focused ion beam instrumentation, as well as a platform for FIB users to share and discuss novel applications and techniques across multiple scientific disciplines. Our focus will be on innovative approaches to imaging, sample preparation, micro/nanofabrication, and analytics that go beyond conventional methods in materials and life sciences, and the research that drives these new applications.

- Latest developments in novel ion sources, FIB instrumentation, and software
- Advances in helium ion microscopy including automation, SIMS, nanofabrication, lithography and imaging with charge neutralization
- Novel geometries, milling strategies and non-standard lift outs for TEM/STEM, APT, and other techniques
- Enhancing analytical SEM with FIB, including 3D EDS/EBSD and other correlative analytics including WDS, CL, Raman spectroscopy, EBIC, TKD, u-CT
- Advances in cryo-FIB, cryo sample transfer techniques, and working with beam-sensitive materials
- Innovative micro and nano-structure prototyping.

A02

Beyond Visualization with In Situ and Operando TEM

Room B111

ORGANIZERS:

Taylor Woehl, University of Maryland
 Yuanyuan Zhu, University of Connecticut
 Chongmin Wang, Pacific Northwest National Laboratories

As in situ liquid and gas TEM imaging techniques become more mature, researchers are beginning to consider how to push their boundaries for quantitative understanding of material dynamics and transformations. As in situ TEM data becomes increasingly multidimensional (in real and reciprocal space) and synchronous (in situ images with real-time readout of temperature, pressure/flow, product signal, etc.), there is significant interest in extracting and even real-time tracking of quantitative information from these exceptionally rich data sets. This symposium invites papers from across the sub-fields of in situ TEM, including applications such as electrochemical systems, catalysis, 2D materials, and soft materials, focused on identifying, extracting, and measuring dynamic structural descriptors and their outcomes to advance our understanding of materials dynamics. Papers utilizing scalable computer algorithms including conventional image analysis and machine learning to extract descriptors and perform quantitative and correlative analysis (e.g. size measurement, particle tracking) on in situ TEM data sets are especially encouraged. Particular focus will be put on rigorously establishing that in situ environmental conditions lead to kinetics that are similar to the corresponding real world processes the materials are involved in.

- Redox reactions and restructuring of nanoparticles in gases and liquids
- Computer-assisted quantitative information extraction
- Machine learning for feature recognition and tracking in in situ TEM video data
- Synchronization and integration of simultaneously acquired in situ data
- Establishing 'real world' relevant conditions during in situ TEM
- Multimodal and postmortem characterization of materials formed during in situ TEM.

A03

Advanced 3D Imaging and Analysis Methods for New Opportunities in Materials Science

Room B112

ORGANIZERS:

Roland Brunner, Materials Center Leoben

Julie Villanova, European Synchrotron Radiation Facility

Guillermo Requena, Das Deutsche Zentrum für Luft- und Raumfahrt

Steve Kelly, Zeiss Group

We invite contributions from researchers developing and applying 3D imaging methods to drive material science. The scope of the symposium is to incorporate: (1) advanced 3D image analysis methods (conventional as well as machine-learning-based), (2) a variety of microscopy approaches based on synchrotron, FIB-SEM, neutron-tomography, XCT and X-ray microscopy, (3) the combination of morphology with structural and chemical information including multi-method/scale/in situ workflows as well as (4) the combination with computational modelling methods e.g., FEM, CFD, etc. Examples of relevant classes of materials include, but are not limited to, energy materials, lightweight materials, new structural alloys, and composites.

- 3D morphology/structure/chemical analysis, including in situ microscopy methods for material science
- Challenges with respect to image analysis
- Challenges with respect to correlative studies including multi-method/scale/in situ workflows
- Challenges with respect to the use of image data for computational modelling methods (e.g. RVE).

A04

Developments of 4D-STEM Imaging—Enabling New Materials Applications

Room B113

ORGANIZERS:

Laura Clark, University of Oxford

Michele Conroy, University of Limerick

Colin Ophus, Lawrence Berkeley National Laboratory

David Muller, Cornell University

4D-STEM is rapidly advancing, pushing the boundaries of which beam-sensitive materials and what functional-material processes can be studied in the microscope. Phase contrast imaging using ptychography and other advanced methods are increasing resolution far beyond conventional limits, and DPC methods are revealing the electromagnetic structures of specimens more clearly than ever before. It is also now possible to measure structure properties such as strain, orientation, order, and disorder from millions of sample points, providing statistically robust measurements over functional length scales. This symposium covers the latest developments of these techniques and applications of these methods to visualize novel materials phenomena.

- Increased access to 4D-STEM detectors is leading to a proliferation of 4D-STEM imaging techniques
- Electron ptychography is particularly powerful for low-dose and for super high-resolution imaging and is a rapidly developing field (both iterative and direct techniques)
- This symposium seeks submissions showing new technique developments applied to enable new materials insights.

A05

Quantitative and Qualitative Mapping of Materials**Room B114****ORGANIZERS:****Emma Bullock, Carnegie Institution for Science****Angela Halfpenny, Central Washington University**

This symposium will discuss applications and advances in qualitative and quantitative mapping utilizing techniques such as energy-dispersive spectrometry, wavelength-dispersive spectrometry, x-ray fluorescence, electron backscatter diffraction, secondary ionization mass spectrometry, cathodoluminescence and laser ablation mass spectrometry. The software used to produce and manipulate maps will be discussed, as will best-practice methods for obtaining optimum results. Applications include, but are not limited to, geological and extraterrestrial materials, semiconductors, biological materials, and ceramics.

- Quantitative element mapping
- Qualitative mapping
- EDS/WDS/EBSD/XRF/SIMS/LA-ICPMS/CL
- Geological and extraterrestrial materials
- Biological materials
- Metals, ceramics and semiconductors.

A06

Expanding the Limits of Atom Probe Tomography**Room C122****ORGANIZERS:****David Diercks, Colorado School of Mines****Jonathan D Poplawsky, Oak Ridge National Laboratory****Francois Vurpillot, Universite' De Rouen****Ann Chiaramonti Debay, National Institute of Standards and Technology**

The use and development of atom probe tomography has been rapidly expanding and improving in many areas including hardware capabilities, reconstruction algorithms, data mining and processing, and new material applications. This symposium will present efforts exploring frontiers in atom probe tomography and field ion microscopy.

- New hardware developments, such as detector and laser technology, in-situ experimental designs, and APT integration with other techniques.

- Novel applications or the technique such as cryo-transfer, in-situ experiments, and cutting edge materials.
- Studies aimed at improving reconstructions, including field evaporation simulations, reconstruction algorithms, and mass spectra analysis.
- A focus on extracting more from atom probe data. Specifically, software tools for improved assessment and visualization of key and non-obvious features within the data including statistical methods, data mining, and machine learning are of interest.

A07

Science of Metrology with Electrons**Room A105**

A07 - Science of Metrology with Electrons

ORGANIZERS:**Andrew Barnum, Thermo Fisher Scientific****Sujitra Pookpanratana, National Institute of Standards and Technology**

With increasing integration of nanotechnologies into products and processes across engineering and manufacturing disciplines, new techniques are required to tackle the challenges of process monitoring and critical dimension analysis. With the capability of electron microscopy to provide imaging across a variety of signal modalities and resolutions to atomic lattice dimensions, electron microscopy has become a critical linchpin for metrology across industries. The growing volume of data provided by automated acquisition and increasing reliance on these techniques to solve a variety of metrology problems underscores new requirements for routine calibrations across analytical modes for properties such as length, strain, chemical composition, and optical behavior, as well as electric and magnetic fields. This symposium will feature current state-of-the-art, recent progress, and new challenges in the field of calibration and metrology for electron microscopes.

- Methods of calibration to ensure bounded accuracy of quantitative measurements for properties such as length, strain, chemical composition, and optical behavior, as well as electric and magnetic fields.
- Creation and use of reference metrologies for calibration transfer between systems.
- Traceability across multiple systems and types of measurements, with a focus on applications in TEM.

A08

From Operando Microcell Experiments to Bulk Devices

Room A107-108

ORGANIZERS:

Vasiliki Tileli, Swiss Federal Institute of Technology
Lausanne

William C. Chueh, Stanford University

Martial Duchamp, Nanyang Technological University

Performing operando experiments using liquid, gas, electrochemical, or heating and biasing stimuli provides valuable insights that can aid the development of next-generation technologies. However, microdevices used to perform operando studies suffer from major limitations that make the acquired results inconsistent with their bulk counterparts. Scanning or transmission electron and x-ray microscopy/spectroscopy techniques all exhibit limitations having to do with the setup and its operation, beam-induced irradiation effects, and temporal, spatial, or energy resolution. This symposium aims to assess the consistency of operando experiments with process that take place in real-life devices including batteries, fuel cells, memory devices, etc.

- Optimizing operando experiments in liquid, gas, or high vacuum conditions to make them relevant to bulk device measurements.
- Bridging the length scales in operando experiments (from meso to micro to nanoscale imaging).
- Strategies to mitigate electron or x-ray artifacts under realistic conditions in operando experiments.
- Development of novel methodologies for the preparation of microdevices for operando experiments.

A09

Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions

Room A105

ORGANIZERS:

Steven Randolph, Thermo Fisher Scientific

Andrew Polonsky, Sandia National Laboratories

McLean Echlin, University of California Santa Barbara

Remco Geurts, Thermo Fisher Scientific

Ultrashort pulsed lasers continue to gain adoption in the microscopy and microanalytical community due to unique attributes of fast material removal rates, the extremely low-damage ablation process, and the ability to process a wide range of materials. The combination of ultrashort pulsed lasers with SEM/FIB greatly expands the 2D and 3D capability of these instruments, including 3D materials science, fundamental laser-material interaction experiments, and ultrafast photochemistry. This symposium calls for novel results and simulations enabled by ultrashort pulsed lasers or laser-material interactions. Submissions in the fields of materials science, energy storage, biology, electronic materials, microelectronics, and laser-material interactions are welcomed.

- Development of workflows and techniques combining ultrashort pulsed lasers / SEM / FIB processing to perform 2D and 3D microanalysis that is uniquely enabled by laser technology
- Materials, electronics, biology, and energy storage application spaces addressed with ultrashort pulsed lasers
- Material response to and physics of ultrashort pulsed lasers, including damage mechanisms
- Modeling of the response of laser-material interactions and of the ablation process.

A10

**Surface and Subsurface Microscopy
and Microanalysis of Physical and
Biological Specimens****Room B115****ORGANIZERS:**

Vincent Smentkowski, GE Research

John A Chaney, The Aerospace Corporation

Xiao-Ying Yu, Pacific Northwest National Laboratory

Ryan Wagner, Purdue University

Surface properties dictate the performance of many physical and biological systems. The surface analyst is asked to detect and image species present in ever-lower concentrations and within ever-smaller spatial and depth dimensions. This symposium emphasizes state-of-the-art surface analytical instrumentation encompassing all aspects of surface and near-surface analyses, such as mass spectrometry, scanning probe microscopy and other probe-based techniques. We will cover advanced data analysis tools; correlative imaging (e.g., AFM and SEM; AFM and SIMS; FIB-SIMS); the use of complementary surface instrumentation to perform a complete analysis of complex systems; quantitative microanalysis; data processing; and surface analytical challenges. Both platform and poster presentations are encouraged.

- State of the art surface analysis and instrumentation
- Advances in scanning probe microscopy for quantitative analysis including nano-scale chemical, mechanical & electrical analyses, for example, TERS, IR, nanomechanical modes.
- How novel surface methods expand and compliment traditional SEM/TEM.
- Correlative microscopy /multidimensional microscopy - combining multiple analytical technologies.
- Data processing in microscopy: Hyper-spectral data, 3D imaging, multivariate statistical analysis, and machine learning.

All symposia are held in the Oregon Convention Center.

B01 Microcrystal Electron Diffraction (MicroED)

Room D137

ORGANIZERS:

Brent Nannenga, Arizona State University

Tamir Gonen, University of California LA

Microcrystal electron diffraction, or MicroED, is a method that can determine high-resolution structures from very small and thin 3D crystals. MicroED has been applied to a variety of microcrystalline samples, including those of biological molecules, small organic molecules, and samples from materials science. This session will focus on recent applications of MicroED for structure determination, as well as advances in MicroED methodology.

- MicroED is capable of using microcrystals for high-resolution structure determination
- Can be applied towards a variety of samples, from biological to inorganic materials
- Session will focus on applications and advanced methods development.

B02 3D Structures: From Macromolecular Assemblies to Whole Cells (3DEM FIG)

Room D136

ORGANIZERS:

Teresa Ruiz, University of Vermont

Melanie Ohi, University of Michigan

Cheri Hampton, AFRL/RXAS Wright-Patterson Air Force Base

William Rice, NYU Langone Health

Our understanding of the 3D structure and functional subtleties of complex biological systems has skyrocketed due to recent advances in EM imaging technology and hybrid methodologies. This symposium will highlight structural studies of macromolecules, microorganisms, cells, and tissues using state-of-the-art high-resolution techniques. These techniques include single particle cryo-EM, cryo-electron tomography, helical reconstruction, STEM; AFM, X-ray crystallography, and molecular modeling.

Biological topics of interest include cellular architecture, metabolism, trafficking, communication, and division; gene regulation, transcription, and translation; host-pathogen interactions and virus structure; in situ studies using TEM and SEM, and all aspects of structure-function studies of biological assemblies.

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

B03 Technical Advances in Cryo-EM

Room D136

ORGANIZERS:

Mike Marko, State University of New York, Wadsworth Center

Christopher Russo, University of Cambridge

Anchi Cheng, New York Structural Biology Center

Cryo-EM technology is in the tradition of advances in biological TEM that has long been a part of (E)MSA. These include advances in the TEM itself, as well as in cameras, specimen preparation, stages, and software. Results are now competitive with x-ray crystallography, and resolution in, single-particle cryo-EM is now in the atomic range, previously obtained only in materials science. Advances in cryo-EM are coming quickly, considerably widening the popularity of the technique. Speakers representing many of the current advances will be invited, and all contributions related to this topic will be most welcome.

- Application of low-dose STEM methods
- Methods for combating beam-induced motion
- Potential for TEM development to widen applications
- Advances and considerations for optimal specimen preparation
- Advances in image-processing for cryo-EM and cryo-ET
- Appropriate application of Micro-ED.

B04

Correlative and Multimodal Microscopy and Analysis

Room D133 - 134

ORGANIZERS:

Si Chen, Argonne National Laboratory

Xiao-Ying Yu, Pacific Northwest National Laboratory

James Fitzpatrick, Washington University, St. Louis

Jacob Hoogenboom, TuDelft

Real-world systems are hierarchical, encompassing large differences in size, structure, composition and arrangement. Correlative microscopy and analysis have evolved to an essential toolkit to characterize these complex systems and have led to advances in both soft and hard material studies by providing information with complimentary modalities and across different scales. In this symposium, we highlight technical innovations in instrument development, sample preparation and handling, in-situ and cryogenic sample environment, and data analysis pipeline. We also seek contributions on applying correlative methods to physical, environmental, biological and biomedical studies.

- Correlative microscopy instrumentation and workflows
- Cryogenic sample preparation and handling
- In-situ sample environment
- Multi-modal data analysis pipeline

B05

Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals

Room D137

ORGANIZERS:

Claudia Lopez, Oregon Health & Science University

Marcela Redigolo, West Virginia University

Joe Mowery, USDA Agriculture Research Service

This symposium covers diverse content related to the research and diagnosis of diseases in humans, animals and plants. The application of various microscopy techniques providing in-depth investigations of disease mechanisms exhibits the versatility of these techniques as key-tools in diagnosis and in the understanding of the host, the host-pathogen interaction, and its environment. Some of these

methods allow for a rapid detection and identification of novel agents, including those not considered by the investigator or clinician, making these techniques highly important in clinically or epidemiologically critical situations. Target attendees include scientists from all levels of bio-imaging expertise and related backgrounds.

- Enhancement of sample preparation workflow for EM analysis of complex tissue for diagnosis or research
- Application of advanced or innovative EM techniques to study host-pathogen interactions, virulence factors and ultrastructural changes
- Electron microscopy in a diagnostic network: recruitment of instruments and microscopists around the world during critical situations and outbreak management, such as a pandemic
- Electron Microscopy for Rapid Diagnosis of Emerging Infectious Agents
- Laboratory safety, considerations and sample preparation methods for microscopy analysis of biohazardous specimens
- Three-dimensional electron microscopy techniques for diagnosis and advanced culture methods and the use of organoids, microspheres and bioprints as models.

B06

Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products – Research, Development, Analysis, Regulation, and Commercialization

Room D137

ORGANIZER:

Daniel Skomski, Merck & Co. Inc.

This symposium, sponsored by the Pharmaceuticals Focused Interest Group (FIG), will present diverse content related to the research, development, manufacture, and use of pharmaceuticals, medical products, and devices. The intent is to connect subject matter experts dealing with the application of microscopy, imaging, and micro/nano-analysis towards problems of interest to the pharmaceutical, biopharmaceutical, medical, device, and health fields. In-depth technical presentations will address the unique problems that arise during drug discovery and development, method development and optimization, vaccine research, formulation, biocompatibility, production,

product life cycle management, and eventual patient use. Addressed topics in the research include material design and properties, physiochemical characterization (actives, excipients, contaminants, small molecule/large molecule/intermediate, polymorphs, particles), product performance, pharmacology, manufacturing, failure modes, biocompatibility, stability, shelf-life, sterility, etc. Also of interest is an understanding of regulations and data integrity concerns as applied to the pharmaceutical industry. Vendors and service providers are encouraged to submit abstracts which describe the use of their technologies as they apply to pharmaceutical industry problems.

- Root cause analysis of issues related to the manufacturing of drugs, medical products, and devices in both R&D and good manufacturing practice (GMP) settings
- Utilization of techniques and methods to overcome unique product performance and pharmacology challenges (polymorphs, contaminants, particles, etc.)
- Regulatory and data integrity compliance of instrumentation and methods in the pharmaceutical industry
- Investigations and evaluations of testing and drug and vaccine development throughout a product lifecycle (identification, development, testing, supply chain, regulatory, etc.)
- Device and throughput challenges (failure mode analysis, biocompatibility, sterility, etc.).

B07

3D Volume Electron Microscopy in Biology Research

Room D133 - 134

ORGANIZERS:

Alice Liang, NYU Grossman School of Medicine

Christopher Guerin, Flanders Institute of Biotechnology (Emeritus)

Ru-ching Hsia, Carnegie Institution for Science

Electron microscopy remains the gold standard for examining the ultrastructural details of cells and tissues. However, for many years obtaining EM data in three dimensions was a difficult and labor-intensive task. Over the last 20 years several approaches, and technologies have been developed that make 3D EM analysis of complex tissue or whole cells increasingly efficient and accessible. While automation of the acquisition, and partial automation of the data reconstruction steps has been achieved, the path to vEM is still challenging at the sample preparation stage. This symposium will evaluate several methods jointly termed Volume electron microscopy (vEM): serial block face scanning electron microscopy (SBF-SEM), focused ion beam scanning electron microscopy (FIB-SEM) and array tomography (AT). Discussions will include different options for vEM, the challenges and improvement of sample preparation protocols and the potentials of the 3D information to answer questions not adequately addressed with 2D techniques.

- Challenges and advancement in sample preparation for volume EM
- Innovation in combined volume EM and Correlative Light and Electron Microscopy (CLEM) workflow
- Application of volume EM techniques in biomedical research
- Techniques, instrumentation, and software development for volume EM image acquisition and analysis.

B08

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

Room D135

ORGANIZERS:

Kedar Narayan, Frederick National Laboratory,
National Cancer Institute

Camenzind G Robinson, St Jude Children's
Research Hospital

Aubrey Weigel, HHMI, Janelia Research Campus

Biological imaging is producing ever larger data sets but is also quickly becoming multi-modal with disparate imaging technologies often being utilized, yet the ability to handle and analyze these data often lags far behind, especially in smaller labs and core facilities. Appropriate integration and correlation of disparate data streams at various scales, and portability of automated solutions remain daunting. This symposium aims to address issues and solutions stemming from large and multi-modal image data in cell biology, including image processing, correlation, segmentation, visualization, and analysis, especially in the context of open-source options.

- Processing, storing, and distributing large image data in cell biology
- Correlating images and metadata from LM, EM, other modalities (XRM, chemical imaging, etc)
- Identifying, segmenting, and visualizing features of interest efficiently
- Adapting and applying open-source tools and frameworks for image processing and analysis
- Implementation of scalable solutions for small and mid-sized labs and facilities.

B09

Memorial Symposium: Shinya Inoue

Room D135

ORGANIZERS:

David Piston, Washington University in St Louis

Wendy Salmon, University of North Carolina

Shinya Inoue was a pioneer in live cell imaging, who made seminal discoveries in cell division, fertilization, and early embryonic development. In the pursuit of cell biological mechanisms, he made repeated improvements to his microscopes, and incorporated the best developments from others. To reach beyond his own research, he founded an annual microscopy course at Woods Hole that fostered interactions between the microscopy industry and the research community. This symposium will honor the future of Dr. Inoue's vision, where symbiotic improvements in microscopy techniques and understanding of biological mechanisms continue to enable new discoveries.

B10

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

Room D133 - 134

ORGANIZERS:

Yongxin (Leon) Zhao, Carnegie Mellon University

Alan M. Watson, University of Pittsburgh

The capability of modern light microscopes to study biologic processes is often limited by the preparation of the tissue to be imaged. Advances in tissue preparation technologies, such as tissue clearing and Expansion Microscopy, facilitate more effective visualization and understanding of structures and processes in intact biologic systems. Innovation in the way that tissues are manipulated prior to imaging often spurs novel uses for established imaging platforms and may inspire the development of new hardware and computational approaches. This symposium offers the opportunity to explore advancements in tissue preparation technologies which push the limits and expand the utility of modern light microscopes. Target attendees include scientists from all levels of bio-imaging expertise and related backgrounds.

All symposia are held in the Oregon Convention Center.

P01 **Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys**

Room A105

ORGANIZERS:

Yi-Sheng (Eason) Chen, University of Sydney
Arun Devaraj, Pacific Northwest National Laboratory
May Martin, National Institute of Standards and Technology
Motomichi Koyama, Institute for Materials Research, Tohoku University

The presence of hydrogen in metals can lead to catastrophic failures known as hydrogen embrittlement. A solution for this problem requires a multiscale understanding of microstructural hydrogen behaviors for which atom probe tomography, nanoscale secondary mass ion spectroscopy, neutron tomography and other methods have proven to be powerful. Combined with structural information provided by both in-situ and ex-situ electron microscopy, these techniques have improved the understanding of how hydrogen causes hydrogen embrittlement and how to prevent it. This symposium aims to bring together worldwide researchers focused on such emerging methods for characterizing hydrogen effects in metals and alloys.

- Design against hydrogen embrittlement requires fundamental understanding available only through advanced characterization techniques
- Progress of hydrogen characterization by atom probe tomography (APT)
- New development in hydrogen characterization by nanoscale secondary ion mass spectroscopy (NanoSIMS)
- Hydrogen characterization by neutron tomography
- Progress of characterizing hydrogen effect in micro and nanoscale by in-situ and ex-situ microscopic techniques.

P02 **Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices**

Room A107-108

ORGANIZERS:

Wenpei Gao, North Carolina State University
Kai He, Clemson University
Jiong Zhang, Intel Corporation

Existing imaging techniques in electron microscopy, including holography, ptychography, differential phase contrast, electron energy loss spectroscopy and their in-situ experimentation, now offer better spatial, temporal and energy resolution, thanks to the advancement in instrumentation and imaging theory. This extends our capability to study the structure, phonon, spin and other exotic states of quantum materials, including two-dimensional materials, topological insulator, and other candidate materials for quantum information sciences. This symposium will focus on recent progress in electron microscopy study of quantum materials, from the development of characterization theory and techniques in materials imaging, to applications through in-situ studies on conceptual devices.

- New development in imaging methods, instruments, and big data analytics to access quantum functionality
- Probing electronic structures and magnetic states in 2D materials and complex oxides using ptychography and 4D STEM
- Characterizing phonons and vibrational properties in semiconductor and electronic materials
- Imaging topological materials
- In-situ microscopy and spectroscopy of electronic materials under biasing.

P03

**Imaging Chemical Reactions
using High Speed Electron
Microscopy (EM)****Room C123****ORGANIZERS:**

Elena Besley, University of Nottingham

Angus Kirkland, University of Oxford

This symposium highlights recent breakthroughs in advanced materials processing, high-speed EM imaging, image analysis or big data and computational modelling used as an analytical tool for quantitative analysis of chemical kinetics at the nanoscale. High-speed EM can be usefully harnessed as a controlled source of energy to promote chemical reactions, controlling their rates, and activating additional reaction channels. High-speed EM allows the direct observation of key intermediate states in chemical reactions. These advances contribute to further chemical understanding of the dynamics of electron beam induced processes typically delivered by computational modelling.

- Millisecond time resolved imaging experiments applied to a wide range of nanoscale materials
- Automated pattern recognition and machine learning techniques for automatic detection of reaction products and intermediates, enabling analysis of large datasets spanning extended timescales
- Development and characterisation of nanoscale devices based on fast structural changes
- Advances in computational modelling suitable for analysis of chemical reactions in EM.

P05

**In Situ TEM Characterization
of Dynamic Processes during
Materials Synthesis and Processing****Room C123****ORGANIZERS:**

Dongsheng Li, Pacific Northwest National Laboratory

Qian Chen, University of Illinois

Yu Han, King Abdullah University of Science and Technology

Barnaby Levin, Direct Electron

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

- Chemical and electrochemical reactions
- Solid-gas interactions
- Nucleation and crystal growth from solutions, melts, and vapors
- Self-assembly, oriented attachment, and nanoparticle-mediated growth
- Developments in specialized holders and electron microscopes, data analysis and mining, and practical challenges for microscopy.

P06 **Nanoscale Optics with Electrons and Photons**

Room A106

ORGANIZERS:

Luiz Tizei, Université Paris-Saclay/niversite

Sophie Meuret, Center for Materials Elaboration and Structural Studies

Sean Collins, Leeds University

The optical response of a system is intimately related to its structure and chemistry. For heterogeneous objects, with nanometer scale anisotropy (either chemical or structural), macroscopic optical measurements provide at best the average response requiring extensive modelling for a full picture. In this symposium, we will discuss the use of electron spectroscopies to understand the optical properties of nanomaterials. More precisely, the symposium will address how optimally to couple optical property measurements to other nanometer-scale resolved structural and chemical data. We will emphasize the use of complementary and correlative techniques to reveal the link between structure and optics at the nanoscale.

- Electron energy loss, electron energy gain and cathodoluminescence for optics
- Nanometer/atomic scale structural and chemical measurements
- Optical effects of local changes in composition
- Applications to different systems, such as: moire structures in 2D materials bilayers for photonics, semiconductor heterostructures (emission and absorption), single object (nanowires, nanotubes, molecules...) and optical spectroscopy.

P07 **Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments**

Room B118 - 119

ORGANIZERS:

Yang Yang, Pennsylvania State University

Janelle Wharry, Purdue University

Xing Wang, Pennsylvania State University

The growing demand for carbon-free energy worldwide can only be met by advanced energy systems, such as Gen IV nuclear reactors, molten salt energy storages, and advanced turbines, which require robust materials for higher temperature, more corrosive and more radioactive environments. This symposium will discuss how advanced microscopy techniques are leveraged to meet the crucial need to rapidly introduce new and high-performance materials. High-throughput methodologies enabled by fast detectors, artificial intelligence and automated characterization could potentially be one of the solutions. On the other hand, the combination of multiple characterization techniques on the same sample (a.k.a. correlative microscopy), including electron microscopy, X-ray synchrotron radiation characterization, atom probe tomography, and positron annihilation microscopy, etc., is playing an important role in deciphering the fundamental mechanisms of materials degradation in extreme environments. Discussions on other advanced methods such as in situ techniques and tomography are also encouraged.

- Nuclear Fuel and Materials
- Correlative Microscopy
- High-Throughput Characterization
- Extreme Environments
- Materials Degradation

P08

Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

Room B115

ORGANIZERS:

Joe Patterson, University of California, Irvine

Hector A Calderon, Instituto Politecnico Nacional (Mexico)

Christina Kisielowski, Lawrence Berkeley National Laboratory

Jennifer Cookman, University of Limerick

Understanding, controlling and reducing electron-beam sample interactions is essential to meaningfully correlate the synthesis, chemistry and properties of organic and inorganic materials. This becomes especially important and challenging for electron tomography, analytical techniques and in-situ experiments of beam sensitive materials. This symposium welcomes contributions that address challenges in electron-beam sample interactions that enable the reliable collection of data that advances our understanding of material structures, properties, and dynamics. Topics and techniques of interest include: low-dose imaging, sample preparation, sensitive detectors, exit wave reconstruction, fast scanning and image overlapping, pulsed beams, machine learning, aloof and event-streamed spectroscopy, and theoretical aspects of electron-sample interactions.

- Precise control over the incident electron beams in time and space
- Theoretical understanding of electron-sample interactions
- Low-dose collection and protective sample preparation methods
- High spatial / temporal resolution imaging of beam-sensitive materials
- Automation and machine learning for experiments and analysis.

P09

Insights into Phase Transitions in Functional Materials by In Situ/ Operando TEM: Experiment Meets Theory

Room A106

ORGANIZERS:

Leopoldo Molina-Luna, Technische Universität Darmstadt

Judy Cha, Yale University

Michele Conroy, University of Limerick

Lin Zhou, Ames Laboratory

Recent technological advances in transmission electron microscopy are transforming what researchers can study at the atomic scale. The capability to perform multiple measurements while simultaneously analyzing corresponding structural, chemical, or even electronic structure changes in nanomaterials or devices down to the atomic scale is opening exciting new opportunities at the forefront of modern materials science research. Phase transformations of nanoscale materials, and corresponding changes in material properties and functionalities, are critical for fundamental science and device applications. In particular, in situ/operando TEM enables direct studies of nucleation and growth during phase transitions in real space, whose pathways and transition kinetics are subject to nanoscale heterogeneities. The focus of this symposium is on the application of in situ/operando TEM techniques that include heating, biasing, cooling, magnetic fields, and mechanical testing to induce and probe phase transitions in functional materials and devices at the nanoscale that, in synergy with theoretical methods, such as DFT calculations, phase-field, micromagnetics, modelling, finite-element based simulations, help unravel the structure and properties of materials down to the atomic scale. Furthermore, as data collection, analysis and recording of dynamic information is becoming increasingly demanding, we also welcome contributions in computer-aided image analysis and big data processing to understand the fundamental physics governing the nano- to atomic-scale phase transitions of functional materials and devices.

- Phase transitions in functional materials and devices
- In situ TEM capabilities (heating, biasing, cooling, magnetic fields, mechanical testing)
- Synergies with theoretical methods (first-principles, phase-field, micromagnetics, finite-element)
- Monitoring changes in chemical composition and band gap via time-resolved direct electron detection EELS
- Combination with advanced TEM techniques (phase related, spectroscopy, 4D-STEM) and controlled electron-beam-induced transitions.
- Computer-aided image analysis (including AI for EM) for quantitative studies.

P10 **Advanced Imaging and Spectroscopy for Nanoscale Materials**

Room B117

ORGANIZERS:

Robert F Klie, University of Illinois Chicago

Shize Yang, Arizona State University

Juan-Carlos Idrobo, Oak Ridge National Laboratory

The objective of this symposium is to provide a platform to discuss recent developments in materials characterization enabled by aberration-corrected scanning and transmission electron microscopy. While spatial resolution of better than 60 pm is now possible, aberration-correction has also enabled a large variety of in-situ experiments, new imaging schemes, and multi-dimensional data acquisitions at close to atomic resolution. Furthermore, multimodal imaging and spectroscopy provide an unprecedented opportunity for materials characterization by using a combination of high-speed, high-sensitivity detectors and spectrometers. The chemistry and structure of crystals, interfaces, and defects down to the atomic-scale can now be directly determined under proper experimental conditions. Such capabilities offer a unique perspective to understand the structure-property relationships and pave the way towards material functionality manipulation from the atomic scale. This symposium is intended to facilitate the exchange of information on the latest developments, challenges, and outlooks in the application of advanced imaging and spectroscopy methods on resolving structures and chemistry in various materials systems, including metals, oxides, and semiconductors.

- Hardware developments (e.g., field-free objective lens, fast detectors)
- New imaging modes
- Atomic-scale spectroscopy (electron energy loss-spectroscopy, energy dispersive x-ray spectroscopy)
- Applications of aberration-corrected electron microscopy to nanoscale materials characterization.

P11 **Planetary-materials Characterization in the Era of Mission Returned Sample Analysis**

Room B114

ORGANIZERS:

Tom Zega, Lunar and Planetary Laboratory - University of Arizona

Jessica Barnes, University of Arizona

Harold Connolly Jr., Rowan University

Pierre Haenecour, Lunar and Planetary Laboratory - University of Arizona

Missions to collect planetary materials from varied celestial sources have provided us with new insights into the early solar system. We expect the return of material from carbonaceous asteroid Bennu by the NASA OSIRIS-REx Mission in just over 14 months. The proposed symposium solicits papers that use microscopy-related techniques in determining the origins of planetary materials. We welcome papers that include but are not limited to: discussing desirable levels of precision or detection, improved methods for sample handling and preparation, and new analytical protocols combining multiple techniques to maximize the information that can be acquired from a small sample. Earth and planetary materials characterization.

- Sample-return missions
- Coordinated analysis and correlative microscopy.

P12 **Memorial Symposium: John C.H. Spence**

Room A105

ORGANIZERS:

Ondrej Krivanek, NION

Jian-Min Zuo, University of Illinois

John Charles Howorth Spence, FRS (foreign member) made a broad range of fundamental advances in our knowledge of the nanoworld through electron microscopy, electron diffraction, and bio-XFEL. His contributions were always highly original, and typically blazed new paths that others followed. He authored a number of key papers and several widely read textbooks, and tutored many students and postdocs who later made their own pivotal advances. He also authored a highly acclaimed popular science book and a touching biography about his father, a WWII flying ace. This symposium will cover the fields he contributed in, and chart their future course.

C01

Microscopy Infrastructures: Architectures, Avenues and Access

Room B116

ORGANIZERS:

Steven Spurgeon, Pacific Northwest National Laboratory

Lewys Jones, Trinity College Dublin

Zineb Saghi, De la recherche à l'industrie

Santhana Eswara, Luxembourg Institute of Science and Technology

Modern microscopy drives new scientific discovery, and new scientific practice is driving innovations in microscopy. Hardware and software developments are reshaping how instruments are priced, purchased, designed, and operated. Today's dynamic research landscape requires us to shift from traditional, closed operating models toward open, agile characterization platforms designed to shorten time to solutions. The field also increasingly demands better value for funders; asynchronous, remote access models; and emphasis on infrastructure resilience. We will explore emerging reprogrammable instrument architectures, new modes of automated/remote operation, and host critical dialogue on the growing cost-driven divide between technological, have, and, have-nots, among other topics.

- The Microscopy "Maker Space": designing and building reconfigurable, open microscopy platforms
- Data-driven, automated or remote operation modes to achieve novel experimentation, resilience, and greater sample throughput
- Reassessing central-facility versus regionally-distributed models to democratize the atomic world
- Virtual learning and acclimation before utilization
- Instrument sustainability, lifecycle, and end-of-life repurposing
- Maximizing instrument meaning and value: reassessing characterization needs vs. wants.

C03

Facilities Management Crucial Skills and Strategies

Room B111

ORGANIZERS:

Luisa Amelia Dempere, University of Florida

John Shields, University of Georgia

Caitlin Tibbetts, University of Florida

This symposium will focus on critical skills and strategies that can help core, multiuser facility managers to navigate more effectively essential functions of their role. These skills and strategies will be addressed as follows: Communication model designed to create desired outcomes in crucial conversations with users, higher administration, and stakeholders. Adoption of proven strategies to effectively influence the behavior of users, and their adoption of rules, procedures, and guidelines. Exposure to negotiation strategies that can effectively address staff and facility needs, use contracts expectations, user-facility agreements, proposal support, publications authorship, facility recognition and acknowledgement, and activities open for negotiation.

- Management Skills
- Management Strategies
- Crucial Conversations with Users
- Influencing Users Behavior
- Negotiation Strategies

C04

Artificial Intelligence, Instrument Automation, and High-dimensional Data Analytics for Microscopy and Microanalysis

Room B116

ORGANIZERS:

Huolin Xin, University of California, Irvine

James LeBeau, Massachusetts Institute of Technology

Markus Kuehbach, Humboldt-Universität zu Berlin

Priyanka Periwal, University of Texas at Austin

The development of increasingly sensitive detectors and higher frames rates of acquisition are driving the development of new image analysis methods. These include the rapid development and application of advanced artificial intelligence methods such as machine learning and automation. Many of these developments are happening within the broader framework of open-source software development and can exploit open data. Open-source software can further enable researchers to design, collaborate, and share experimental techniques without the limitations of proprietary software. These developments are intertwined with issues regarding data storage, handling, and management, and are aided by adherence to Findable, Accessible, Interoperable, Reusable (FAIR) data principles. We welcome submission in the following topical areas.

- Application of artificial intelligence to microscopy and spectroscopy
- Healing, inpainting, and compressed sensing of discrete or contaminated microscopy and spectroscopy datasets
- Discovery of hidden correlations and inverse problems
- Efficient storage, handling, and management of large-volume/high-dimensional data
- Open software and open frameworks for microscopy and spectroscopy
- Ontology and infrastructure tools which support microscopists with aligning the above-mentioned analyses better with the aims of the FAIR data stewardship principles

C05

Vendor Symposium

Room D138

This symposium is a forum for vendors to highlight important breakthroughs in technology and methodology developed by companies working at the cutting edge of microscopy, microanalysis, and image processing. It covers new instrumentation, technologies and methods that advance all fields of microscopy and microanalysis for both physical and biological sciences. It will provide an open forum for the exchange of ideas and best practices.



Microscopy Outreach Sessions

Participants are welcome from the following areas: Academia, Education, all levels of Government, Business/Industry, and change leaders within Science, Technology, Engineering, and Math sectors.

X91

Microscopy Explorations for Families and Kids of All Ages (formerly "Family Affair")

ORGANIZERS:

Elaine Humphrey, University of Victoria, Canada
Pat Connelly, National Institutes of Health

Room: B112

X92

Project MICRO

ORGANIZERS:

Elaine Humphrey, University of Victoria, Canada
Janet Schwarz, University of Vermont
Pat Connelly, National Institutes of Health

Room: B112

The Outreach booth is part of the MSA Megabooth and is available every day the exhibit hall is open. Learn how to set up different stations in a classroom and share your fun microscopy outreach classroom experiences! See different microscope systems in action for use in a classroom; peruse a selection of books suitable for elementary school-age children; and put your name into the draw for a daily door prize.

X94

STEM Roundtable: Building Skills for the Future

ORGANIZER:

Lori Harvey, Hitachi High Technologies America

Room B114

We will explore how to integrate varied resources to have broader, sustainable impacts in STEM education, including bridging K-12 outreach with undergraduate and graduate education, and emphasizing the importance of diversity and inclusion which will lead to a stronger workforce for everyone. In response to education changes in 2020, The HTA Inspire STEM Education Outreach Program has put forth a plan to provide an opportunity to make quality in-person and virtual experiences easily accessible to teachers as they create the classrooms of tomorrow now. The program is continuing its work with local, national, and international partners to provide flexible access to easy to use content and technology that can be used in the following learning scenarios: Brick to Click Learning, Click to Brick Learning, Blended Learning and Online Learning.

Session is open to all — no separate registration fee required.

X30

**Technologists' Forum Roundtable:
Image Data Analysis
Software Review****Room D138****ORGANIZERS:****D. Page Baluch, Arizona State University****Frank P. Macaluso, Albert Einstein College of Medicine**

With the introduction of new 3D imaging microscope systems, data size and complexity has increased requiring more advanced software to analyze the results. Although many classic data analysis programs exist, there has been the development of new programs that are stand alone or integrated into microscope systems that have enhanced capabilities and improved user interfaces. This session will review a few new programs used to analyze data from whole slide scanners, light sheet imaging systems and 3D fluorescent image data.

- Analysis of whole slide scanner data using deep learning AI for multiplex data.
- Automated 3D analysis workflows for Light sheet, SEM, FIB-SEM, CLEM and other volume image data sets.
- 3D/4D visualization and analysis for cell-based segmentation, automated tracking and identification of intracellular relationships within 3D fluorescent image data sets.

X31

**Technologists' Forum Symposia:
3D SEM Techniques****Room D138****ORGANIZERS:****D. Page Baluch, Arizona State University****Ru-Ching Hsia, Carnegie Institution for Science**

Interest in three-dimensional scanning electron microscopy has increased over the past few years with the expanded capability to combine Correlative Electron Microscopy (CLEM) with 3-D volume analysis. As more tools and workflows become available, the techniques in sample preparation and data analysis are still challenging. This year the Technologists' Forum is partnering with the organizers of the 3D Volume Electron Microscopy in Biological Science symposium to provide a series of

presentations that focus on sample preparation, image acquisition and analysis.

- Review of the challenges and new developments in sample preparation for volume EM.
- Experimental design and workflows for sample preparation, image acquisition and analysis.
- Tips and tricks on 3-DSEM image acquisition and analysis.

X32

**Technologists' Forum Workshop –
Tissue Clearing Tips & Techniques****Room D137****ORGANIZERS:****D. Page Baluch, Arizona State University****John L. Grazul, Cornell University****Ru-Ching Hsia, Carnegie Institution for Science**

With an increased interest in 3D tissue imaging, researchers have had to develop protocols to optically clear thick tissues for light microscopy-based applications. Tissue clearing is now combined with many other techniques such as multiplexing protein imaging, fluorescent in situ hybridization for DNA and RNA, super-resolution imaging techniques, and multiomics studies. This year the Technologists' Forum is partnering with the organizers of the Development, Challenges and Biomedical Applications of Tissue Clearing, Expansion Microscopy and Volumetric Imaging symposium to provide a series of presentations that will review the most common protocols used in tissue clearing, highlighting the challenges, and describing sample processing workflows.

- Identify the clearing technique most suited for your tissue type and imaging method.
- Learn about the most common clearing techniques used in light-based microscopy.
- Tips in avoiding tissue or objective lens/microscope system damage.

Biological Sciences Tutorials

X41

Applying CryoAPEX in the Cell Biology of RNA Viruses; A Question-Based Evolution of the Methodology

Room B110

ORGANIZER:

Ranjan Sengupta, NIDCD

- Understanding APEX2 tagging in the context of the functional preservation of candidate protein
- APEX2 based localization of membrane protein and membrane interacting proteins
- Ultrastructural preservation of cells using hybrid chemical and cryofixation
- Marrying APEX2 tagging with electron tomography: a way to localize proteins in 3D space within the cellular ultrastructure.

X42

Indirect Correlative Light and Electron Microscopy (iCLEM)

Room B110

ORGANIZERS:

Heather Struckman, The Ohio State University
Rengasayee (Sai) Veeraraghavan, The Ohio State University

- iCLEM exploits structural fiducials in samples that are identifiable via both light and electron microscopy to correlate distributions of measurements rather than individual images.
- This sidesteps the need to image samples on two different microscopes.
- iCLEM incorporates computational image analyses designed for rich quantitative assessment and high throughput.

Physical Sciences Tutorials

X43

A Multi-Modal Approach for Characterizing Battery Materials

Room B110

ORGANIZER:

Dr. Arnaud Demortiere

- Electrochemical TEM investigations for liquid and solid electrolyte
- 4D-STEM ASTAR and 3DED techniques: a mapping of crystallographic transformation
- Micro & nano-XCT a tool for 3D morphological investigation in coupling with phase contrast, XANES, diffraction and ptychography.

X44

Precession Electron Diffraction: A Little Bit of History, Basics, and Recent Developments in Projected Crystal Symmetry Quantifications

Room B110

ORGANIZER:

Peter Moeck, Portland State University

- A brief history of the technique
- Experimental implementation of a commercial product by NanoMEGAS and quasi-kinematic crystallography in 3D on the basis of sets of zone axis patterns
- Recent developments in projected crystal symmetry quantifications and very recent developments in correcting for dynamical diffraction effects.

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Immunogold labeling is present in the brushborder and endocytotic vesicles of a proximal tubular cell. 25,000x magnification. B. Guhl and J. Roth, Inst. for Cell- and Molecular Pathology, University of Zürich.



trimtool 20, 45, 90

One trimming tool for all of your trimming needs, be it at room or cryo temperatures.

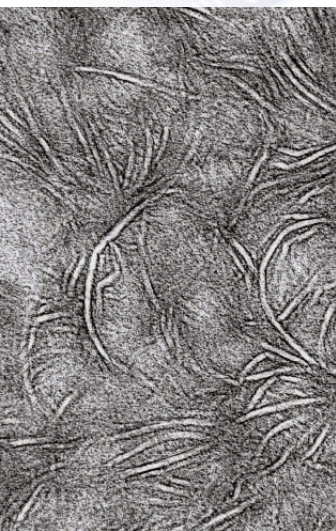
A well trimmed sample is a precondition for perfect section ribbons. Due to the extreme sharpness of our diamond blades, less mechanical damage is applied to the sample during trimming. Very shiny sample faces and precise sides are the result.

histo cryo

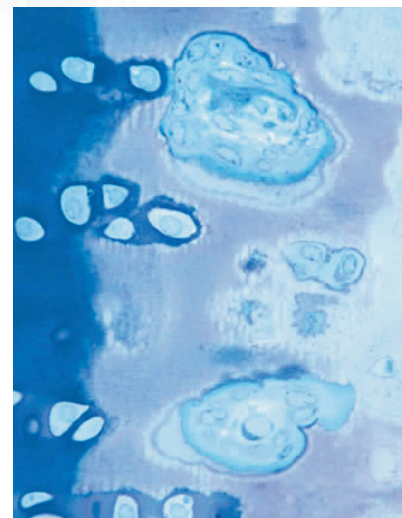
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- Knives are available in 45° angle.
- Section thickness range 0.2-2µm.
- Cutting edge length 4, 6, and 8 mm.

E. B. Hunziker, M. E. Müller Institute for Biomechanics, University of Bern. Rabbit joint, calcified cartilage/bone. X760



120,000x magnification. Ronald Walter, BASF Aktiengesellschaft, Polymer Physics, D-67056 Ludwigshafen.



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M&M 2022

Monday, August 1

A

Analytical Sciences Symposia - Monday Afternoon

A01.1 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

SESSION CHAIRS:

Suzy Vitale, Frances Allen, Joshua Sugar, Matthew Thorseth

PLATFORM SESSION

Monday 1:30 PM • Room: D138

- 1:30 PM **1** *Expanding the Energy Range and Fabrication of Sources Enabling Novel Focused Ion Beam Nanofabrication and Modification; (invited) Michael Titze*, Aaron Katzenmeyer, Vigneshwaran Chandrasekaran, Anthony Flores, Barney Doyle, Yongqiang Wang, Han Htoon, Edward Bielejec
- 2:00 PM **2** *Focused Ion Beam Preparation of Low Melting Point Metals: Lessons Learned From Pb/Sn Solders; Paul Kotula*, Suzy Vitale, Daniel Perry, Damion Cummings, Julia Deitz, Joseph Michael
- 2:15 PM **3** *In-situ Fracture Toughness of Single Crystal Silicon Double-Cantilever Beams; Sara Dickens*, Frank Delrio, Scott Grutzik, William Mook, Brad Boyce, Eric Hintsala, Douglas Stauffer, Robert Cook
- 2:30 PM **4** *FIB Sample Preparation of Hybrid Organic-Inorganic Perovskite (HOIP) Solar Cells; Felipe Schnaider Tontini*, Mounib Bahri, Michel De Keersmaecker, Erin Ratcliff, Neal Armstrong, Nigel Browning
- 2:45 PM **5** *Taking Full Control: Leveraging Software Customizability and Open-Source Hardware to Tailor FIB Instrument Controls; Aleksander Mosberg*, Iain Godfrey, Quentin Ramasse

A03.1 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science

PLATFORM SESSION

Monday 1:30 PM • Room: B112

- 1:30 PM **52** *3D Operando Monitoring of Lithiation Spatial Composition in NMC Cathode Electrode by X-ray nano-CT & XANES Techniques; (invited) Arnaud Demortière*
- 2:00 PM **53** *Correlated XRM and 3D FIB-SEM Workflow to Investigate the Structure-Property Relationship of Si-Based Battery Anode Materials; Stephen Kelly*, Robin White, Benjamin Tordoff, Sebastian Schaedler, Thomas Vorauer, Johanna Schoggel, Bernd Fuchsbichler, Stefan Koller, Roland Brunner

2:15 PM **54** *Synchrotron Holotomography on Silicon-Based Anode Materials for Improved Lithium Ion Batteries!; Fereshteh Falah Chamasemani, Michael Häusler*, Thomas Vorauer, Guilhem Paradol, Alice Robba, Victor Vanpeene, Bernd Fuchsbichler, Claire Villeveille, Sandrine Lyonnard, Roland Brunner

2:30 PM **55** *Multimodal 3D Characterisation of Carbon-based Perovskite Solar Cells; Jebin Jestine*, Richard Johnston, Cameron Pleydell-Pearce, Peter Davies, Trystan Watson, Simone Meroni, Carys Worsley, Raptis Dimitrios, Tom Dunlop, Ria Mitchell, Tobias Volkenandt, Benjamin Tordoff, Stephen Kelly, Robin White, Mansoureh Rad

2:45 PM **56** *Advanced Crack Analytics on 3D X-ray Tomography of Irradiated Silicon Carbide Claddings; Fei Xu*, Joshua Kane, Peng Xu, Nikolaus Cordes, Jason Schulthess, Mahmut Cinbiz, Sean Gonderman, Christian Deck, Jack Gazza

A05.1

Theory

PLATFORM SESSION

Monday 1:30 PM • Room: B114

- 1:30 PM **104** *Strategies for Standardizing EDS Measurements; Nicholas Ritchie*
- 1:45 PM **105** *What Can One Do With a Million X-rays?; Marek Vaňatka*, Petr Wandrol, Jan Klusacek, Ondřej Vaverka, Ondřej Šembera, Tomáš Tůma, Chris Stephens
- 2:00 PM **106** *Using 3D Reconstruction Technique Along with Monte Carlo Modelling for Quantitative Characterizations of Fracture Surface of Monel Alloy; Seyed Mahmoud Bayazid*, Raynald Gauvin
- 2:15 PM **107** *Deep Learning-based Blind Denoising for Enhancing Energy-dispersive X-ray Spectroscopy (EDS) Images; Jack Taylor*, Ke Chen, Yalin Zheng, Nigel Browning
- 2:30 PM **108** *Practical Aspects of X-Ray Mapping in Electron Probe Microanalysis of Minerals; (invited) Karsten Goemann*, Adam Abersteiner, Vadim Kamenetsky

Scientific Program

B

Biological Sciences Symposia - Monday Afternoon

B02.1

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

SESSION CHAIRS:

Melanie Ohi, Cheri Hampton, William Rice, Teresa Ruiz

PLATFORM SESSION

Monday 1:30 PM • Room: D136

- 1:30 PM **233** *Co-Factor Interactions in Alpha and Beta-Coronavirus Core Polymerase Complexes;* (invited) **Robert Kirchdoerfer**
- 2:00 PM **234** *Mechanism of Signal Sequence Handover from NAC to SRP on Ribosomes During Er-Protein Targeting;* **Ahmad Jomaa**, Martin Gamerding, Hao-Hsuan Hsieh, Annalena Wallisch, Viswanathan Chandrasekaran, Zeynel Ulusoy, Alain Scaiola, Ramanujan s.Hegde, Shou Shan, Nenad Ban, Elke Deuerling
- 2:15 PM **235** *Structural Studies of Dicer-2 Complexes;* **Helen Donelick**, Brenda Bass, Peter Shen
- 2:30 PM **236** *Sleeping Beauty Redux – Resting Ribosomes in Neurons;* Patrick Smith, Edward Petrossian, Melanie Freeman, Zachary Campbell, **Sarah Loerch**

B07.1

3D Volume Electron Microscopy In Biology Research

SESSION CHAIRS:

Alice Liang, Ru-ching Hsia

PLATFORM SESSION

Monday 1:30 PM • Room: D133-134

- 1:30 PM **323** *3D Visualization of Structural and Protein Compositional Changes in Plakophilin-2 Deficient Hearts;* **Feng-Xia Liang**, Chantal J.M. van Opbergen, Chris Petzold, Joseph Sall, Mario Delmar
- 1:45 PM **324** *Volume Electron Microscopy to Provide Insight into the 3-Dimensional World of Cells and Tissues* (invited) **Paul Verkade**
- 2:15 PM **325** *Optimization of Scanning Electron Microscopy and Serial Block Face - Scanning Electron Microscopy for Investigating Bacteria and Whipworm Egg Interactions;* **Amicha Robertson**, Joseph Sall, Chris Petzold, Ken Cadwell, Feng-Xia Liang
- 2:30 PM **326** *Tips and Tricks for Volume Electron Microscopy Workflows in Plants;* (invited) **Kirk Czymmek**

C

Cross-Cutting Symposia - Monday Afternoon

C03.1

Facilities Management Crucial Skills and Strategies

PLATFORM SESSION

Monday 1:30 PM • Room: B110

- 1:30 PM **381** *Generating User Engagement in an Academic Core Research Facility;* (invited) **Brent Gila**
- 2:15 PM **382** *Strategies for Establishing and Operating Microscopy Core Facilities in Non-R1 Institutions;* (invited) **Paul Eason**

C04.1

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

SESSION CHAIRS:

Enzo Rotunno

PLATFORM SESSION

Monday 1:30 PM • Room: B116

- 1:30 PM **383** *How to Get Something Out of Nothing (Almost!): Extracting Information from Noisy Data;* (invited) **Peter Crozier**
- 2:00 PM **384** *Physics-Guided Machine Learning for the Analysis of Low SNR STEM-EDXS Data;* **Adrien Teurtrie**, Nathanaël Perraudin, Thomas Holvoet, Hui Chen, Duncan Alexander, Guillaume Obozinski, Cécile Hébert
- 2:15 PM **385** *Simulation-Trained Machine Learning Models for Lorentz Microscopy;* **Arthur McCray**, Amanda Petford Long, Charudatta Phatak
- 2:30 PM **386** *Large-scale Automated Analysis of High-Resolution Transmission Electron Microscopy Data Assisted by Deep Learning Neural Networks;* **Matthew Helmi Leth Larsen**, Cuauhtémoc Núñez Valencia, William Lomholdt, Daniel Kelly, Pei Liu, Jakob Birkedal Wagner, Ole Winther, Thomas Willum Hansen, Jakob Schiøtz
- 2:45 PM **387** *Doing More with Less: Artificial Intelligence Guided Analytics for Electron Microscopy Applications;* **Sarah Akers**, Marjolein Oostrom, Christina Doty, Matthew Olszta, Derek Hopkins, Kevin Fiedler, Steven Spurgeon

Scientific Program

P

Physical Sciences Symposia - Monday Afternoon

P01.1

Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys

SESSION CHAIR: Dr Yi-Sheng (Eason) Chen

PLATFORM SESSION

Monday 1:30 PM • Room: A105

- 1:30 PM **429** *New Tools and New Insights: Unravelling Hydrogen Effects in Structural Alloys; (invited)*
C. Cem Tasan
- 2:00 PM **430** *Insight on High Temperature Hydrogen Attack Initiation and Morphology on Case Studies - 3D FIB-SEM and TEM Analyses for Fine Microstructural Characterization of Attacked Low Carbon Steels; Camille Flament, Olivier Gillia, Thomas David, Romain Soulas, Laure Guetaz, Charles Le Nevé, Raphaël Goti*
- 2:15 PM **431** *Characterization of Deuterium Distributions in Corroded Zirconium Alloys Using High-Resolution SIMS Imaging; Junliang Liu*
- 2:30 PM **432** *Hydrogen Localisation in Metallurgical Samples with High Resolution Secondary Ion Mass Spectrometry Imaging (NanoSIMS); (invited)*
Katie Moore, Yasser Aboura, Chris Jones, David Martelo, Roberto Morana, Robert Akid, Michael Preuss

P02.1

Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Monday 1:30 PM • Room: A107-108

- 1:30 PM **451** *Polarization-Induced Anisotropic Phonons at Ferroelectric-Insulator Interfaces; Chaitanya Gadre, Xingxu Yan, Xiaoqing Pan*
- 1:45 PM **452** *Vibrational STEM-EELS simulations with the FRFPMS method: Applications and Advances; Paul Zeiger, Dominik Legut, Jan Rusz*
- 2:00 PM **453** *Exploring Vibrational Spectroscopy of Quantum Materials in the Scanning Transmission Electron Microscope; Alexander Reifsnnyder, Mohamed Nawwar, Vicky Doan-Nguyen, David McComb*
- 2:15 PM **454** *STEM Imaging, Monochromated EELS, and Theory of Natural and Artificial Superlattices; Eric Hoglund, Jordan Hachtel, De-Liang Bao, Andrew O'Hara, Md. Shafkat Bin Hoque, Sokrates Pantelides, Patrick Hopkins, James Howe*
- 2:30 PM **455** *Emergent Phonon Phenomena at Interfaces probed by Vibrational EELS; Chaitanya Gadre, Xingxu Yan, (invited) Xiaoqing Pan*

P05.1

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

PLATFORM SESSION

Monday 1:30 PM • Room: C123

- 1:30 PM **497** *Probing Reaction Intermediates, Kinetics, and Surface Chemistry during Nanoparticle Synthesis and Assembly with Liquid Phase TEM; (invited)*
Taylor Woehl, Mei Wang, Thilini Dissanayake, Jiayue Sun, Asher Leff
- 2:00 PM **496** *Exploring Calcium Phosphate Biomineralization Systems Using In Situ Liquid Phase Electron Microscopy; Liza-Anastasia DiCecco, Ruixin Gao, Dimitra Athanasiadou, Ryan Lee Chan, Karina M. M. Carneiro, Deb Kelly, Eli Sone, Kathryn Grandfield*
- 2:15 PM **498** *Ultra-Transparent Atomic Layer Deposition Membranes for Liquid Cell TEM; Rohan Dhall, Michael Elowson, Adam Schwartzberg, Sardar Alam, Stephanie Chang, Vittoria Tommasini, Arian Gashi, Emory Chan, Stefano Cabrini, Shaul Aloni*
- 2:30 PM **499** *Liquid Phase Transmission Electron Microscopy Visualization of Surface Pattern Formation during Chemical Reaction Driven Assembly of Nanoparticles; Thilini Dissanayake, Taylor Woehl*
- 2:45 PM **500** *Atomistic Reaction Kinetics and Chemistry Revealed using In Situ STEM; Jacob Smith, Xi Chen, Wenpei Gao*

P

Physical Sciences Symposia - Monday Afternoon cont.

P07.1

Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Monday 1:30 PM • Room: B118-119

- 1:30 PM **550** *Automated Analysis of Grain Growth Under In-situ Irradiation Using Convolutional Neural Network; (invited) Xinyuan Xu, Zefeng Yu, Arthur Motta, Xing Wang*
- 2:15 PM **551** *Laboratory-Based 3D X-ray Imaging of Neutron-Irradiated Ceramic Particle Nuclear Fuel; Nikolaus Cordes, Brian Gross, William Chuirazzi, Joshua Kane, John Stempien*
- 2:30 PM **552** *Wavelet Transform U-Net for Reconstructed Image Denoising Toward High Throughput Neutron Tomography; Michael Daugherty, Jacob LaManna, Youngju Kim, Daniel Hussey, Eli Baltic, David Jacobson*
- 2:45 PM **553** *Real-time, On-Microscope Automated Quantification of Features in Microscopy Experiments Using Machine Learning and Edge Computing; Kevin G. Field, Priyam Patki, Nasir Sharaf, Kai Sun, Laura Hawkins, Matthew Lynch, Ryan Jacobs, Dane Morgan, Lingfeng He, Christopher Field*

P08.1

Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

SESSION CHAIR: Christian Kisielowski

PLATFORM SESSION

Monday 1:30 PM • Room: B115

- 1:30 PM **580** *Probing Atom Dynamics in Excited Nanocrystals; Fu-Rong Home, Dirk Van Dyck, Christian Kisielowski, Bastian Barton, Lars P. Hansen, ((invited) Stig Helveg*
- 2:00 PM **581** *Optimizing STEM Imaging Conditions Toward Reliable Representation of Single Atom Catalysts; Haoyang Ni, Jian-Min Zuo, Miaofang Chi*
- 2:30 PM **583** *Sparsity and Noise Effects on the Reconstruction of Subsampled Scanning Transmission Electron Microscopy Data; Eduardo Ortega*
- 2:45 PM **584** *Spatial Distribution of the Electron Dose and the Effects on Beam Damage in STEM; Daniel Nicholls, Mounib Bahri, B. Layla Mehdi, Nigel Browning*

P09.1

In situ Biasing

PLATFORM SESSION

Monday 1:30 PM • Room: A106

- 1:30 PM **608** *In situ TEM Study of Ferroelectric Oxide Heterostructures; (invited) Myung-Geun Han, Yangyang Zhang, Nagarajan Valanoor, Frederick Walker, Charles Ahn*
- 2:00 PM **609** *Operando Observation of Reversible Oxygen Migration and Phase Transitions in Hafnia-Based Ferroelectric Devices; Pavan Nukala, Majid Ahmadi, Yingfen Wei, Sytze de Graaf, Bart J. Kooi, Beatriz Noheda, Sylvia Matzen, Dina Carbone, Alexander Bjorling, Henny Zandbergen, Tuhin Chakraborty, Evgenios Stylianidis, Dan Mannix*
- 2:15 PM **610** *Determining the Polarization Fraction of Thin Film Ferroelectric HZO with STEM EBIC; Ho Leung Chan, Shelby Fields, Tristan O'Neill, Yueyun Chen, William Hubbard, Jon Ihlefeld, B. C. Regan*
- 2:30 PM **611** *Monitoring Bismuth Ferrite Domain Walls Behavior Under Electric Field With Atomic Resolution By In Situ Scanning Transmission Electron Microscopy; Oana-Andreea Condurache, Goran Dražić, Tadej Rojac, Brahim Dkhil, Andraž Bradeško, Hana Uršič, Andreja Benčan*
- 2:45 PM **612** *Characterization of GaN E-mode HEMT Devices by In-Situ STEM Electrical Biasing; Abhas Mehta, Qingxiao Wang, Sam Shichijo, Moon Kim*

Scientific Program

P

Physical Sciences Symposia - Monday Afternoon cont.

P10.1

Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Monday 1:30 PM • Room: B117

1:30 PM **640** *Application of a Novel Electron Energy Filter Combined with a Hybrid-Pixel Direct Electron Detector for the Analysis of Functional Oxides by STEM/EELS with Focus on Weak Signals and High Spatio-Temporal Resolution;* (invited) **Rolf Erni**, Alicia Ruiz Caridad, Alexander Vogel, Marta D Rossell

2:00 PM **641** *Electronic-Structure Engineering Through Atomic-Scale Strain Control in Geometrically Frustrated Spinel LiV_2O_4 ;* Yu-Mi Wu, Ulrike Niemann, Minu Kim, Yi Wang, Hidenori Takagi, **Peter A. van Aken**

2:15 PM **642** *Probing the Structural and Electronic Couplings in Rare-earth Nickelate Superlattices by STEM-EELS;* **Bernat Mundet**, Claribel Dominguez, Jennifer Fowlie, Marta Gibert, Jean-Marc Triscone, Duncan Alexander

2:30 PM **643** *Characterization of Interfaces and Defects in Multiferroic Aurivillius Phase Thin Films by STEM and EELS-SI;* **Núria Bagués**, Louise Colfer, Michael Schmidt, Lynette Keene, David McComb

2:45 PM **644** *Probing Defects in Epitaxially Grown Cubic Boron Nitride on Diamond;* **Andrew Lang**, David Storm, Sergey Maximenko, Neeraj Nepal, David Meyer, Rhonda Stroud

P12.1

John Spence Memorial - Opening Session

PLATFORM SESSION

Monday 1:30 PM • Room: B113

1:30 PM **710** *Spreading Happiness and Scientific Enlightenment: 40 Years as a Friend and Colleague of John Spence;* (invited) **Stuart Lindsay**

2:00 PM **711** *From John Spence's Postdoc Time in Oxford to my research on GaN and Graphene;* (invited) **Colin Humphreys**

2:30 PM **712** *The Beauty and Clarity of a Well Designed Experiment;* **Philip Batson**

2:45 PM **713** *John C.H. Spence – Friend, Teacher, Mentor, Scientific Pioneer and Visionary;* **Ondrej Krivanek**

A

Analytical Sciences Posters - Monday Afternoon

A03.1P

Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #16

3:00 PM **757** *3D Structural Determination of Core-Shell Nanoparticles*; **Hyesung Jo**, Dae Han Wi, Taegu Lee, Chaehwa Jeong, Juhyeok Lee, Hionsuck Baik, Wolfgang Theis, Colin Ophus, Peter Ercius

POSTER #17

3:00 PM **759** *Automatic 3D Reconstruction by Deep Learning Neural Networks Using Image Acquired via 4D-STEM Stereo Imaging*; **Gulnaz Ganeeva**, Okan Altıngövdü, Quy Ong Khac, Francesco Stellacci, Pascal Fua, Emad Oveisi

POSTER #18

3:00 PM **760** *Correlative Mapping with AFM, STEM HAADF, and PF-QNM/SROM of Interpenetrating Networks of Elastomeric and Glassy Polymers*; **Alyssa Fielitz**, Jeremy Beebe, Dongchan Ahn, Marius Chyashnavichyus, Tyler Heyl, Myoungbae Lee, Carl Reinhardt, Kenneth Shull, Anthony Silvaroli

POSTER #19

3:00 PM **761** *Determining the 3D Atomic Structure of Metallic Glass*; **Yao Yang**, Jihan Zhou, Fan Zhu, Yakun Yuan, Dillan Chang, Dennis Kim, Arjun Rana, Xuezheng Tian, Yonggang Yao

POSTER #21

3:00 PM **762** *High throughput Imaging and Increasing Resolution of X-ray Imaging at High Acceleration Voltages*; **Anasuya Adibhatla**, Emil Espes

POSTER #23

3:00 PM **764** *Increasing Resolution of X-ray Imaging at High Acceleration Voltages*; **Emil Espes**, Anasuya Adibhatla

POSTER #24

3:00 PM **765** *Single-Atom Level Determination of 3D Surface Atomic Structure via Neural Network-Assisted Atomic Electron Tomography*; **Juhyeok Lee**, Chaehwa Jeong, Yongsoo Yang

POSTER #25

3:00 PM **766** *Structural and Chemical Characterization of Janus Nanoparticles with 2D and 3D Electron Microscopy*; **Jesus Valdez**, Wanting He, Yunnan Liu, Dongling Ma, Audrey Moores

POSTER #26

3:00 PM **767** *Volume Imaging By Tracking Sparse Topological Features In Electron Micrograph Tilt Series*; **Timothy Petersen**, Cheng Zhao, Espen Bøjesen, Nils Broge, Satoshi Hata, Yun Liu

POSTER #20

3:00 PM **757** *Great White Pelican Mandible as Bioinspiration for Vehicle Design - Structural Bioprospecting Via X-Ray Micro-CT and Finite Element Analysis*; **Nicola Thomas**, William Harrison, Caroline Buttler, Richard Johnston

A01.1P

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

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #1

3:00 PM **737** *Applications of a Triple Beam Microscope in Materials Science*; **Stéphanie Bessette**, Nicolas Brodusch, Sima A. Alidokht, Bruno Noronha Castilho, Richard R. Chromik, Raynald Gauvin

POSTER #2

3:00 PM **738** *Plasma FIB applications in Life Science: From Large Volumes to Cryo-Lamella Preparation*; **Daniela Slamková**

POSTER #3

3:00 PM **739** *Possible Approaches for Combined Use of Xenon and Gallium Ion Sources for Task Specific Focused Ion Beam Sample Preparation*; **Ladislav Klimša**; Jan Duchoň; Petr Svora; Jaromír Kopeček

A02.1P

Beyond Visualization with In Situ and Operando TEM

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #11

3:00 PM **750** *AXON: An In-situ TEM Software Platform Streamlines Image Acquisition, Metadata Synchronization and Data Analysis, Enabling Deeper Understanding, and Improved Reproducibility of In-situ Experimental Results*; **Madeline Dressel Dukes**, Kate Marusak, Yaofeng Guo, Jennifer McConnell, Franklin Walden, John Damiano

POSTER #12

3:00 PM **751** *Observation of Magnetic Domain Dynamics by Higher and Wider Ranges of Applied Magnetic Fields using Lorentz Microscopy*; **Ken Harada**, Hiroshi Nakajima, Keiko Shimada, Shigeo Mori, Yoshio Takahashi

Scientific Program

A

Analytical Sciences Posters - Monday Afternoon cont.

A05.1P

Quantitative and Qualitative Mapping of Materials

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #63

3:00 PM **804** *Deep-Sea Nodules Metallo-Thermic Reduction as a New "Natural Alloys" Concept; Jaromír Kopeček*, Ladislav Klimša, Tímea Meľová, František Laufek, Alena Michalcová, Lucie Šulcová, Klára Borkovcová, David Nováček, Nguyen Hong Vu

POSTER #64

3:00 PM **805** *Five Years of Live Chemical Imaging: From the First Live Maps to Real-time Dynamic Imaging Combining Morphology and Chemistry with Overlap Corrected EDS Data; Simon Burgess*, Anthony Hyde, Haithem Mansour, Philippe Pinard, John Zhang, Peter Statham

POSTER #65

3:00 PM **806** *Fully Quantitative Mapping of Igneous Phenocrysts by EPMA Using Mean Atomic Number Background Estimates; Scott Boroughs*

POSTER #66

3:00 PM **807** *Identification and Characterization of Gold Mineralization in a Fault Controlled Breccia; Timothy Miller*, Angela Halfpenny

POSTER #67

3:00 PM **808** *Large Area Standards-based Quantitative EDS Mapping of a Monzogabbro Sample; Stephen Seddio*

POSTER #68

3:00 PM **809** *The Promises when WDS Supports the EDS X-ray Analysis in SEM and the Evaluation Algorithms do Merge; Frank Eggert*, Patrick Camus, Jens Rafaelsen

POSTER #62

3:00 PM *Cathodoluminescence Response of Barite at Room and Liquid Nitrogen Temperatures; Heather Lowers*, Colin MacRae, Nicholas Wilson, Philip Verplanck

B

Biological Sciences Posters - Monday Afternoon

B02.1P

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

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #113

3:00 PM **872** *3D Reconstruction of Plant Leaf Cells using TEM and FIB-SEM*; **Bernd Zechmann**, Günther Zellnig

POSTER #114

3:00 PM **873** *Cryo-EM Structural Studies of the Vibrio cholerae Flagellum*; **Victoria Pappas**, Laurie Zhang, Juan Sanchez, Elizabeth Wright

POSTER #115

3:00 PM **874** *High Resolution Cryo-EM Structure of Drosophila Thick Filaments*; **Fatemeh Abbasi Yeganeh**, Hosna Rastegarpouyani, Kenneth Taylor

POSTER #116

3:00 PM **875** *In-Situ TEM Studies on Nanoparticle Interactions with Bacterial Cells*; **Abhijit Phakatkar**, Pankaj Ghildiyal, Yujie Wang, Michael Zachariah, Tolou Shokuhfar, Reza Shahbazian-Yassar

POSTER #117

3:00 PM **876** *Multi-Signal Characterization of Biological Structures at Low-Voltage Using STEM-in-SEM*; **Kelly Parker**, Abhalaxmi Singh, Vinayak Dravid

Scientific Program

C

Cross-Cutting Posters - Monday Afternoon

C04.1P

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #158

3:00 PM **932** *A High-Throughput Electron Microscopy Workflow and its Applications in Life Sciences;* **Guido Ridolfi**, Marre Niessen, Melanie Adams Cioaba, Ruth Chalmers, Remco Jager, Gerard Rauwerda

POSTER #159

3:00 PM **933** *Approaches Taken to Streamline and Consolidate Large Dataset Processing Techniques, with a Focus on Ptychography;* **Thomas Pekin**, Marcel Schloz, Pablo Fernandez Robledo, Anton Gladyshev, Sherjeel Shabih, Benedikt Haas

POSTER #160

3:00 PM **934** *Automation of TEM Alignment using Python Scripting;* **Shota Hisada**, Ryusuke Sagawa, Hiroki Hashiguchi, Daichi Maekawa, Hidetaka Sawada

POSTER #161

3:00 PM **936** *Exploring Motifs and Their Hierarchies in Crystals via Unsupervised Learning;* **Jiadong Dan**, Xiaoxu Zhao, Qian He, Duane Loh, Stephen. J Pennycook

POSTER #162

3:00 PM **937** *Phase-residue Removal Based on Sparse Modeling in Electron Holography;* **Yoshio Takahashi**, Tetsuya Akashi, Toshiaki Tanigaki

C03.1P

Facilities Management Crucial Skills and Strategies

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #157

3:00 PM **931** *The National Center for CryoEM Access and Training: Broadening Access to CryoEM through Centralized Facilities;* **Edward Eng**, Christina Zimanyi, Hui Wei, Mahira Aragon, Eugene Chua, Elina Kopylov, Cathleen Castello, Clint Potter, Bridget Carragher

P

Physical Sciences Posters - Monday Afternoon

P10.1P

Advanced Imaging and Spectroscopy for Nanoscale Materials

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #241

3:00 PM **1018** *Atomic Scale Visualization of Cation Point Defects in Gadolinium Doped Ceria*; **Mai Tan**, Rachel Gorelik, Peter Crozier

POSTER #242

3:00 PM **1019** *Atomic Structure and Chemistry of LaMnO₃ Heterointerfaces*; **Yi-Chieh Yang**, XiaoYan Zhong

POSTER #243

3:00 PM **1020** *Characterisation of Planar Defects in Ternary Layered Chalcogenides for Electronic Devices*; **Tigran Simonian**, Ahin Roy, Zdeněk Sofer, Valeria Nicolosi

POSTER #244

3:00 PM **1021** *Characterization of Modulated Nanostructure in Au-Pt Alloy using Aberration Corrected STEM*; **Ronit Sawant**, Ray Carpenter

POSTER #245

3:00 PM **1022** *Characterization of Nanoscale Twin Boundary Structure in Metastable β Titanium Alloys Using Aberration-corrected Scanning Transmission Electron Microscopy*; **Dian Li**, Yufeng Zheng

POSTER #246

3:00 PM **1023** *Charge Distribution Control with Atomic Resolution Via Strain Engineering In Oxide Heterostructures*; **Yu-Mi Wu**, Eren Suyolcu, Gideok Kim, Georg Christiani, Yi Wang, Bernhard Keimer, Peter A. van Aken

POSTER #247

3:00 PM **1024** *Electron Microscopy Investigation of Cation Exchange Reaction to Synthesize Lateral Hybrid Nanostructures*; **Naveen Goyal**, Ranit Ram, Rajeev Kumar Rai, N Ravishankar

POSTER #248

3:00 PM **1025** *Exploring the Atomic Scale Structure and Properties of Grain Boundary in SrTiO₃ by Electron Beam Imaging and Spectroscopy*; **Xiaowang Wang**, Chaitanya Gadre, Christopher Addiego, Huaixun Huyan, Mingjie Xu, Xingxu Yan

POSTER #249

3:00 PM **1026** *Identification and Manipulation of NV Centers in Nanodiamond*; **Bethany Hudak**, Rhonda Stroud

POSTER #250

3:00 PM **1027** *Inside Look into Catalytic Condenser for Programmable Solid Acids using STEM*; **Silu Guo**, Tzia Ming Onn, Paul Dauenhauer, K. Andre Mkhoyan

POSTER #251

3:00 PM **1028** *Investigation of Nanoscale Shuffle Transformation in Titanium Alloys Using Aberration-Corrected Scanning Transmission Electron Microscopy*; **Dian Li**, **Yufeng Zheng**

POSTER #252

3:00 PM **1029** *Measuring Near-Room-Temperature Valence Transition in Strained Perovskite Oxide using STEM-EELS*; **Supriya Ghosh**, K. Andre Mkhoyan

POSTER #253

3:00 PM **1030** *Multiplet Structure for the Perovskite Vanadium-doped BCZT using EELS*; **Guillermo Herrera-Perez**, Raul Borja-Urby, Carlos Ornelas-Gutiérrez, Armando Reyes-Rojas, Francisco Paraguay-Delgado, Luis Fuentes-Cobas

POSTER #254

3:00 PM **1031** *Optoelectronic Properties of Hexagonal Wurtzite Yb-doped ZnO using EELS*; Carlos Ornelas-Gutiérrez, Paul Olalde-Velasco, Raul Borja-Urby, **Guillermo Herrera-Perez**, Umapada Pal

POSTER #255

3:00 PM **1032** *Potassium-Mediated Anisotropic Etching of Transition Metal Dichalcogenides Driven by Self-Running Oxide Droplets*; **Aram Yoon**, Jung Hwa Kim, Zonghoon Lee

POSTER #256

3:00 PM **1033** *Short-Range-Order in (ZnSnN₂)_{1-x}(ZnO)_{2x} as Examined by EELS Fine Structure*; **Allison Mis**, Celeste Melamed, Geoff Brennecke, Adele C Tamboli, Nestor Zaluzec, Thomas Gage

POSTER #257

3:00 PM **1034** *Spatial Decorrelation of Ceria Surface Reduction and Platinum Surface Loading Site*; **Peter Tieu**, Jaeha Lee, Chaitanya Gadre, Xingxu Yan, Wenjie Zang, Phillip Christopher

POSTER #258

3:00 PM **1035** *Structural and Chemical Characterization of Ge/GeSn Core/Shell Nanowires*; **Milenka Andelic**, Alexandre Pofelski, Gianluigi Botton, Simone Assali, Sebastian Koelling, Lu Luo

POSTER #259

3:00 PM **1037** *Surface Morphology of Nanostructured TiO₂@Graphene Composites Obtained by Lyophilization*; **Snejana Bakardjieva**, Jakub Mares, Filip Mamoń, Stefan Michna, Radek Fajgar, Vera Jandová, Natalija Murafa

Scientific Program

P

Physical Sciences Posters - Monday Afternoon cont.

POSTER #260

3:00 PM **1038** *TEM Analysis and Mechanical Properties of Ternary Mn+1AX_n and Binary MXene for Applications in Nanocoating Technology;* **Snejana Bakardjieva**, Filip Mamoń, Jakub Mares, Stefan Michna, Jiri Vacik, Pavel Horak, Jiri Nemecek

POSTER #262

3:00 PM **1040** *Uranium Reduction by Magnetite - Mechanism of UO₂ Formation Monitored by STEM, SAED and EELS;* **Thomas LaGrange**, Barbora Bartova, Zezhen Pan, Sergei Butorin, Neil Hyatt, Martin Stennett, Rizlan Bernier-Latmani

POSTER #263

3:00 PM **1041** *Use of Partial Scattering EDX Cross-Sections to Quantify Light Elements in the STEM;* **Alex Sheader**, Peter Nellist

POSTER #220

3:00 PM **996** *Interpretability of Low-Dose HRTEM Images of Supported Metal Nanoparticles;* **William Lomholdt**, Matthew Helmi Leth Larsen, Cuauhtémoc Núñez Valencia, Pei Liu, Daniel Kelly, Jakob Schiøtz

POSTER #221

3:00 PM **997** *Spatial Differentiation of Aluminium Siting by the Single-Atom Adsorption Sites in Zeolite by Electron Microscopy;* **Ping-Luen Ho**, Christopher Foo, Wei-Che Lin, Shik Chi Edman Tsang, Peter Nellist

POSTER #222

3:00 PM **998** *STEM-EELS Exploration of Beam-Sensitive Perovskite Nanocrystals;* **Brittany Ford**, David McComb, Michael Brennan, Tod Grusenmeyer

POSTER #219

3:00 PM *iDPC, the Ultimate STEM Imaging Performance;* **Eric Van Cappellen**, Eric G.T. Bosch, Ivan Lazic

P08.1P

Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #215

3:00 PM **992** *AXON Dose: A Machine Vision Solution for Accurate, Quantifiable Dose Management in the Transmission Electron Microscope;* **Franklin Walden**, Madelin Dukes, Kate Marusak, Yaofeng Guo, Jennifer McConnell, John Damiano

POSTER #216

3:00 PM **993** *Development of an Organic Controlled Environment Vitrification System to Expand Cryo-Protection of Beam Sensitive Materials;* Jovany Merham, **Wyeth Gibson**, Joseph Patterson

POSTER #217

3:00 PM **994** *Electron Microscopy Characterization of Gold Nanoparticles Supported on an Ordered TiO₂ Nanowires Array;* Ernesto Neri-Cruz, David Levi Quiroz-Aguilera, Ricardo Ortega-Díaz, Vicente Garibay Febles, **Héctor Calderón Benavides**

POSTER #218

3:00 PM **995** *Exploring Electron Energy-Loss Spectroscopy for Characterization of Structured Fluids;* **Brittany Ford**, David McComb

P12.1P

Memorial Symposium: John C.H. Spence

POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

POSTER #286

3:00 PM **1066** *Elemental Quantification and Experimental Measurement of Mean Free Path Using EELS and CBED at 30 keV;* **Nicolas Dumaesq**, Raynald Gauvin

M&M 2022

Tuesday, August 2

Scientific Program

A

Analytical Sciences Symposia - Tuesday Morning

A01.2 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

SESSION CHAIRS:

Suzy Vitale, Frances Allen, Joshua Sugar, Matthew Thorseth

PLATFORM SESSION

Tuesday 8:30 AM • Room: D138

- 8:30 AM **6** *Using the Helium Ion Microscope for Imaging and Modification of Nanostructures, 2D Materials, and SARS-CoV-2 infected Cells; (invited) Armin Götzhäuser*
- 9:00 AM **7** *SIMS Performed on Focused Ion Beam Instruments: In-Situ Correlative Structural and Chemical Imaging; Jean-Nicolas Audinot, Alexander Ost, Charlotte Stoffels, Patrick Philipp, Olivier De Castro, Antje Biesemeier, Hung Quang Hoang, Tom Wirtz*
- 9:30 AM **8** *Scanning Transmission Helium Ion Microscopy-How Does It Compare to TEM?; Annalena Wolff, Rebecca Fieth*
- 9:45 AM **745** *Raman Spectroscopy and Electron Microscopy Studies of Ga FIB and Post-FIB Ar Ion Milling's Impact on Si TEM Specimens; Cecile Bonifacio, Susheng Tan, Pawel Nowakowski, Mary Ray, Paul Fischione*

A02.1 Beyond Visualization with In Situ and Operando TEM

PLATFORM SESSION

Tuesday 8:30 AM • Room: B111

- 8:30 AM **22** *Machine Learning Based Tracking of Single Nanoparticle Vibrations from a Projected 3D Moiré Lattice; Chang Liu, Lehan Yao, (invited) Qian Chen*
- 9:00 AM **23** *Observing Nano-Scale Dynamics of Active Soft Materials by In Situ Electrochemistry and Liquid Cell Transmission Electron Microscopy; Wyeth Gibson, Joseph Patterson*
- 9:15 AM **24** *Advancing High-Resolution Imaging of Human Viruses in Liquid; G.M. Jonaid, William Dearnaley, Samantha Berry, Jennifer Gray, Michael Spilman, Madelin Dukes, Deb Kelly*
- 9:30 AM **25** *Visualizing Aerosol Phase Phenomena with Liquid Phase Transmission Electron Microscopy; Yuhang Wang, Dewansh Rastogi, Kotiba Malek, Akua Asa-Awuku, Taylor Woehl*
- 9:45 AM **26** *Examining Deposition Dynamics of Silver onto Gold Nanorods with Liquid Phase Transmission Electron Microscopy; Amy Chen, Asher Leff, Jonathan Boltersdorf, Taylor Woehl*

A03.2 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science

PLATFORM SESSION

Tuesday 8:30 AM • Room: B112

- 8:30 AM **57** *Simultaneous Neutron and X-ray Tomography for Materials Research; (invited) Jacob LaManna, Michael Daugherty, Youngju Kim, Daniel Hussey, Eli Baltic, David Jacobson*
- 9:00 AM **58** *Investigations of Silicon-Based Anodes for Li-Ion Batteries Using X-Ray and Neutron 3D/4D Imaging Techniques; Erik Lübke, Lukas Helfen, Roland Brunner, Thomas Vorauer, Jakub Drnec, Stefan Koller, Sandrine Lyonnard*
- 9:15 AM **59** *4D Reconstructions from Microscale Photogrammetry: Correlation of 3D Surface Representations with SIMS to Link Microstructural Topography and Chemical Information; Alexander Ost, Jean-Nicolas Audinot, Tom Wirtz*
- 9:30 AM **60** *Cryo-Electron Tomography for Imaging and Quantitative Analysis of Beam-Sensitive Fuel Cell Materials; Robin Girod, Timon Lazaridis, Hubert Gasteiger, Vasiliki Tileli*
- 9:45 AM **61** *Great White Pelican Mandible as Bioinspiration for Vehicle Design—Structural Bioprospecting Via X-Ray Micro-CT and Finite Element Analysis; Nicola Thomas, William Harrison, Caroline Buttler, Richard Johnston*

PLATFORM SESSION**Tuesday 8:30 AM • Room: B114**

- 8:30 AM **109** *Crystallographic Controls on Porosity in Exhumed Metamorphic Rocks; (invited)*
Alexandra Nagurney
- 9:00 AM **110** *Mapping of Space Weathering Features and Vesicle Contents in Lunar Soils; Katherine Burgess, **Brittany Cymes**, Rhonda Stroud*
- 9:15 AM **111** *Unmixing Mineral Phases, Improving Quantification: Use Machine Learning to Understand Deep-Mantle with STEM-EDS Data; **Hui Chen**, James Badro, Duncan Alexander, Cécile Hébert*
- 9:30 AM **112** *Enhanced Compositional Mapping on the SEM Through Combined EDS-WDS Mapping in AZtecWave; **Rosie Jones**, Simon Burgess, Philippe Pinard*
- 9:45 AM **113** *On the Accuracy of the Composition-By-Difference Method for Determining Lithium Content in Oxides; **Jonathan Lee**, Shangshang Mu, David Stowe*

Scientific Program

B

Biological Sciences Symposia - Tuesday Morning

B02.2

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

SESSION CHAIRS:

Melanie Ohi, Cheri Hampton, William Rice, Teresa Ruiz

PLATFORM SESSION

Tuesday 8:30 AM • Room: D136

- 8:30 AM **237** *Integrative Structural Analysis of Human Nuclear Pore Complex; (invited) Shyamal Mosalaganti*
- 9:00 AM **238** *Cryo-ET Structural Studies of Ty1 Retrotransposon Capsids; Bryan Sibert, Adam Hannon-Hatfield, David Garfinkel, Elizabeth Wright*
- 9:15 AM **239** *Elucidating the 3D Structure of β -(1,3)-glucan Synthase from *Candida glabrata* by Subtomogram Averaging; Jennifer Jiang, Cristina Jiménez-Ortigosa, Muyuan Chen, Kelley R. Healey, Joyce Kong, Yun-Kyung Lee, Daniel P. Farrell, Frank DiMaio, David S. Perlin, Wei Dai*
- 9:30 AM **240** *Investigating the Ultrastructural Effects of F-BAR Proteins on Neuritogenesis by CLEM and Cryo-ET; Joseph Kim, Lauren English, Tanner Tenpas, Jae Yang, Erik Dent, Elizabeth Wright*
- 9:45 AM **241** *Visualizing the Macro- and Micronutrient Distribution of Toxic Cyanobacteria in Two and Three Dimensions; Bobby Duersch, Yanqi Luo, Si Chen, Steven Soini, Dawn Raja Somu, Vivian Merk*

B07.2

3D Volume Electron Microscopy in Biology Research

SESSION CHAIRS:

Alice Liang, Ru-ching Hsia

PLATFORM SESSION

Tuesday 8:30 AM • Room: D133-134

- 8:30 AM **327** *Thicker Sections (300-500 nm) Observed in the Conventional TEM May Reveal Extended Structures Not Recognized in Ultrathin Sections; Douglas Keene, Sara Tufa*
- 8:45 AM **328** *Comparison of Ultrastructure Determined by Serial Block Face SEM and Focused Ion Beam SEM from Blood Platelets and Thrombi; Richard Leapman, Denzel Ryan Cruz, Douglas Palumbo, Rahul Akkem, Sung Rhee, Irina Pokrovskaya, Brian Storrie, Maria Aronova*
- 9:00 AM **329** *Building a Volume EM Atlas of Whole Cells and Tissues with Enhanced FIB-SEM; (invited) C. Shan Xu*
- 9:30 AM **330** *Biological Markers to Study the Morphological Modifications Induced by Perinatal Asphyxia; Rodolfo Kolliker Frers, Juan Pablo Luaces, Maria Ines Herrera, Micaela Martinez, Sofia Bordet, Guenson Chevalier, Gabriel Cao, Lucas Udovin, Toro-Urrego Nicolas, Tamara Kobiec, Graciela Ottaviano, Santiago Perez Loret, Matilde Otero-Losada, Maria Laura Aon, Cecilia Quarracino, Francisco Capani*
- 9:45 AM **331** *Parsing the Relationship Between 3View SBF-SEM Performance and Sample Preparation; Joseph Sall, Feng-Xia Liang*

C

Cross-Cutting Symposia - Tuesday Morning

C04.2

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

SESSION CHAIR:

Colin Ophus

PLATFORM SESSION

Tuesday 8:30 AM • Room: B116

- 8:30 AM **388** *Artificial Neural Network for Automatic Alignment of Electron Optical Devices; (invited)*
Enzo Rotunno, Vincenzo Grillo
- 9:00 AM **389** *Compressive Hyperspectral Microscopy of Plasmonic Nanoparticles – Noise Characteristics and Performance Limits; **George Lewis**, Anthony Giljum, Paul Midgley, Kevin Kelly, Emilie Ringe*
- 9:15 AM **390** *Deep Learning Computer Vision for Anomaly Detection in Scanning Transmission Electron Microscopy; **Robert Klie**, Enea Prifti, James Buban*
- 9:30 AM **391** *Versatile Automated Domain Mapping of 4D-STEM Data Utilising Unsupervised ML Algorithms and Bayesian Statistics; **Andy Bridger**, Mohsen Danie, Keith Butler, Thomas Wood, Bill David*
- 9:45 AM **392** *Convolutional Neural Network as a Solution to Segment and Classify High Resolution TEM Images to Obtain 3D Information; **Matan Leibovich**, Ramon Manzorro, Mai Tan, Sreyas Mohan, Adria Marcos-Morales, Carlos Fernandez-Granda, Peter Crozier*

Scientific Program

P

Physical Sciences Symposia - Tuesday Morning

P01.2 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys

SESSION CHAIR: Dr Arun Devaraj

PLATFORM SESSION

Monday 8:30 AM • Room: A105

8:30 AM **433** *The Role of an Al-Induced Ferritic Microfilm in Martensitic Steels on the Hydrogen Embrittlement Mechanisms Revealed by Advanced Microscopic Characterization;* Margot Pinson, Saurabh Mohan Das, Hauke Springer, Kim Verbeken, (invited) **Tom Depover**

9:00 AM **434** *Effects of Mechanical Deformation on Dislocation Density, Phase Separation and Hydrogen Diffusion in 4130 Steel;* **Zachary Buck**, Matthew Connolly, May Martin, Damian Lauria, Jason Killgore, Peter Bradley, Andrew Slifk, Yan Chen, Naresh Osti

9:15 AM **435** *Hydrogen Embrittlement of Ni-Based Inconel 718 Superalloy;* **Hanlei Zhang**, Yuankang Wang, Xin Wang, Daozheng Li, Wei Xiong

9:30 AM **436** *Electron Microscopic Investigation of Hydrogen Effects on Strain Localization and Martensitic Transformations in an Austenitic Stainless Steel;* (invited) **Douglas Medlin**, Julian Sabisch, James Nathaniel, Joshua Sugar, Joe Ronevich, Christopher San Marchi

P02.2 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Tuesday 8:30 AM • Room: A107-108

8:30 AM **456** *Detection Limits for Imaging Chiral Magnetic Materials with 4-Dimensional Lorentz Scanning Transmission Electron Microscopy;* **Xiyue Zhang**, Kayla Nguyen, Emrah Turgut, Zhen Chen, Celesta Chang, Yu-Tsun Shao, Gregory Fuchs, David Muller

8:45 AM **457** *Methods for Multi-Layer van der Waals Heterostructures Topological Materials Discovery;* **David Bell**, Austin Akey, Aravind Devarakonda, Liang Fu, Efthimios Kaxiras, Joseph Checkelskey

9:00 AM **458** *Reveal of Magnetic Domains and Tunable Supercell Structures in Two-dimensional Layered Oxide Thin Film via Differential Phase Contrast Imaging and Atomic-resolution STEM;* **Di Zhang**, Juanjuan Lu, Xingyao Gao, Ping Lu, Jianan Shen, Hongyi Dou, Zihao He, Haiyan Wang

9:15 AM **459** *Unravelling Temperature-Dependent Ordered Skyrmion Phases in Magnetic Layered Materials using Lorentz transmission Electron Microscopy;* **Reed Yalisove**, Sandhya Susarla, Hongrui Zhang, Rui Chen, Xiang Chen, Robert Birgeneau, Jie Yao, Ramamoorthy Ramesh, Mary Scott

9:30 AM **460** *Room Temperature Néel-Type Skyrmions in a van der Waals Ferromagnet Revealed by Lorentz 4D-STEM;* **Yu-Tsun Shao**, Hongrui Zhang, Rui Chen, Xiang Chen, Sandhya Susarla, Jonathan Reichanadter, Lucas Caretta, Xiaoxi Huang, Nicholas Settineri, Zhen Chen, Edith Bourret-Courchesne, Peter Ercius, Jie Yao, Jeffery Neaton, Robert Birgeneau, Ramamoorthy Ramesh, David Muller

9:45 AM **461** *Magnetic Signature in a Topological Kagome Magnet;* **Guangming Cheng**, Nan Yao

P05.2 In situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

PLATFORM SESSION

Tuesday 8:30 AM • Room: C123

8:30 AM **501** *Structure and Phase Stability in Extreme Environments Explored via In-situ TEM Experiments;* Eric Lang, Nathan Madden, Ryan Schoell, Trevor Clark, David Adams, (invited) **Khalid Hattar**

9:00 AM **502** *In-situ (S)TEM Investigation of Phase Transformation Mechanism in the Ni-rich Cathodes During Cycling;* **Ioannis Siachos**, Weiqun Li, Chloe Coates, Annalena Genreith-Schriever, Clare P. Grey, B. Layla Mehdi

9:15 AM **503** *Surface Modification of Au Nanoparticles Induced by Time Exposition Under the Electron Beam in TEM: Understanding the Formation of Self-Assembled Au Nanoporous Structures;* **Daniel Saldivar-Ayala**, Yazmín Hernández-Rodríguez, Oscar Cigarroa-Mayorga

9:30 AM **504** *In Situ Observation of Disconnection-Mediated Grain Rotation;* **Yuan Tian**, Mingjie Xu, Leonardo Estrada, Horst Hahn, David Srolovitz, Xiaoqing Pan

9:45 AM **505** *Structural Characterization of Gold Nanoparticles Using Liquid-phase 4D-STEM;* **Oliver Lin**, Chang Liu, Wenxiang Chen, Jian-Min Zuo, Qian Chen

P

Physical Sciences Symposia - Tuesday Morning cont.

P07.2 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Tuesday 8:30 AM • Room: B118-119

- 8:30 AM **557** *From Event Detection to Physical Hypothesis Learning via Automated and Autonomous Microscopy; (invited) Sergei Kalinin, Yongtao Liu, Rama Vasudevan, Kyle Kelley, Maxim Ziatdinov*
- 9:00 AM **556** *Identifying Chemical Disorder in Irradiated SiC Fiber-Reinforced SiC Matrix Composites with High-Throughput Correlative Microscopy; Keyou Mao, Takaaki Koyanagi, Takashi Nozawa, Yutai Katoh*
- 9:15 AM **554** *STEM-EELS Analysis of Niobium Oxide Multilayer Films for High Temperature Memristor Devices; Bradley De Gregorio, Evgeniya Lock, Keith Knipping, Hans Cho*
- 9:30 AM **555** *Real-time Multi-Object Tracking of Ion-irradiation Induced Defects in in situ TEM Videos; Rajat Sainju, Wei-Ying Chen, Samuel Schaefer, Qian Yang, Caiwen Ding, Meimei Li, Yuanyuan Zhu*
- 9:45 AM **558** *Correlating Automated High-Throughput ADF-STEM and 4D-STEM Imaging for the Characterization of Irradiation-Induced Defects; Alex Lin, Sean Mills, Alexander Pattison, Wolfgang Theis, Andrew Minor, Peter Ercius*

P08.2 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

SESSION CHAIR: Joe Patterson

PLATFORM SESSION

Tuesday 8:30 AM • Room: B115

- 8:30 AM **585** *Combining Spatial and Temporal Resolution in Cryo-TEM of Device Materials; (invited) Nikita Dutta, Nakita Noel, Craig Arnold, Katherine Jungjohann, Mowafak Al-Jassim*
- 9:00 AM **586** *Studying Electronic Structure in Two-Dimensional Functionalized MXenes with Cryo-STEM; Francisco Lagunas Vargas, Chenkun Zhou, Dmitri Talapin, Robert Klie*
- 9:15 AM **587** *Understanding Structural and Chemical Modifications of ZIF MOF Under Electron-Beam Irradiation using STEM-EELS; Supriya Ghosh, Hwanhui Yun, K. Andre Mkhoyan*

- 9:30 AM **588** *Electron Beam Damage Mechanisms in Solution Phase Electron Microscopy of Metal-Organic Frameworks; Karthikeyan Gnanasekaran, Roberto dos Reis, Nathan Gianneschi*

- 9:45 AM **589** *Comparing Structural and Functional Changes of Biomolecules Under Electron Irradiation With Liquid Cell Transmission Electron Microscopy; Trevor Moser, James Evans*

P09.2 Energy Materials

PLATFORM SESSION

Tuesday 8:30 AM • Room: A106

- 8:30 AM **613** *Dynamic Atomic Behaviour, Ion Exchange and Chemical Synthesis Studied Using our Liquid Cell 2D Material Heterostructures and Scanning Transmission Electron Microscopy; Sarah Haigh, Nick Clark, Yi-chao Zou, Daniel Kelly, Lucas Mogg, Marcelo Lozada Hidalgo, Roman Gorbachev*
- 8:45 AM **614** *Towards Beyond-Lithium Batteries: New Insights from In Situ TEM Combined with Theoretical Modeling; (invited) Kai He*
- 9:15 AM **615** *In Situ Phase Transformation during Sol-Gel Synthesis of Garnet Solid Electrolytes; Hongkui Zheng, Kai He*
- 9:30 AM **616** *New Insights into the Mechanisms of Ag-Induced Layer Exchange From Multimodal In Situ Studies in SEM and TEM; Peter Denninger, Peter Schweizer, Anja Greppmair, Tim Schwöpe, Dominik Drobek, Moritz Buwen, Benjamin Apeleo Zubiri, Erdmann Spiecker*

Scientific Program

P

Physical Sciences Symposia - Tuesday Morning cont.

P10.2 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Tuesday 8:30 AM • Room: B117

- 8:30 AM **645** *Detecting Exotic Vibrational States at Interfaces by Electron Microscopy; (invited) Xingxu Yan, Chaitanya Gadre, Toshihiro Aoki, Xiaoqing Pan*
- 9:00 AM **646** *Spectroscopy of Nanosphere-Substrate Coupling: The Role of Multipolar Surface Phonon Modes; Ka Yin Lee, Elliot Beutler, David Masiello, Maureen Joel Lagos*
- 9:15 AM **647** *Understanding the Surface Chemistry Dependent Plasmon Response in Ti3C2Tx MXenes using Monochromated STEM-EELS; Sudhajit Misra, Jordan Hachtel, Matthew Boebinger, Murali Gopal Muraleedharan, Andrea Konecna, Tyler S Mathis, Paul Kent, Michael Naguib, Yury Gogotsi, Raymond Unocic*
- 9:30 AM **648** *Strain Relaxation and Excitonic Absorption of Atomic Reconstructed WSe2 Moiré Superlattices; Steffi Woo, Fuhui Shao, Nianheng Wu, Robert Schneider, Ashish Arora, Johann Preuß, Benjamin Carey, Steffen Michaelis, Andrew J. Mayne, Rudolf Bratschitsch, Luiz Tizei*
- 9:45 AM **649** *Nanoscale Vibrational Spectroscopy to Probe Li Motion at Individual Interfaces in Battery Materials; Kartik Venkatraman, Michael Zachman, Miaofang Chi*

P12.2 John Spence Memorial - CBED and EELS

PLATFORM SESSION

Tuesday 8:30 AM • Room: B113

- 8:30 AM **714** *Seeing Electrons in Chemical Bonds – John Spence’s Vision for Electron Microdiffraction and How to Realize it for Molecular Crystals; (invited) Jian-Min Zuo*
- 9:00 AM **715** *Bouncing Around Between Real and Reciprocal Space with Electrons and X-rays, an Adventure with John Spence; Peter Rez*
- 9:15 AM **716** *John C. H. Spence’s Career-Long Impact on Me as His Early Graduate Student; Mark Disko*
- 9:30 AM **717** *Scanning Precession Electron Diffraction and what We Get out of Such Data in Studies of Aluminium Alloys; Elisabeth Thronsen, Tina Bergh, Emil Frang Christiansen, Tor Inge Thorsen, Antonius T. J. van Helvoort, Randi Holmestad*
- 9:45 AM **718** *Adventures in 4D-STEM, Underpinned by the Legacy of JCH Spence; Joanne Etheridge, Wei Chao, Bryan Esser, Weilun Li, Timothy Petersen, Changlin Zheng*

A

Analytical Sciences Symposia - Late Tuesday Morning

A01.3 Advances in Focused Ion Beam Instrumentation, Applications and Techniques in Materials and Life Sciences

SESSION CHAIRS:

Suzy Vitale, Frances Allen, Joshua Sugar, Matthew Thorseth

PLATFORM SESSION

Tuesday 10:30 AM • Room: D138

- 10:30 AM **11** *Challenges in FIB TEM Sample Preparation: Damage Issues and Solutions; (invited) Xiangli Zhong, Sarah Haigh, Xiaorong Zhou, Philip Withers, M.G. Burke*
- 11:00 AM **12** *Advanced Large Area Sample Preparation for Electron Microscopy using Initial Notches; Richard Busch, Michael Krause, Thomas Höche*
- 11:15 AM **13** *Building In-Situ Diamond Anvil Cell Sample Assemblies with Xe PFIB; Suzy Vitale, Zachary Geballe, Jing Yang*
- 11:30 AM **14** *Preparation of Atom Probe Specimens Containing Individual Nanoparticles; Mark McLean, Frederick Meisenkothen*
- 11:45 AM **15** *Yield Assessment of Protective Coatings for Atom Probe Analysis; Yimeng Chen, Katherine Rice, Robert Ulfing*

A02.2 Beyond Visualization with In Situ and Operando TEM

PLATFORM SESSION

Tuesday 10:30 AM • Room: B111

- 10:30 AM **27** *Ultrahigh Temperature In Situ TEM Based Small-Scale Mechanical Characterization; (invited) Shen Dillon, Eric Lang, Khalid Hattar*
- 11:00 AM **28** *Enabling Structure-Property Correlation in Electrochemical Cell Transmission Electron Microscopy Studies of Electrocatalysts; Aram Yoon, Philipp Grosse, Jeffrey Poon, Beatriz Roldan Cuenya, See Wee Chee*
- 11:15 AM **29** *Temperature Mapping with STEM Atomic Scale Debye-Waller Thermometry; Menglin Zhu, Jinwoo Hwang*
- 11:30 AM **30** *Determining Atomic Structure of Grain Boundaries and Heterostructure Interfaces at Solid-State Electrode/Electrolyte Heterostructures in Lithium Based Oxides; Connor Murrill, Stuart Cavill, Khalil El hajraoui, Demie Kepaptsoglou, Richard Douthwaite, Vlado Lazarov*

- 11:45 AM **31** *Site-Specific Sample Preparation by Concentrated Ar Ion Milling for Post-Mortem Atomic Resolution Imaging of Rapidly Solidified Al-Cu Thin Films after Pulsed Laser Melting; Cecile Bonifacio, Bathula Vishwanadh, JaehyukJo, Jörg Wiezorek, Mary Ray, Paul Fischione*

A03.3 Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science

PLATFORM SESSION

Tuesday 10:30 AM • Room: B112

- 10:30 AM **65** *Large Volume 3D Electron Backscatter Diffraction Characterization of Lath Martensite in 13%Cr-4%Ni Stainless Steel by Xe Plasma FIB; Mehdi Mosayebi, Hui Yuan, Betty Huang, Daniel Paquet, Pierre-Antony Deschênes, Nabil Bassim*
- 11:00 AM **63** *4D Investigation of new Aluminum Alloy for Additive Manufacturing; Katrin Bugelnig*
- 11:15 AM **64** *Correlative Micro-Compression and 3D X-ray Nanotomography Study of the Fracture Behavior of TCP Phases in an Additively Manufactured Ni-Base Superalloy; Michael Sommerschuh, Janis Wirth, Benoit Merle, Julian Pistor, Silvan Englisch, Thomas Przybilla, Carolin Körner, Mathias Göken, Benjamin Apeleo Zubiri, Erdmann Spiecker*
- 11:45 AM **66** *Crystal Structure and Defect Analysis of Colloidal Supraparticles by Lab-Based X-Ray Microscopy; Silvan Englisch, Junwei Wang, Lukas J. Roemling, Johannes Voß, Janis Wirth, Chrameh Fru Mbah, Benjamin Apeleo Zubiri, Michael Engel, Nicolas Vogel, Erdmann Spiecker*

Scientific Program

A

Analytical Sciences Symposia - Late Tuesday Morning cont.

A05.3

SEM EDS/EBSD

PLATFORM SESSION

Tuesday 10:30 AM • Room: B114

- 10:30 AM **114** *SEM-EDS Mapping at the Nanoscale – The Low Voltage Approach*; (invited) **Ifat Kaplan-Ashiri**
- 11:00 AM **115** *SEM EDS Mapping of Ultra-Low Energy X-rays Using a Silicon Nitride Window Silicon Drift Detector*; **Shangshang Mu**, Jens Rafaelsen, Masanobu Kawabata
- 11:15 AM **116** *In situ EBSD Studies of Blocky Grain Growth in Welded Zircaloy-4*; **Ben Britton**, Ruth Birch
- 11:30 AM **117** *Detecting Temperature-Induced Strain Changes using In Situ Transmission Kikuchi Diffraction*; **Yueyun Chen**, Jared Lodico, Xin Yi Ling, B. C. Regan, Matthew Mecklenburg
- 11:45 AM **118** *Local Stress Measurements in Microelectronic Devices using HREBSD*; **Tim Ruggles**

A06.1

Expanding Fundamental Understanding in Atom Probe Tomography

SESSION CHAIRS:

Ann Chiamonti, David Diercks, Jonathan Poplawsky

PLATFORM SESSION

Tuesday 10:30 AM • Room: C122

- 10:30 AM **139** *Mysterious Field Evaporation Behavior of Hydrogen in Aluminium Based Material Analyzed with Atom Probe Tomography*; (invited) **Loïc Rousseau**, Jean Baptiste Maillet, Leigh Stephenson, Benoit Gervais, Baptiste Gault, François Vurpillot
- 11:00 AM **140** *Hydrogen Trapping in Fully Martensitic Steels using Atom Probe Tomography*; **Rekha M Y**, Ilias Bikmukhametov, Luke N Brewer, Gregory B Thompson
- 11:15 AM **141** *Laser Ablation Sample Preparation for Grain Boundary Analysis of H in Atom Probe Tomography*; **Martina Heller**, Veronika Schon, Benedict Ott, Peter Felfer
- 11:30 AM **142** *Solving Peak Tail Overlaps in Atom Probe Tomography using Convolutional Networks*; **Martin Meier**, Paul Bagot, Michael Moody, Daniel Haley
- 11:45 AM **143** *Analysis of Multiple-ion Events in Atom Probe Tomography Studies of MoNbTi and HfNbTaTiZr Refractory High Entropy Alloys*; **Patrick Callahan**, Keith Knipling, David Beaudry

B

Biological Sciences Symposia - Late Tuesday Morning

B01.1

Microcrystal Electron Diffraction (MicroED)

SESSION CHAIR:

Brett Nannenga

PLATFORM SESSION

Tuesday 10:30 AM • Room: D137

- 10:30 AM **226** *MicroED Conception and Current Practices;* Tamir Gonen; (invited) **Max Clabbers**
- 11:00 AM **227** *Progress Towards More Accurate and Precise MicroED Measurements;* **Matthew Mecklenburg**, (invited) Ambarneil Saha
- 11:30 AM **228** *A Complete Micro-Electron Diffraction (MicroED) Solution for Fast Structure Determination for Macromolecules and Small Molecules;* (invited) **Natalie Young**

B02.3

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

SESSION CHAIRS:

Melanie Ohi, Cheri Hampton, William Rice, Teresa Ruiz

PLATFORM SESSION

Tuesday 10:30 AM • Room: D136

- 10:30 AM **242** *Free Energy Profiles From Single-Molecule CryoEM;* Julian Giraldo-Barreto, Sebastian Ortiz, Erik H Thiede, Karen Palacio-Rodriguez, Bob Carpenter, Alex H Barnett, (invited) **Pilar Cossio**
- 11:00 AM **243** *Conformational Dynamics of the CCT Protein Folding Machine;* **Shuxin Wang**, Mikaila Sass, William Ludlam, Theresa Smith, Barry Willardson, Peter Shen
- 11:15 AM **244** *Cryo-EM Studies of Genome Organisation and Transcription Complexes;* (invited) **Seychelle Vos**
- 11:45 AM **245** *Molecular Structure Determination Extrapolated to Zero Dose with an Electron Cryomicroscope;* **Katerina Naydenova**, Jude Short, Christopher Russo

B07.3

3D Volume Electron Microscopy in Biology Research

SESSION CHAIRS:

Alice Liang, Ru-ching Hsia

PLATFORM SESSION

Tuesday 10:30 AM • Room: D133-134

- 10:30 AM **332** *Volume Imaging: From HeLa Cells to the Human Nervous System;* (invited) **Anna Steyer**
- 11:00 AM **333** *3D Visualisation of Biological Species at Hard-Soft Bone Interfaces using Cryo FIB/SEM;* **Aekta Upadhyay**, Patricia Abellan, Angelique Galvani, Jean Le Bideau, Valerie Geoffroy
- 11:15 AM **334** *Effects of Chloramphenicol Treatment on Cellular Storage Granules and Membrane Structures in Rhodobacter sphaeroides;* **Daniel Parrell**, Rachelle Lemke, Joseph Olson, Timothy Donohue, Elizabeth Wright
- 11:30 AM (invited) **Noelle Antao**, Cherry Lam, Ari Davydov, Joseph Sall, Feng-Xia Liang, Damian Ekiert, Gira Bhabha

B09.1

Shinya Inoué: Impact on Education, Innovation, and Research

PLATFORM SESSION

Tuesday 10:30 AM • Room: D135

- 10:30 AM **350** *Shinya Inoue, a Life Dedicated to Education;* (invited) **Paul Maddox**
- 11:00 AM **351** *Advancing Pharmaceutical Research through Innovations in Imaging;* (invited) **Bonnie Howell**
- 11:30 AM **352** *Live Cell Imaging: The Past, The Present and Future Opportunities;* (invited) **Simon Watkins**

Scientific Program

C

Cross-Cutting Symposia - Late Tuesday Morning

C04.3

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

SESSION CHAIRS:

Paul Voyles

PLATFORM SESSION

Tuesday 10:30 AM • Room: B116

10:30 AM **396** *Automated Acquisition and Deep Learning of 2D Materials on the Million-Atom Scale; (invited)*
Chia-Hao Lee, Abid Khan, Yue Zhang, M. Abir Hossain, Arend van der Zande, Bryan Clark, Pinshane Huang

11:00 AM **394** *Strain Mapping from Electron Diffraction Patterns using a Fourier-space Complex Neural Network; Joydeep Munshi*, Alexander M Rakowski, Benjamin H Savitzky, Steven E Zeltman, Jim Ciston, Andrew Minor, Maria KY Chan, Colin Ophus

11:15 AM **395** *Lossless Image Compression for 4D-STEM Datasets; Jacob Hinkle*, Debangshu Mukherjee, Kevin Roccapiore, Alexander M Rakowski, Christopher Nelson, Ondrej Dyck, Stephen Jesse, Nageswara Rao, Colin Ophus, Andrew Lupini, Olga Ovchinnikova

11:30 AM **393** *4D-STEM Analysis with the Open Source py4DSTEM and crystal4D Toolkits; (invited)*
Colin Ophus, Alexander M Rakowski, Joydeep Munshi, Benjamin Savitzky, Steven Zeltmann, Alexandra Bruefach, Mary Scott, Jim Ciston, Andrew M Minor, Maria KY Chan

P

Physical Sciences Symposia - Late Tuesday Morning

P01.3 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys

SESSION CHAIR:

Dr May Martin

PLATFORM SESSION

Monday 10:30 AM • Room: A105

- 10:30 AM **437** *Characterization of Hydrogen Effect on Mechanical Properties of Metals at Different Length Scales;* (invited) **Afrooz Bamoush**
- 11:00 AM **438** *Hydride Formation and Deformation Mechanisms in Commercially Pure Titanium;* **Stoichko Antonov**, Qing Tan, Baptiste Gault
- 11:15 AM **439** *Cryogenic Focused Ion Beam Sample Preparation for the Analysis of Hydrogen in Zr Alloy APT Experiments;* **Megan Jones**, Christopher Parmenter, Benjamin Jenkins, Paul Styman, ShyamSikotra, Michael Moody, Daniel Haley
- 11:30 AM **440** *In-situ Micromechanics of Hydrogen-induced Deformation in Pearlitic Steels;* (invited) **Hanyu Li**, Ranming Niu, Julie Cairney, Yi-Sheng Chen

P02.3 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Tuesday 10:30 AM • Room: A107-108

- 10:30 AM **462** *Identifying Possible Two-Level-System Sources in Superconducting Qubit with Advanced Electron Microscopy;* (invited) **Lin Zhou**, Xiaotian Fang, Tea-Hoon Kim, Matt Kramer, Alexander Romanenko, Posen Posen, Anna Grassellino, Cameron Kopas, Mark Field, Jayss Marshall, Joshua Mutus, Hilal Cansizoglu, Matthew Reagor
- 11:00 AM **463** *In-Situ EBIC STEM: Automated Quantification;* **Grigore Moldovan**, Aidan Conlan, David Cooper
- 11:15 AM **464** *Characterization and Growth of Quad Unit Cell Linear Defects in Potassium Tantalate;* **Tim Eldred**, Kaveh Ahadi, Wenpei Gao
- 11:30 AM **465** *Characterization of Future Generation Transistors Using Electron Beam;* **Qianlang Liu**
- 12:00 PM **466** *Real Space Demonstration of Electric Current-Induced Isolated Skyrmion Deformation;* **Fehmi Yasin**, Jan Masell, Kosuke Karube, Akiko Kikkawa, Yasujiro Taguchi, Yoshinori Tokura, Xiuzhen Yu

P05.3 In situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

PLATFORM SESSION

Tuesday 10:30 AM • Room: C123

- 10:30 AM **508** *Efficient Sampling and Reconstruction Strategies for In-Situ SEM/STEM;* (invited) **Nigel Browning**, Mounib Bahri, Jony Castegna, Ke Chen, Yalin Zheng, Jack Wells, Jack Taylor, William Pearson, Alex Robinson, Daniel Nicholls, B. Layla Mehdi
- 11:00 AM **506** *Data Synchronization in Operando Gas and Heating TEM;* **Fan Zhang**, Merijn Pen, Hector Hugo Perez Garza, Ronald Spruit, Wei Liu, Dan Zhou
- 11:15 AM **507** *Dynamic Atomic-Scale Imaging of Cluster-Ion Anti-Perovskites Using Low-Dose Cryogenic HRTEM;* **Blanka Janicek**, Sunil Mair, Yet-Ming Chiang, Colin Ophus, Xi Jiang
- 11:30 AM **509** *Rhodium Doping of Strontium Titanate for Enhanced Visible Light Absorption;* **Piyush Haluai**, Peter Crozier
- 11:45 AM **510** *Revealing the Reaction Behavior of Co_{0.86}Mn_{0.14}O under H₂ using In Situ Closed-Cell Gas Reaction S/TEM;* **Kinga Unocic**, Nicole LiBretto, Anh T To, Jeremy Kropf, Daniel Ruddy, Theodore Krause, Lawrence Allard, Susan Habas

Scientific Program

P

Physical Sciences Symposia - Late Tuesday Morning cont.

P07.3 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Tuesday 10:30 AM • Room: B118-119

- 10:30 AM **563** *Coupling Extreme Environments in the SEM: Present and Future Developments; (invited) Eric Lang*, Samuel Briggs, Trevor Clark, Nathan Heckman, Anthony Monterrosa, Christopher Barr, Brad Boyce, Dan Buller, Khalid Hattar
- 11:00 AM **561** *Aqueous Corrosion of WCLL Breeder Blanket Structural Material Eurofer-97 for Nuclear Fusion Reactors; David Kumar*, Robert Burrows, Lucy Platts, Angus Siberry, Aidan Gunn, Mariia Zimina, Chris Harrington, Ross Springell, Tomas Martin, Alessandro Del Nevo
- 11:15 AM **562** *Evaluation of Microstructural Evolution in Isothermally Aged Ferritic Candidate Cladding Materials for Sodium-Cooled Fast Reactor Applications; Benjamin Adam*, David Sprouster, Adam Koziol, Luanne Rolly, Julie Tucker
- 11:30 AM **559** *New Correlative Microscopy Approaches to Understand the Microstructural Origins of Creep Cavitation in Austenitic Steels; Tomas Martin*, Siqi He, Edward Horton, Hao Shang, Antonio Fernandez-Caballero, Nicolo Grilli, Mahmoud Mostafavi, David Knowles, Alan Cocks, Peter Flewitt
- 11:45 AM **560** *Microanalysis of the Effects of Tokamak Thermal Transients on Eurofer 97 Steel; James Hargreaves*, David Kumar, Huw Dawson, Lottie Harding, Hugo Dominguez Andrade, Tomas Martin

P08.3 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

SESSION CHAIR:

Joe Patterson

PLATFORM SESSION

Tuesday 10:30 AM • Room: B115

- 10:30 AM **590** *Analysis of Complex, Beam-Sensitive Systems by Electron Microscopy; Martha Ilett*, Helen Freeman, Zabeada Aslam, Maryam Afzali, Johanna Galloway, Fiona Meldrum, (invited) **Rik Drummond-Brydson**
- 11:00 AM **591** *Resolving Electrode-Electrolyte Interfaces In Batteries With Low Dose Cryogenic Transmission Electron Microscopy; Zewen Zhang*, Yuzhang Li, Weijiang Zhou, Yanbin Li, Wah Chiu, Yi Cui
- 11:15 AM **592** *The Importance of the σ -hole in the Self-Assembly of Halogenated Polypeptides; Morgan Seidler*, Nan Li, Xubo Luo, Sunting Xuan, David Prendergast, Ronald Zuckermann, Nitash Balsara, Xi Jiang
- 11:30 AM **593** *Overcoming Artifacts in Imaging Nanometer-thick Ionomer Layers in Anion Exchange Membrane Fuel Cells; Michael Colletta*, Yao Yang, Berit Goodge, Héctor Abruña, Lena Kourkoutis
- 11:45 AM **594** *Advances in Beam-Sensitive Sample Preparation and Observation; Pawel Nowakowski*, Cecile Bonifacio, Mary Ray, Paul Fischione

P09.3 Phase Transitions I

PLATFORM SESSION

Tuesday 10:30 AM • Room: A106

- 10:30 AM **618** *Robust Measurements of Functional Material Properties using In Situ 4D-STEM; (invited) Colin Ophus*, Shelly Michele Conroy, Mohsen Danie, Benjamin Savitzky, Alexander M Rakowski, Abigail Ackerman, Steven Zeltmann, Jim Ciston, Andrew M Minor, David Dye
- 11:00 AM **619** *In Situ Transmission Kikuchi Diffraction Observation of Thin-Film GST Crystal Phase and Grain Evolution; Yueyun Chen*, Ho Leung Chan, B. C. Regan, Matthew Mecklenburg
- 11:15 AM **620** *In situ TEM Study to Unravel Dynamic Processes and Phase Transition During the Synthesis of Ultrathin Crystalline ALD Nanotubes; Lilian Vogl*, Peter Schweizer, Laszlo Pethö, Amit Sharma, Erdmann Spiecker, Ivo Utke, Johann Michler

P

Physical Sciences Symposia - Late Tuesday Morning cont.

- 11:30 AM **621** *In-situ Imaging of Anisotropic Layer-by-layer Phase Transition in Few-layer MoTe₂*; **Chia-Hao Lee**, Huije Ryu, Gillian Nolan, Yichao Zhang, Yangjin Lee, Kwanpyo Kim, Gwan-Hyoung Lee, Pinshane Huang
- 11:45 AM **622** *Structural Modulations in Quasi-One-Dimensional Transition Metal Chalcogenides: A Combined DFT and STEM Investigation*; **Guodong Ren**, Jordan Hachtel, Arashdeep Thind, Gwan-Yeong Jung, Boyang Zhao, Jayakanth Ravichandran, Miaofang Chi, Rohan Mishra

P10.3 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Tuesday 10:30 AM • Room: B117

- 10:30 AM **650** *High Resolution Electron Energy-Loss Spectroscopy for the Study Organic and Biological Systems in the Scanning Transmission Electron Microscope*; (invited) **David McComb**
- 11:00 AM **651** *Compositional Analysis on Epoxy-resin/ inorganic Interfaces using Scanning Transmission Electron Microscopy*; **Tomohiro Miyata**, Yohei Sato, Kaname Yoshida, Hsin-Hui Huang, Teruyasu Mizoguchi, Katsumi Hagita, Masashi Mizukami, Hiroshi Jinnai
- 11:15 AM **652** *Few-tilt Electron Ptychotomography: A New Method to Determine the 3D Structure of 2D Materials with High-precision and Low-dose*; **Christoph Hofer**, Kimmo Mustonen, Viera Skákalová, Timothy Pennycook, Hesham El-Sherif, Natalie Briggs, Brian Bersch, Joshua Robinson
- 11:30 AM **654** *A Hybrid Approach to Calibrate the Affine Transformation Between Scan-Camera Coordinates for 4D-STEM Datasets*; Shoucong Ning, Wenhui Xu, Yinhang Ma, Leyi Loh, Timothy Pennycook, Wu Zhou, Fucui Zhang, Michel Bosman, Stephen Pennycook, Duane Loh, **Qian He**
- 11:45 AM **653** *Observation of 2D Si-Vacancies Filled by Gallium Intercalation of Epitaxial Graphene*; Hesham El-Sherif, Natalie Briggs, Brian Bersch, Joshua Robinson, **Nabil Bassim**

P12.3 John Spence Memorial - CBED and EELS

PLATFORM SESSION

Tuesday 10:30 AM • Room: B113

- 10:30 AM **719** *John C. H. Spence and the Age of X-Ray Lasers*; (invited) **Henry Chapman**
- 11:00 AM **720** *Coherence and Inelastic Scattering in Electron Microscopy*; **Christian Kisielowski**, Petra Specht, Bert Freitag, Erik Kieft, Steve Rozeveld, Joo Kang, Alyssa Fielitz, Thomas Fielitz, David Yancey, Dirk Van Dyck
- 11:15 AM **721** *The Design and Operation of a New Relativistic Ultrafast Electron Diffraction and Imaging (RUEDI) National Facility in the UK*; **Nigel Browning**, William Bryan, Professor Kirkland, R. J. Dwayne Miller, Ian Robinson, Timothy Noakes, B. Layla Mehdi, James Clarke, Julian McKenzie, Michael Ellis, Yoshie Murooka, Carsten Welsch, Simon Maskell, Jasper van Thor, Sven Schroeder
- 11:30 AM **722** *Structure Determination from Multiple-Scattering Electron Crystallography*; (invited) **Jeffrey Donatelli**, John Spence

Scientific Program

TF

**Technologists' Forum Sessions -
Late Tuesday Morning**

X41

**Applying CryoAPEX in the Cell
Biology of RNA Viruses; A
Question-Based Evolution of
the Methodology**

PLATFORM SESSION

Tuesday 10:30 AM • Room: B110

11:00 AM **728** *CryoAPEX: Inception, Growth and Evolution
of the Method; (invited) Ranjan Sengupta,
Seema Mattoo, Robert Stahelin*

97

Scientific Program

A

Analytical Sciences Symposia - Tuesday Afternoon cont.

A04.1

4D STEM of Beam-Sensitive Materials

PLATFORM SESSION

Tuesday 1:30 PM • Room: B113

- 1:30 PM **76** *4D-STEM of Beam-Sensitive Materials;* (invited) **Karen C Bustillo**, Steven Zeltmann, Benjamin Savitzky, Jim Ciston, Rohan Dhall, Peter Ercius, Colin Ophus, Andrew Minor
- 2:00 PM **77** *Dose-Efficient Defect Contrast with 4D-STEM;* **Stephanie Ribet**, Colin Ophus, Roberto dos Reis, Vinayak Dravid
- 2:15 PM **78** *Electron Microscopy View on Organic Mixed Ionic-Electronic Conductors Using 4D-STEM and HRTEM;* **Yael Tsarfati**, Karen C Bustillo, Luke Balhorn, Tyler Quill, Jennifer Donohue, Steven Zeltmann, Benjamin Savitzky, Colin Ophus, Christopher Takacs, Iain McCulloch, Andrew Minor, Alberto Salleo
- 2:30 PM **79** *Applications of Low Dose Electron Ptychography;* (invited) **Angus Kirkland**, Judy Kim, Chris Allen, Chen Huang, Emanuela Liberti, Colum M. O'Leary, Peter Nellist, Peng Wang

A05.4

EPMA

PLATFORM SESSION

Tuesday 1:30 PM • Room: B114

- 1:30 PM **119** *Electrons Rock: Multiscale Analysis of Subgrain Deformation Boundaries in Antarctic Garnets;* **Berit Goodge**, Bryan Bandli, Lena Kourkoutis, John Goodge
- 1:45 PM **120** *Quantitative WDS Compositional Mapping Using the Electron Microprobe;* **Julie Chouinard**, Julien Allaz, Anette von der Handt, Gareth Seward, Owen Neill, Julie Chouinard, Paul Carpenter
- 2:00 PM **121** *Quantitative Compositional Wavelength-Dispersive Mapping of Particles from the Moon;* **Emma Bullock**, Corrigan Cari, Sarah Valencia, Natalie Curran, Barbara Cohen
- 2:15 PM **122** *Quantitative EPMA and Compositional Mapping of Nakhilite Northwest Africa 14369;* **Paul Carpenter**, Anthony Irving, Chris Yen, Bradley Jolliff

- 2:30 PM **123** *Using an EPMA to Map Ionsdaleite in Ureilite Meteorites;* (invited) **Nicholas Wilson**, Dougal McCulloch, Alan Salek, Brenton Cook, Colin MacRae, Aaron Torpy, Andrew Tomkins

A06.2

Expanding Techniques and Tools for Atom Probe Tomography

SESSION CHAIRS:

Ann Chiaramonti, **David Diercks**, **Jonathan Poplawsky**

PLATFORM SESSION

Tuesday 1:30 PM • Room: C122

- 1:30 PM **144** *Dynamic Observation of Electro-Assisted Fe Oxidation by Operando Atom Probe;* (invited) **Sten Lambeets**, Naseeha Cardwell, Isaac Onyango, Mark Wirth, Janet Teng, Graham Orren, Arun Devaraj, Thierry Visart de Bocarmé, Jean-Sabin McEwen, Daniel Perea
- 2:00 PM **145** *Fully Automated Data Acquisition and Reporting for Semiconductor Dopant Analysis;* **Katherine Rice**, Gard Groth, Ty Prosa
- 2:15 PM **146** *A Standards-based Approach to Dopant Quantification Using Atom Probe Tomography;* **Karen DeRocher**, Mark McLean, Frederick Meisenkothen
- 2:30 PM **147** *AP Suite Extension Infrastructure;* **James Payne**, David Reinhard, Tim Payne, Eric Strennen, Brian Geiser
- 2:45 PM **148** *APT_PyControl, an Open-source Python Atom Probe Tomography Control Software Package;* **Mehrad Monajem**, Peter Felfer

B

Biological Sciences Symposia - Tuesday Afternoon

B01.2

Microcrystal Electron Diffraction (MicroED)

SESSION CHAIR: Brett Nannenga

PLATFORM SESSION

Tuesday 1:30 PM • Room: D137

- 1:30 PM **229** *Electron Counting and Phasing in MicroED; (invited) Johan Hattne*, Michael Martynowycz, Max Clabbers, Tamir Gonen
- 2:15 PM **230** *Crystal Structure Determination of Gramicidin by Microcrystal Electron Diffraction; Nicole Hofer*, David McComb
- 2:30 PM **231** *Applying the Semi-Automated MicroED Processing Pipeline, AutoMicroED; Samantha Powell*, Irina Novikova, Doo Nam Kim, James Evans
- 2:45 PM **232** *A Computer Program for Objective Point Symmetry Classifications of Electron Diffraction Spot Patterns with Apparent Hexagonal or Rectangular-Centered Lattice Metric; Lukas von Koch*, Peter Moeck

B03.1

Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Tuesday 1:30 PM • Room: D136

- 1:30 PM **246** *The Case for Lower Voltage TEMs: A 100 keV FEG for High Resolution Microscopy; (invited) Mohamed El-Gomati*, Torquil Wells, Xiaoping Zha, Christopher Russo, Richard Henderson, Greg McMullan, Richard Sykes
- 2:00 PM **247** *Breaking to the Subnanometer Resolution Range of Cryo-EM SPA Reconstructions Obtained from 120 kV LaB6 TEM; Simonas Masiulis*, Jan Staníček, Ondřej Šáněl, Miloš Malinský, Oliver Raschdorf, Daniel Němeček
- 2:15 PM **248** *Large-Format Direct Detection Camera for Cryo-EM at 100 keV; Brian Lee*, David Joyce, Julio Kovacs, Sahil Gulati, Mike Petrillo, Stephen Mick, Paul Mooney, Matthew Lent, Christopher Booth
- 2:30 PM **249** *First Results from a Novel CMOS Detector Optimised for 100keV CryoEM; Liam O'Ryan*, Deividas Krukauskas, Tobias Starborg, Roger Goldsbrough, Professor Kirkland, Nicola Guerrini
- 2:45 PM **250** *Apollo: A Novel Event-Based Direct Detector for Cryo-EM; Benjamin Bammes*, Xiaofeng Fu, Michael Spilman, Ruizhi Peng, Scott Stagg

B07.4

3D Volume Electron Microscopy in Biology Research

SESSION CHAIRS:

Alice Liang, Ru-ching Hsia

PLATFORM SESSION

Tuesday 1:30 PM • Room: D133-134

- 1:30 PM **336** *Laboratory Cryo Soft X-ray Tomography for Label-Free Imaging of Bulk Samples; Kenneth Fahy*, Paul Sheridan, William Fyans, Fergal O'Reilly, Tony McEnroe
- 1:45 PM **337** *Soft X-Ray Tomography: A Mesoscale Bio-Imaging Technique to Study Single Cells in 3D with Automated Segmentation Tools for Several Sub-Cellular Structures; Bieke Vanslembrouck*, Jian-hua Chen, Axel Ekman, Mark LeGros, Carolyn Larabell
- 2:00 PM **338** *3D Imaging and Elemental Analysis of Biological Samples; Yuuki Yamaguchi*, Yukari Moriya, Tomohiro Haruta, Shunsuke Asahina
- 2:15 PM **339** *Volume Electron Microscopy: Taking the Measure of Cells in 3D; (invited) Kedar Narayan*
- 2:45 PM **340** *Noise Reconstruction and Removal Network: a New Way to Denoise FIB-SEM Image; Katya Giannios, Abhishek Chaurasia, Guillaume Thibault*, Jessica Riesterer, Erin Stempinski, Terence Lo, Bambi DeLaRosa, Joe Gray

B09.2

Shinya Inoué: Impact on Education, Innovation, and Research II

PLATFORM SESSION

Tuesday 1:30 PM • Room: D135

- 1:30 PM **353** *Biological and Technological Tools to Probe Systems Level Structure of Human Oral Biofilms; Alex Lemus*, Ruogu Wang, Colin Henneberry, Yunlong Feng, (invited) Alex Valm
- 2:00 PM **354** *Inspired By Shinya Inoué: Quantitative Orientation-Independent Differential Interference Contrast Microscopy; Zach Marin*, Yujin Bao, Joerg Bewersdorf, Michael Shribak
- 2:15 PM **355** *Elevating Polarized Light Microscopy to the Third Dimension; (invited) Rudolf Oldenbourg*
- 2:45 PM **356** *Reflecting on the Past and Building the Future of Imaging at MBL: Carrying Forward Shinya Inoué's Legacy; Abhishek Kumar*, Louis Kerr, Michael Shribak, Rudolf Oldenbourg, Nipam Patel

Scientific Program

C

Cross-Cutting Symposia - Tuesday Afternoon

C04.4

Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

PLATFORM SESSION

Tuesday 1:30 PM • Room: B116

- 1:30 PM **397** *Infrastructure for Analysis of Large Microscopy and Microanalysis Data Sets;* Jingrui Wei, Carter Francis, Dane Morgan, KJ Schmidt, Aristana Scourtas, Ian Foster, Ben Blaiszik, (invited) **Paul Voyles**
- 2:00 PM **398** *Synthetic Data Curation Strategies for Robust Model Development: A Case Study with HRTEM Micrograph Segmentation;* **Luis Rangel DaCosta**, Katherine Sytwu, Kate Groschner, Mary Scott
- 2:15 PM **399** *Intelligent and Automatic Parameter Optimization for High-resolution Electron Ptychography;* **Michael Cao**, Zhen Chen, Yi Jiang, Yimo Han
- 2:30 PM **400** *Efficient Memory Storage and Linear Parallel Scaling for Large-Scale Electron Ptychography;* **Xiao Wang**, Debangshu Mukherjee, Aristeidis Tsaris, Mark Oxley, Olga Ovchinnikova, Jacob Hinkle
- 2:45 PM **401** *Automatic and Quantitative Measurement of Spectrometer Aberrations in Monochromated EELS;* **Yueming Guo**, Andrew Lupini

P

Physical Sciences Symposia - Tuesday Afternoon

P01.4 Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys

SESSION CHAIR:

Dr Dallin Barton

PLATFORM SESSION

Monday 1:30 PM • Room: A105

1:30 PM **441** Visualization of Hydrogen-Trapping Sites in Steels by Atom Probe Tomography; (invited) **Jun Takahashi**, Kazuto Kawakami, Shinya Teramoto, Yuuji Sakiyama, Tomohiko Omura

2:00 PM **442** Imaging of Hydrogen in Metals Using an Atom Probe with Ultra-Low Hydrogen Background; **Peter Felfer**, Benedict Ott, Martina Heller, Martin Weiser, Mehrpad Monajem

2:15 PM **443** Exploiting Adsorption Dynamics in Atom Probe Tomography for accurate Measurements of Hydrogen Concentrations; **Martin Meier**, Megan Jones, Peter Felfer, Paul Bagot, Michael Moody, Daniel Haley

2:30 PM **444** The Observation of H Isotope in Fe-Cr-Ni Model Stainless Steels at the Nano Scale using Atom Probe Tomography; **Dallin Barto**, Daniel Perea, Mark Wirth, Arun Devaraj

2:45 PM **445** Preliminary Atom Probe Tomography Evidence for Hydrogen Trapping at a Beta-Nb Second Phase Particle in a Neutron-Irradiated Zirconium Alloy; **Benjamin Jenkins**, Jack Haley, Martin Meier, Megan Jones, Baptiste Gault, Patrick Burr, Michael Moody, Chris Grovenor

P02.4 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Tuesday 1:30 PM • Room: A105

1:30 PM **467** Building Atomic and Plasmonic Devices via Electron Beams: from Desired Structures to Desired Properties; Kevin Roccapriore, Ayana Ghosh, Rama Vasudevan, Raymond Unocic, Matthew Boebinger, Maxim Ziatdinov, **Sergei Kalinin** (invited)

2:00 PM **465** Nanoscale Engineering of Magnetic Textures in the Layered Magnet CrSBr using Electrons and Helium Ions; Julian Klein, Thang Pham, Thomsen Dahl, Jonathan Curtis, Michael Lorke, Matthias Florian, Alexander Steinhoff, Kate Reidy, Kierstin Torres, Ren Wiscons, Jan Luxa, Zdenek Sofer, Frank Jahnke, Prineha Narang, Frances Ross

2:15 PM **469** Atomic-Scale Phase Transformation of CrCl₃ Elucidated by Cryo-STEM; **Hsin-Yun Chao**, Miaofang Chi

2:30 PM **470** In-situ Imaging of Thermally Activated Atomic Reconstruction of Twisted Bilayer Transition Metal Dichalcogenides; **Yichao Zhang**, Chia-Hao Lee, Gillian Nolan, Ji-Hwan Baek, Gwan-Hyoung Lee, Pinshane Huang

2:45 PM **471** Channeling-Induced Artifacts in Atom Tracking of Cations in Distorted Perovskites Imaged by HAADF-STEM; **Michelle Smeaton**, Noah Schnitzer, Hong Zheng, John Mitchell, Lena Kourkoutis

P05.4 In situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

PLATFORM SESSION

Tuesday 1:30 PM • Room: C123

1:30 PM **511** Tacking Directional Movement of Nanomotors with Liquid Cell Electron Microscopy; Jiawei Wan, Qiubo Zhang, Mark Asta, (invited) **Haimei Zheng**

2:00 PM **512** Direct Observation of Atomic Scale Diffusion Processes Using in situ HRSTEM; **Peter Schweizer**, Laszlo Pethö, Emese Huszár, Lilian Vogl, Johann Michler, Xavier Maeder

2:15 PM **974** Pt carbide Formation During Graphitic Carbon Growth Studied Using In Situ TEM; **Hannah Nerl**, Milivoj Plodinec

2:30 PM **970** Identifying Experimental Parameters for In Situ TEM Heating Experiments on Metastable Microstructures: Application to a Quasicrystal-Reinforced Al Alloy; **Baris Yavas**, Mingxuan Li, Hannah Leonard, Mark Aindow

Scientific Program

P

Physical Sciences Symposia - Tuesday Afternoon cont.

P08.4 Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

SESSION CHAIRS:

Wyeth Gibson

PLATFORM SESSION

Tuesday 1:30 PM • Room: B115

- 1:30 PM **595** Latency Dose Formation in DMC by Inelastic Electron Scattering; (invited) **Petra Specht**, Christian Kisielowski, Bert Freitag, Erik Kieft, Steve Rozeveld, Joo Kang, Alyssa Fielitz, Thomas Fielitz, Dirk Van Dyck, David Yancey
- 2:00 PM **596** How Low Can You Go: Pushing the Limits of Dose and Frame-time in the STEM; Petra Specht, Christian Kisielowski, Bert Freitag, Erik Kieft, Steve Rozeveld, Joo Kang, Alyssa Fielitz, Thomas Fielitz, Dirk Van Dyck, David Yancey, **Tiarnan Mullarkey**
- 2:15 PM **597** Machine-Learning Assisted Exit-wave Reconstruction for Quantitative Feature Extraction; **Matthew Helmi Leth Larsen**, Frederik Dahl, David Christoffer Bisp Nielsen, Lars P. Hansen, Bastian Barton, Christian Kisielowski, Ole Winther, Thomas Willum Hansen, Stig Helveg, Jakob Schiøtz
- 2:30 PM **598** Electron Counted STEM-EELS Spectroscopy Optimized for low kV (< 80 kV) via Hybrid Pixel Detection; **Liam Spillane**, Roberto dos Reis, Anahita Pakzad, Ray Twisten
- 2:45 PM **599** Electrostatic Switching for Spatiotemporal Dose Control in a Transmission Electron Microscope; **Bryan Reed**, Ruth Bloom, Gonzalo Eyzaguirre, Curt Henrichs, Nima Moghadam, Daniel Masiel

P09.4 Dynamics of Magnetic Materials

PLATFORM SESSION

Tuesday 1:30 PM • Room: A106

- 1:30 PM **623** Evolution of Skyrmion Lattice Order in the van der Waals Ferromagnet Fe_3GeTe_2 ; (invited) **Arthur McCray**, Yue Li, Rabindra Basnet, Krishna Pandey, Jin Hu, Daniel Phelan, Xuedan Ma, Amanda Petford Long, Charudatta Phatak
- 2:00 PM **624** Insights into the Origin of Skyrmion Pinning in [Pt/Co/Cu] Magnetic Multilayers; **Binbin Wang**, Núria Bagués, Shekhar Das, Shuyu Cheng, Camelia Selcu, Denis Pelekhov, P Chris Hammel, Mohit Randeria, Roland Kawakami, David McComb

2:15 PM **625** Magnetization Study of the Magnetocaloric Properties in $\text{La}_{0.7}\text{Ca}_{0.23}\text{Sr}_{0.07}\text{MnO}_3$ Manganite by In Situ Electron Holography; **Arturo Galindo**, Jose Matutes, Arturo Ponce

2:30 PM **626** Evolution of Novel Chiral Spin Textures in Fe/Gd Based Multilayer Thin Films; **William Parker**, Sergio Montoya, Eric Fullerton, Benjamin McMorran

2:45 PM **627** Towards the In-Situ Detection of Spin Charge Accumulation at a Metal/Insulator Interface using STEM-EELS Technique; **Khalil El hajraoui**, Adam Kerrigan, Kelly Morrison, Stuart Cavill, Vlado Lazarov, Quentin Ramasse, Demie Kepaptsoglou

P10.4 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Tuesday 1:30 PM • Room: B117

- 1:30 PM **655** Developing Atomic-scale Understanding of Functional Materials; (invited) **Arashdeep Thind**, Rohan Mishra, Robert Klie
- 2:00 PM **656** Atomic Resolution Investigation of Ultra-Low Energy Ion-Implanted Monolayer TMDs Using Scanning Transmission Electron Microscopy; **Michael Hennessy**, Eoin Moynihan, Eoghan O'Connell, Stefan Rost, Manuel Auge, Minh Bui, Beata Kardynal, Hans Hofsäss, Ursel Bangert
- 2:15 PM **657** Bulk and Surface Exsolution Produce a Variety of Fe-rich and Fe-depleted Ellipsoidal Nanostructures in Functional Perovskite Thin Films; Komal Syed, Jiayue Wang, Bilge Yildiz, **William Bowman**
- 2:30 PM **658** Direct Visualization of Spinel-Like Rhodium Aluminate (RhAlOx) to Understand its Role in Rh/Al₂O₃-Based Three-Way Catalysts; **Cheng-Han Li**, Jason Wu, Joerg Jinschek
- 2:45 PM **659** Investigation of Chalcogenide Perovskite Thin Films Using Scanning Transmission Electron Microscopy (STEM); **Michael Xu**, Ida Sadeghi, Kevin Ye, Rafael Jaramillo, James LeBeau

TF

Technologists' Forum Sessions - Tuesday Afternoon

X42

Indirect Correlative Light and Electron Microscopy (iCLEM)

PLATFORM SESSION

Tuesday 2:00 PM • Room: B110

2:00 PM **729** *Indirect Correlative Light and Electron
Microscopy – A High Throughput Approach
With Robust Quantitative Capabilities;* (invited)
Rengasayee Veeraraghavan, Heather
Struckman

Scientific Program

A

Analytical Sciences Posters - Tuesday Afternoon

A05.2P Quantitative and Qualitative Mapping of Materials

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #69

3:00 PM **810** *A Comparison of Quartz Source Determination Using Supervised Machine Learning versus a Traditional Ratio Approach;* **Angela Halfpenny**, Meaghan Wetherell, Craig Scrivner

POSTER #70

3:00 PM **811** *Benefits of Using a 4 srad XEDS Detector in Quantitative 3D-Compositional Analysis of Core@shell Nanoparticles;* **Adrián Pedraza-Tardajos**, Qiongyang Chen, Maarten Wirix, Lin Jiang, Bert Freitag, Sara Bals

POSTER #71

3:00 PM **812** *Fast Automatic Analytical Particle Analysis using an AI Guided Smart Scan Strategy;* **Pavel Potocek**, Philipp Müller, Thorsten Wiecek, Maurice Peemen, Bert Freitag

POSTER #73

3:00 PM **814** *Quantifying Pb in Microelectronic Electrodes to Mitigate Sn Whisker Growth with the use of Energy Dispersive X-Ray Spectroscopy (EDS) and Image Analysis;* **Luis Jauregui**, Rebecca Wheeling, Jeier Yang

POSTER #74

3:00 PM **815** *Towards Quantitative Maps of Lithium in the Scanning Electron Microscope;* **Raynald Gauvin**, Nicolas Brodusch

A06.1P Expanding the Limits of Atom Probe Tomography

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #83

3:00 PM **829** *A Reconstruction Wizard for Electrostatic Reconstruction;* **Brian Geiser**, David Reinhard, Joe Bunton, David Larson, Robert Ulfig, Katherine Rice, Yimeng Chen, Ty Prosa, Tim Payne

POSTER #84

3:00 PM **830** *Benefits of a Full Field of View in Atom Probe Tomography;* **David Reinhard**, Katherine Rice, Robert Ulfig, Isabelle Martin, Brian Geiser, David Larson

POSTER #85

3:00 PM **831** *Deep-Ultra-Violet Atom-Probe Tomography Using Automation to Understand Operational Parameter Space: A Progress Report;* **Ty Prosa**, Dan Lenz, Joe Bunton, Nick Brewer, Gard Groth, David Reinhard

POSTER #86

3:00 PM **832** *Nanoscale Clusters and Heterogeneities in Engineering and Amorphous Alloys;* **Stephan Gerstl**, Robin Schäublin, Jörg Löffler

POSTER #87

3:00 PM **833** *Origin of High-Density Zone Lines in Field Desorption Patterns of Tungsten;* **Jiayuwen Qi**, Christian Oberdorfer, Emmanuelle Marquis, Wolfgang Windl

POSTER #88

3:00 PM **834** *Simultaneous Voltage and Laser Pulsing in Atom Probe Tomography;* **David Larson**, Ty Prosa, David Reinhard, Robert Ulfig, Michael Holman, Dan Lenz

POSTER #89

3:00 PM **835** *Structural Change of MgNiY Long Period Stacking Order Investigated with Atom Probe;* **Yimeng Chen**, Katherine Rice, Peter Clifton, Manuel Legree, Jean-Louis Bobet

A04.1P Developments of 4D-STEM Imaging—Enabling New Materials Applications

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #39

3:00 PM **782** *Acquisition and Analysis of Serial Electron Diffraction for Structure;* **Asma Sarguroh**, Ehsan Nikbin, Jessica Besaw, Hazem Daoud, Robert McLeod, Jane Howe, R. J. Dwayne Miller

POSTER #40

3:00 PM **783** *Addressing Thickness Induced Contrast Reversals in Focused Probe Ptychography;* **Chuang Gao**, Christoph Hofer, Timothy Pennycook

POSTER #41

3:00 PM **784** *Fourier Ptychography in the TEM: Developments and Applications;* **Andrew Barnum**

POSTER #42

3:00 PM **785** *High Resolution Three-Dimensional Reconstructions in Electron Microscopy Through Multifocus Ptychography;* **Marcel Schloz**, Thomas Pekin, Hamish Brown, Jim Ciston, Christoph Koch

POSTER #43

3:00 PM **786** *Signal Enhancement of Low-Dose Cryogenic 4D-STEM Data for Mapping of Beam Sensitive Materials;* **Danielle Markovich**, Michael Colletta, Yue Yu, Megan Treichel, Kevin J. Noonan, Lena Kourkoutis

A

Analytical Sciences Posters - Tuesday Afternoon cont.

POSTER #44

3:00 PM **787** *Towards Low-dose and Fast 4-D Scanning Transmission Electron Microscopy: New Sampling and Reconstruction Approaches;* **Amirafshar Moshtaghpour**, Abner Velazco-Torrejon, Alex Robinson, Emanuela Liberti, Judy Kim, Nigel Browning

POSTER #45

3:00 PM **788** *Uncovering In-Plane Domain Structures in Two-Dimensional Ferroelectric SnSe Using Machine-Learning Assisted 4D-STEM;* **Chuoqiao Shi**, Nannan Mao, Jing Kong, Yimo Han

A03.2P

Advanced 3D Imaging and Analysis Methods for New Opportunities in Material Science

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #29

3:00 PM **61** *Great White Pelican Mandible as Bioinspiration for Vehicle Design - Structural Bioprospecting Via X-Ray Micro-CT and Finite Element Analysis;* **Richard Johnston**, Nicola Thomas, William Harrison, Caroline Buttler

POSTER #27

3:00 PM **768** *Acquisition to Visualization: New Approaches in Dynamic In-Situ X-ray Imaging;* Jan Dewanckele, **Wesley De Boever**, Marijn Boone, Michiel Krols, Frederik Coppens

POSTER #28

3:00 PM **769** *Analysis of Fibers, Pores, and Mechanical Properties in μ CT-scan of a Long Fiber-Reinforced Thermoplastic;* **Oliver Rimmel**, Martina Hübner, Andreas Griebner

POSTER #30

3:00 PM **770** *Impact of Chemical Composition on 3D Elemental Distribution and Damage Behavior of Cast Al-Si Alloys;* **Katrin Bugelnig**

POSTER #31

3:00 PM **771** *In-situ 3D X-ray Tomography and Analysis of Reverse Osmosis Membranes Under Compaction;* **Yara Suleiman**, Nicholas May, Mi Zhang, Aiden Zhu, Shawn Zhang, Jeffrey Mccutcheon

POSTER #32

3:00 PM **772** *Investigation of the Multiscale Microstructure of an Age-Hardenable Metal Matrix Composite using Correlative Microscopy;* **Hrishikesh Bale**, Sebastian Krauss, Rosen Ivanov, Bradley Diak, Michael Phaneuf

POSTER #33

3:00 PM **773** *MetalJet X-ray Sources for High-Speed Imaging;* **Emil Espes**, Anasuya Adibhatla

POSTER #34

3:00 PM **774** *Morphology and Growth Habit of a novel Flux-grown Layered Semiconductor KBiS₂ revealed by Lab-based Diffraction-Contrast Tomography;* Kejian Qu, **Hrishikesh Bale**, Zachary Riedel, Junehu Park, Leilei Yin, André Schleife

POSTER #35

3:00 PM **775** *Neutron Dark Field Tomography of Hierarchical Structures;* **Jacob LaManna**, Daniel Hussey, Caitlyn Wolf, Youngju Kim, Michael Daugherty, Ryan Murphy, Paul Kienzle, Nikolai Klimov, Michael Huber

POSTER #36

3:00 PM **776** *New Insights in Materials Characterization – Spectral Computed Tomography;* **Wesley De Boever**, Denis Van Loo, Marek Dosbaba, Marijn Boone

POSTER #37

3:00 PM **777** *Three-Dimensional Reconstruction of Printed Circuit Boards: Comparative Study between 3D femtosecond Laser Serial Sectioning and Optical Imaging versus 3D X-Ray Computed Tomography;* **Hongbin Choi**, Nicholas May, Adrian Phoulady, Pouya Tavousi, Sina Shahbazmohamadi

POSTER #38

3:00 PM **778** *Understanding 3D Biomineralization in Human Kidney Stones with Correlative X-Ray Micro-CT & X-Ray Fluorescence Microscopy;* Kymora Scotland, Gerard Wong, **Katarzyna Matusik**, Michael Lun, Sheraz Gul, Frances Su, Jeff Gelb, Wenbing Yun

Scientific Program

A

Analytical Sciences Posters - Tuesday Afternoon cont.

A01.2P

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

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #4

3:00 PM **740** *Cryo-FIB and Transmission Electron Microscopy of Cryoformed Metals*; Ana Luisa Terasawa Senra, **Daniel Huber**, Ricardo Namur, Antonio Ramirez, Osvaldo Cintho Poster

POSTER #5

3:00 PM **741** *Electron/Ion Microscopy of Low-temperature Sintered Y-TZP Ceramics with Additive of Lithium Disilicate Glass for Dental Restorations*; **Jiancun Rao**, Ke Li, Congqin Ning, Wen-An Chiou

POSTER #6

3:00 PM **742** *Image Segmentation Methods for FIB-SEM Images of Cathodes*; **Andreas Griebner**, Martina Hümbert, Christian Wagner, Sarah Reeb, Ilona Glatt, Robin White

POSTER #7

3:00 PM **743** *Improving Cryo-Electron Tomography Data Quality and Throughput by Minimizing Ice Contamination During Lamellae Fabrication using CERES Ice Shield*; **Caspar Jonker**, Stuart Howes, Katherine Lau, Friedrich Förster

POSTER #8

3:00 PM **744** *Laser Ablation: A New Approach to APT Specimen Preparation*; Samantha Hestad, Fabián Pérez Willard, Cheryl Hartfield, Kyle Crosby, Robert Ulfing, **Katherine Rice**

POSTER #9

3:00 PM **746** *Robotic Fabrication of High-Quality Lamellae for Aberration-Corrected Transmission Electron Microscopy*; **Mikhail Dutka**, Brandon van Leer, Hideyo Tsurusawa, Nobuto Nakanishi, Kayoko Kawano, Yiquiang Cheng

POSTER #10

3:00 PM **747** *T- SEM: Quantitative Composition and Structure Analysis of FIB lamellae in SEM*; **Meiken Falke**, Purvesh Soni, Anna Mogilatenko

A02.2P

Beyond Visualization with In Situ and Operando TEM

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #13

3:00 PM **752** *Etching Dynamics of Geometrically Confined Silicon Nanostructure*; **Kunmo Koo**, Joon Ha Chang, Sanghyeon Ji, Jacob Choe, Seungmin Shin, Geun-Taek Lee, Jong Min Yuk

POSTER #14

3:00 PM **753** *Extensible Real-Time Data Processing with Python in DigitalMicrograph*; **Benjamin Miller**, Cory Czarnik, Bernhard Schaffer, Winnie Lei

POSTER #15

3:00 PM **754** *In-Situ ETEM Reveals Formation Mechanism of Single Pt Atom on Ru Nanoparticle Electrocatalysts for CO-Resilient Methanol Oxidation*; Agus R. Poerwoprajitno, Lucy Gloag, **John Watt**, Soshan Cheong, Benjamin Miller, Dale L. Huber

B

Biological Sciences Posters - Tuesday Afternoon

B07.1P

3D Volume Electron Microscopy in Biology Research

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #140

3:00 PM **913** *Characterization and Optimization of OSTEM; A Novel Detection Method for Single- And Multibeam Scanning Electron Microscopy; Arent Kievits, Job Fermie, Peter Duinkerken, Ryan Lane, Elizabeth Carroll, Ben Giepmans*

POSTER #141

3:00 PM **914** *Computing for Optimized Biological Microscopy Data Processing and Analysis at The Rosalind Franklin Institute; Luís Perdigo, Neville Yee, Elaine Ho, Avery Pennington, Oliver King, Michele Darrow*

POSTER #142

3:00 PM **915** *The Crystalline Structure and Fibers of the Red Delicious Cultivar Apple Cellulose by TEM and AFM; Liliana Edith Rojas-Candelas, José Chanona-Pérez, Juan Méndez-Méndez, Benjamín Arredondo-Tamayo, Héctor Calderón Benavides, Christian Kisielowski*

B02.2P

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

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #118

3:00 PM **879** *Cryo-EM Reveals New Species-specific Proteins and Symmetry Elements in the Legionella pneumophila Dot/Icm T4SS; Jacquelyn Roberts, Michael Sheedlo, Clarissa Durie, Jeong Min Chung, Louise Chang, Michele Swanson, Melanie Ohi*

POSTER #119

3:00 PM **880** *CryoEM Structure of a Vascular KATP Channel in the Presence of Activating Mg-Nucleotides; Camden Driggers, Min Woo Sung*

POSTER #120

3:00 PM **881** *Glacios Enhancements for High Throughput, High Resolution Structure Determination Supporting Multiple Acquisition Methods Without Performance Compromise; Alevtyna Yakushevksa, Adrian Koh, Abhay Kotecha, Jeffrey Lengyel*

POSTER #121

3:00 PM **882** *Structural Analysis Helicobacter Pylori VacA's Channel in Membrane; Sarah Connolly, Amanda Erwin, Georgia Caso, Timothy Cover, Melanie Ohi*

POSTER #122

3:00 PM **883** *Uncovering Tumor Suppressor P53 Dynamics Using Microprocessor Materials; Maria Solares, G.M. Jonaid, Deb Kelly*

Scientific Program

C

Cross-Cutting Posters - Tuesday Afternoon

C04.2P

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #165

3:00 PM **940** *Automation of Supported Nanoparticle Recognition in Low Contrast STEM Images;* **Mads Lützen**, Daniel Kelly, Thomas Smits huysen, Christian Damsgaard

POSTER #166

3:00 PM **941** *Development of a Flexible Ensemble Classification System for Microscopy;* **Tomas McIntee**, Mathieu Therezien, Zach Russell

POSTER #167

3:00 PM **942** *Electron Image Reconstruction for Pixelated Semiconductor Tracking Detectors Based on Neural Networks;* **Björn Eckert**, Stefan Aschauer, Emma Hedley, Martin Huth, Petra Majewski, Lothar Strueder

POSTER #168

3:00 PM **943** *NexusLIMS-Euclid: A Customizable Data Management Software for Microscopists with Cloud Computing Outlook;* **Ao Liu**, Weinan Si, June Lau, Joshua Taillon, Roberto dos Reis, Laura Bartolo

POSTER #169

3:00 PM **944** *Synthetic Data for Machine Learning and Novel Edge Detection to Measure Particle Size Distributions in TEM;* **Eoin Walsh**, Andrew Stewart

POSTER #170

3:00 PM **945** *Understanding the Role of Neural Network Complexity and Receptive Field in Identifying Nanoparticles in TEM Images;* **Katherine Sytwu**, Kate Groschner, Mary Scott

P

Physical Sciences Posters - Tuesday Afternoon

P05.1P

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

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #191

3:00 PM **968** *2D to 3D Structural Transformation of Calcium Oxalate Revealed by In Situ Graphene Liquid Cell TEM*; **Lioudmila Sorokina**, Abhijit Phakatkar, Reza Shahbazian-Yassar, Tolou Shokuhfar

POSTER #194

3:00 PM **971** *In situ TEM Observations of Thermally Activated Phenomena in Materials Under Far-From-Equilibrium Conditions*; **Sriram Vijayan**, Kaustubh Bawane, Fidelma Di Lemma, Lingfeng He, Carolin Fink, Joerg Jinschek

P08.2P

Electron Microscopy of Beam Sensitive Samples: The Trials and Tribulations of Electron-beam Sample Interactions

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #223

3:00 PM **999** *Atomic Structure of Hierarchical Few-Unit-Cell MFI Zeolites*; **Supriya Ghosh**, Peng Lu, Michael Tsapatsis, K. Andre Mkhoyan

POSTER #224

3:00 PM **1000** *Atomic-scale Fabrication of 1D-2D Nano Hetero-structures within 2D Materials through Automated Tracking and Electron Beam Control*; **Matthew Boebinger**, Ayana Ghosh, Sudhajit Misra, Kevin Roccapriore, Kai Xiao, Andrew Lupini, Maxim Ziatdinov, Sergei Kalinin, Stephen Jesse

POSTER #225

3:00 PM **1001** *Characterising and Minimising Damage Effects in Air- and Beam-Sensitive Solid-State Li-ion Battery Materials*; **Ruomu Zhang**, Alex Shearer, Weixin Song, Emanuela Liberti, Peter Bruce, Peter Nellist

POSTER #226

3:00 PM **1002** *Digital Image Processing in C++ in SEM Images*; **Luis Ramirez Peña**, Héctor Calderón Benavides, Alin Andra Carsteanu

POSTER #227

3:00 PM **1003** *Electron Backscatter Diffraction Analysis of Beam Sensitive Samples using Direct Detection Technology*; **Matthew Nowell**, Rene de Kloe

POSTER #228

3:00 PM **1004** *Formation of Defects in MoS₂ during Data Acquisition of High-Resolution Transmission Electron Microscopy*; **Cuauhtémoc Núñez Valencia**, Matthew Helmi Leth Larsen, Daniel Kelly, William Lomholdt, Thomas Willum Hansen, Jakob Schiøtz

POSTER #229

3:00 PM **1005** *Investigating Sweet Spot Imaging of Perovskite Catalysts Bearing Exsolved Active Nanoparticles*; **Maadhav Kothari**

POSTER #230

3:00 PM **1006** *Optimized Ultra-Fast Low Dose Electron Detection*; **Maximilian Schmid**, Erdogan Celik, Stefan Aschauer, Heike Soltan, Sepideh Mazloomzadeh

POSTER #231

3:00 PM **1007** *Ways to Suppress Electro Beam Damage Using High-Speed Electron Beam Control by Electrostatic Shutter in Sample Observation and Analysis*; **Hiroki Hashiguchi**, Kazuki Yagi, Yu Jimbo, Ryusuke Sagawa, Ruth Bloom, Bryan Reed, Daniel Masiel, Ichiro Ohnishi

P07.1P

Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #209

3:00 PM **986** *Computer Vision Approaches for Segmentation of Nanoscale Precipitates in Nickel-Based Superalloy IN718*; **Nishan Senanayake**, Jennifer Carter

POSTER #211

3:00 PM **987** *Investigation of Stress Corrosion Cracking in CMSX-4 Turbine Blade Alloys using Deep Learning Assisted X-Ray Microscopy*; **Hrishikesh Bale**, Maadhav Kothari, Andy Holwell, Simon Gray, Johnathan Leggett

Scientific Program

P

Physical Sciences Posters - Tuesday Afternoon cont.

P09.1P

Insights into Phase Transitions in Functional Materials by In Situ/ Operando TEM: Experiment Meets Theory

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #232

3:00 PM **1010** *Coupling Electronic Holography and Finite-Element Method Simulations to Measure Electric Fields in Nanocapacitors; Kilian Gruel, Raphaël Serra, Leifeng Zhang, Aurélien Massebouef, Martin Hýtch, Christophe Gatel*

POSTER #233

3:00 PM **1011** *DeepSTEM: Deep-Learning-Based Object Function Reconstruction for In Situ STEM; Yeongdong Lee, Jongyeong Lee, Handolsam Chung, Jaemin Kim, Zonghoon Lee*

POSTER #234

3:00 PM *Lorentz Transmission Electron Microscopy of Ni-Mn-Ga-Fe Magnetic Shape Memory Alloy: Magnetic Domain Structure Across the Austenite-Martensite Interface; Marek Vronka, Ladislav Straka, Mariana Klemntova, Oleg Heczko*

POSTER #235

3:00 PM **1012** *Transformation during In Situ Heating of Bismuth Antimony Telluride Nanoplates; Xiner Lu, Kai He*

POSTER #332

3:00 PM *Direct Observation of the SEI Layer Formation Process on the Graphite Anode by in situ TEM; B. Layla Mehdi*

P01.1P

Emerging Methods for Characterizing Hydrogen Effects in Metals and Alloys

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #183

3:00 PM **957** *Direct Observation of Hydrogen Distribution in Pearlite; Yi-Sheng Chen, Ranming Niu, Pang-Yu Liu, Patrick Burr, Julie Cairney*

POSTER #184

3:00 PM **959** *Improving the Quantification of Deuterium in Zr Alloy Atom Probe Tomography Data; Megan Jones, Andrew London, Andrew Breen, Benjamin Jenkins, Paul Styman, Shyam Sikotra, Daniel Haley*

POSTER #185

3:00 PM **960** *Ion-Beam Induced Structural Transformations in Austenitic Stainless Steel; Josh Sugar, Suzy Vitale*

P02.1P

Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

POSTER #186

3:00 PM **962** *Electron Microscopy with Spin Polarization Analysis of 3D Topological Magnetic Domain Structure in Amorphous Fe/Gd Thin Films; Rich Moraski, Ian Gilbert, Sergio Montoya, Eric Fullerton, Benjamin McMorran, William Parker*

POSTER #187

3:00 PM **963** *Implications on the Tuning of Gold Nanorods Interface: Post-Synthesis Modification using the Electron Beam in the Transmission Electron Microscope; Eric Vazquez-Vazquez, Yazmín Hernández-Rodríguez, Issis Romero-Ibarra, Oscar Cigarroa-Mayorga*

POSTER #188

3:00 PM **964** *Micromagnetics Simulation as a Supplement to and Diagnostic for Lorentz Transmission Electron Microscopy; Jacques Reddinger, William Parker*

POSTER #333

3:00 PM **468** *Exploring the Cryogenic Phase Changes within 2D MoTe₂ via TEM, 4DSTEM and Electron Spectroscopy Techniques; Samad Abdus, Eoin Moynihan, Alan Harvey, Ursel Bangert, Shelly Michele Conroy*

P05.2P

In Situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #196

3:00 PM *Applications of SPM Methods in Polymer Industry - Overview of Recent Advances; Johnpeter Ngunjiri, Gregory F Meyers, James Bohling, Ibrahim Eryazici*

POSTER #195

3:00 PM **977** *Electrochemical Dissolution and Redeposition of Metallic Nanostructures Revealed by Liquid Phase Transmission Electron Microscopy; Eva Bladt, Hongyu Sun, Anne Beker, Yevheniy Pivak, Hector Hugo Perez Garza*

POSTER #200

3:00 PM **513** *Laser-Induced Dynamics of Nano-Energetic Systems via In-situ TEM; Suman Kumari, Tugba Isik, Volkan Ortalan*

POSTER #197

3:00 PM **972** *In Situ Solid-Phase Crystallization of Functional Ceramics in the Transmission Electron Microscope*; **Jenna Wardini**, Jenna Wardini, George Harrington, William Bowman

POSTER #198

3:00 PM *In Situ Transmission Electron Microscopy Observation of 3C-SiC Heteroepitaxial Growth on Si Nanomembrane*; **Kangsik Kim**, Seungwoo Son, Seonwoo Lee, Jong-Hyun Ahn, Zonghoon Lee

POSTER #199

3:00 PM **973** *In Situ Transmission Electron Microscopy Study of 2D Transition Oxide Nanosheets Formation inside the Liquid Sandwiched Between Graphene Layers*; **Azadeh Amiri**, Reza Shahbazian-Yassar

POSTER #202

3:00 PM **975** *Real-time Analysis of Oxygen Vacancy of Indium Oxide via Environmental Transmission Electron Microscopy*; **Chenyue Qiu**, Mengsha Li, Stas Dogel, Hooman Hosseinkhannazer, Lu Wang, Doug Perovic

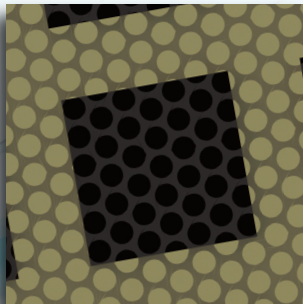
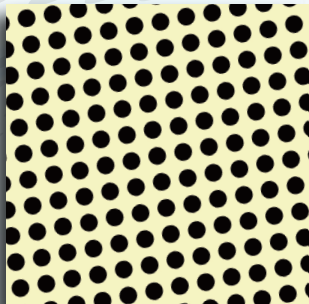
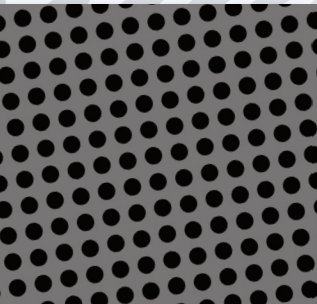
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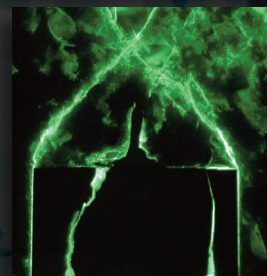
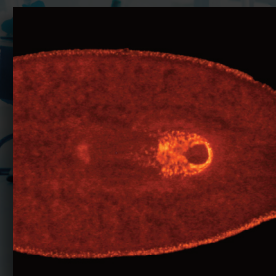
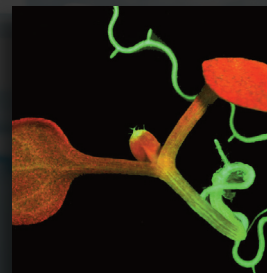
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M&M 2022

Wednesday, August 3

Scientific Program

A

Analytical Sciences Symposia - Wednesday Morning

A02.4 Beyond Visualization with In Situ and Operando TEM

PLATFORM SESSION

Wednesday 8:30 AM • Room: B111

- 8:30 AM **36** *Approaches to Monitoring Structural Modification Using In Situ Electron Microscopy; (invited) Thomas Willum Hansen, William Lomholdt, Matthew Helmi Leth Larsen, Cuauhtémoc Núñez Valencia, Daniel Kelly, Pei Liu, Jens Kling, Jakob Schiøtz*
- 9:00 AM **37** *Deactivation Mechanism of Ni Nanoparticles in Dry Reforming of Methane Revealed by Operando TEM; Milivoj Plodinec, Hannah C. Nerl, Thomas Lunkenbein, Robert Schlögl*
- 9:15 AM *Facet-controlled Single Atom Catalysts for Efficient CO Oxidation; Wenjie Zang, Xingxu Yan, Peter Tieu, Xiaoqing Pan*
- 9:30 AM **39** *Dynamic Structural Changes due to Metal-Support Interaction under Reactive Conditions; Hannes Frey, Arik Beck, Xing Huang, Jeroen van Bokhoven, Marc Willinger*
- 9:45 AM **40** *Quantifying Atomic Scale Oxidation Dynamics of Cu using In Situ ETEM and Advanced Data Analysis; Meng Li, Matthew Curnan, Richard Garza, Stephen House, Wissam Saidi, Judith Yang*

A04.2 4D STEM Algorithm Developments

PLATFORM SESSION

Wednesday 8:30 AM • Room: B113

- 8:30 AM **80** *Lattice-Vibration Limited Resolution, 3D Depth Sectioning and High Dose-Efficient Imaging via Multislice Electron Ptychography; (invited) Zhen Chen, Yi Jiang, Yu-Tsun Shao, Megan Holtz, Michal Odstrcil, Manuel Guizar-Sicairos, Isabelle Hanke, Steffen Ganschow, Darrell Schlom, David Muller*
- 9:15 AM **82** *4D-STEM Measurement of Thickness and Orientation by Bloch Wave Dynamical Diffraction Matching; Steven Zeltmann, Andrew M Minor, Colin Ophus*
- 9:30 AM **83** *A Facile Method for Improving Quantitative 4D-STEM; Bryan Esser, Joanne Etheridge*
- 9:45 AM **84** *Structured Illumination Electron Ptychography at the Atomic Scale; Hannah DeVylde, Philipp Pelz, Peter Ercius, Mary Scott*

A05.5 XRF, SIMS, Optical Microscopy

PLATFORM SESSION

Wednesday 8:30 AM • Room: B114

- 8:30 AM **124** *Imaging Trace Elements in the Geosphere with Synchrotron Radiation-based X-ray Fluorescence Microscopy; (invited) Ryan Tappero*
- 9:00 AM **125** *Micro-XRF Mapping of Chemically Zoned Beryl: Fast, Non-Destructive, and Precise; Tina Hill, Mona Sirbescu*
- 9:15 AM **126** *Application of Quantitative and Qualitative Mapping of Materials in Forensic Practice; Marek Kotrlý, Josef Uher, Ivana Turková*
- 9:30 AM **127** *Subcellular Mapping of Trace Elements in Plants Using High Resolution Secondary Ion Mass Spectrometry (NanoSIMS); Katie Moore, Sadia Sheraz, James Dinsley, Mary Burkitt-Gray, Peter Shewry, Janneke Balk*
- 9:45 AM **128** *Automated Quantitative Mapping of Ore Minerals by Multispectral Reflected-Light Microscopy; Juan Carlos Catalina, Ursula Grunwald, David Alarcón, Ricardo Castroviejo*

A06.3 Expanding Techniques and Tools for Atom Probe Tomography

SESSION CHAIRS:

Ann Chiamonti, David Diercks, Jonathan Poplawsky

PLATFORM SESSION

Wednesday 8:30 AM • Room: C122

- 8:30 AM **149** *3D-Atomic-Scale Analysis of Magnetoelectric Multiferroic Topologies via Scanning Transmission Electron Microscopy and Spectroscopy Complemented by Atom Probe Tomography; (invited) Michele Conroy, James Douglas, Sinead Griffin, Louise Colfer, Jennifer Halpin, Eoghan O'Connell, Kalani Moore, Ursel Bangert, Lynette Keeney, Baptiste Gault*
- 9:00 AM **150** *Nanoscale Spatial and Chemical Exploration of Porcine Trabeculae Bone using Atom Probe Tomography; Yanru Ren, Martina Cihova, Axel Moore, Molly Stevens, Paul Bagot, Michael Moody*
- 9:15 AM **151** *Atom Probe Tomography of Catalyst Nanoparticles; Nora Vorlauffer, Jan Josten, Chandra Macauley, Nemanja Martić, Andreas Hutzler, Nicola Taccardi, Karl Mayrhofer, Peter Felfer*
- 9:30 AM **152** *Carbon Capping for Specimen Preparation of Atom Probe Samples with Features of Interest Near the Surface; Edwin Supple, Brian Gorman, Robert Butera, Christopher J. K. Richardson, Chomani Gaspe, Kevin Dwyer*

A

Analytical Sciences Symposia - Wednesday Morning cont.

- 9:45 AM **153** *The Effect of ω - and α -Phase Precipitation on the β -Phase Lattice Parameters During 400°C aging in Ti-11Cr(at.%);* **JoAnn Ballor**, Jonathan Poplawsky, Arun Devaraj, Scott Misture, Carl Boehlert

A09.1

Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions

PLATFORM SESSION

Wednesday 8:30 AM • Room: A105

- 8:30 AM **185** *Atomistic Modeling of Ultrashort Pulse Laser-Induced Generation of Crystal Defects;* (invited) **Leonid Zhigilei**, Miao He, Eaman Karim, Maxim Shugaev, Cheng-Yu Shih
- 9:00 AM **845** *Single Image Composite Tomography Utilizing Large Scale Femtosecond Laser Cross-sectioning and Scanning Electron Microscopy;* **Sina Shahbazzmohamadi**, Nicholas May, Adrian Phoulady, Hongbin Choi, Pouya Tavousi
- 9:15 AM **841** *A Multiscale, Correlative, Air Free Workflow for the Analysis of Li Distribution in Batteries via ToF-SIMS;* **Stephen Kelly**, Robin White, Benjamin Tordoff, Sebastian Schaedler, Thomas Vorauer, Johanna Schoggl, Bernd Fuchsbichler, Stefan Koller, Roland Brunner
- 9:30 AM **186** *Merging Machine Learning and TriBeam Tomography for 3D Defect Detection in an AM CoNi-Based Superalloy;* **James Lamb**, McLean Echlin, Andrew Polonsky, Remco Geurts, Kira Pusch, Evan Raeker, Aurelien Botman, Chris Torbet, Tresa Pollock
- 9:45 AM **187** *Femtosecond Laser Heat Affected Zones in Aluminum;* **Rena Gannon**, Thomas Blum, Jared Johnson

A10.1

Advances in Atomic Force Microscopy (AFM)

PLATFORM SESSION

Wednesday 8:30 AM • Room: B115

- 8:30 AM **194** *Cantilevered Plates for Micrometrology;* (invited) **Ryan Tung**
- 9:00 AM **195** *Photothermal Cantilever Excitation: Unlocking New Methods in Atomic Force Microscopy;* **Edward Nelson**, Christina Newcomb, Jonathan Adams, Gotthold Flaschner, Christian Bippes
- 9:15 AM **196** *Probing and Manipulating a Single Chemical Bond Using Scanning Probe Microscopy;* **Pengcheng Chen**, Nan Yao
- 9:30 AM **197** *Measuring Dynamics in Energy Materials Using Functional Atomic Force Microscopy;* (invited) **Rajiv Giridharagopal**

Wednesday, August 3

Scientific Program

B

Biological Sciences Symposia - Wednesday Morning

B01.2 Technical Advances in Cryo-EM

SESSION CHAIRS:

Christopher Russo, Anchi Cheng, Mike Marko

PLATFORM SESSION

Wednesday 8:30 AM - Room: D136

- 8:30 AM **251** *Laser-Based Phase Contrast; (invited) Holger Mueller*, Jonathan Remis, Shahar Sandhaus, Joseph Silber, Jake Whinnery, Robert Glaeser, Jeske Dioquino, Petar Petrov, Xudong Pei, Liqi Zhou, Huang Huang, Mark Boyce, Judy kim, Emanuela Liberti, Takeo Sasaki, Peijun Zhang, David Stuart, Angus Kirkland
- 9:00 AM **252** *Cryogenic Electron Ptychographic Single Particle Analysis; (invited) Peng Wang*
- 9:15 AM **253** *Dose-Efficient tcBF-STEM with Information Retrieval Beyond the Scan Sampling Rate for Imaging Frozen-Hydrated Biological Specimens; Yue Yu*, Michael Colletta, Katherine Spoth, David Muller, Lena Kourkoutis
- 9:30 AM **254** *Probing Biological Materials by Vibrational Analysis in the Electron Microscope; Ondrej Krivanek*, Benedikt Haas, Zdravko Kochovski, Johannes Müller, Christoph Koch, Katia March, Alice Dohnalkova, Niklas Dellby, Michael Hotz, Benjamin Plotkin-Swing, Tracy Lovejoy, Peter Rez
- 9:45 AM **255** *Curiously Absent Knock-On Damage of Lithium Metal at Cryogenic Temperatures; Matthew Mecklenburg*, Xintong Yuan, Yuzhang Li

B05.1 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals

PLATFORM SESSION

Wednesday 8:30 AM - Room: D137

- 8:30 AM **299** *Use of Scanning Electron Microscopy to Evaluate and Determine Host:parasite Interactions in a Large Animal Model; (invited) Scott Bowdridge*
- 9:00 AM **300** *Disruption of the Cellular and Extracellular Morphogenesis of Valve Tissues in Avian Models of Cyanotic Heart Defects; Rich Goodwin*, Mohammed Khalil, Thomas Nathaniel

- 9:15 AM **301** *MMP20-ablated Induced Aberrant Mineralization in Early Secretory Enamel; Ya-Hsiang Hsu*, Amanda Trout, John Bartlett, Charles Smith, David McComb

- 9:30 AM **302** *Bioforensic Microscopy Analysis of Infectious Organisms; (invited) Robert Pope*, Henry Lupari, Jamie Saynuk

B08.1 From Images to Insights: Working with Large Multi-Modal Data in Cell Biological Imaging

PLATFORM SESSION

Wednesday 8:30 AM - Room: D135

- 8:30 AM **342** *Object Segmentation on Cryo-electron Tomography Data; Lan Dang*, Steven Ludtke
- 8:45 AM **343** *Organelle Segmentation Facilitated by Correlative Light Microscopy Data; (invited) Ryan Lane*, Luuk Balkenende, Simon van Staalduine, Anouk Wolters, Ben Giepmans, Lenard Voortman, Jacob Hoogenboom
- 9:15 AM **344** *A Framework to Segment Cellular Ultrastructure from 3D Electron Microscopy Images of Human Biopsies; Archana Machireddy*, Guillaume Thibault, Cecilia E. Bueno, Hannah R. Smith, Jessica Riesterer, Joe Gray, Xubo Song
- 9:30 AM **345** *Towards Public Archiving of Large, Multi-Modal Imaging Datasets; Matthew Hartley*, Gerard Kleywegt

B10.1 Development, Challenges and Biomedical Applications of Tissue Clearing, Expansion Microscopy and Volumetric Imaging

SESSION CHAIR:

Yongxin Zhao

PLATFORM SESSION

Wednesday 8:30 AM - Room: D133-134

- 8:30 AM **357** *Hybrid Open-Top Light-Sheet Microscopy for Multi-Scale 3D Imaging of Cleared and Expanded Tissues; (invited) Adam Glaser*
- 9:15 AM **358** *High-Resolution Chemical Imaging of Cells and Tissues; (invited) Lu Wei*, Chenxi Qian, Kun Miao, Li-En Lin

C

Cross-Cutting Symposia - Wednesday Morning

C04.5

Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

SESSION CHAIR:

Mary Scott

PLATFORM SESSION

Wednesday 8:30 AM • Room: B116

- 8:30 AM **403** *Python and FPGA-based Workflow for Automated and Interoperable Scanning Probe Microscopy*; **Shivaranjan Rghuraman**, Yongtao Liu, Kyle Kelley, Rama Vasudevan, Stephen Jesse
- 8:45 AM **402** *Exploiting Automatic Image Processing and In-Situ Transmission Electron Microscopy to Understand the Stability of Supported Nanoparticles*; (invited) **Eric Stach**, James Horwath, Dmitri Zakharov, Remi Megret, Leena Vyas, Stephen Jesse, Peter Voorhees
- 9:15 AM **404** *Compressed STEM Simulations*; **Alex Robinson**, Daniel Nicholls, Jack Wells, Amirafshar Moshtaghpour, Angus Kirkland, Nigel Browning
- 9:30 AM **405** *Application of Deep Unsupervised Convolutional Neural Networks to Denoise Large Temporally Resolved In Situ TEM Datasets*; Adria Marcos-Morales, **Advait Gilankar**, Ramon Manzorro, Piyush Haluai, Mai Tan, Joshua Vincent, Carlos Fernandez-Granda, Peter Crozier
- 9:45 AM **406** *Nanoparticle Localization Using Gabor Filters*; **Andrei Hernandez-Robles**, Guillermo Bárcena-González, Álvaro Mayoral, Pedro Galindo, Arturo Ponce

Wednesday, August 3

Scientific Program

P

Physical Sciences Symposia - Wednesday Morning cont.

P02.5

Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Wednesday 8:30 AM • Room: A107-108

- 8:30 AM **472** *Imaging Charged Domain Walls in a 2D Ferroelectric*; **Edmund Han**, Shahriar Nahid, Gillian Nolan, Yue Zhang, André Schleife, Arend van der Zande, (invited) Pinshane Huang
- 9:00 AM **473** *Universal Torsional Periodic Lattice Distortion in Twisted 2D Materials*; **Suk Hyun Sung**, Yin Min Goh, Hyobin Yoo, Rebecca Engelke, Hongchao Xie, Zidong Li, Andrew Ye, Parag Deotare, Andrew Mannix, Jiwoong Park, Liuyan Zhao, Philip Kim, Robert Hovden
- 9:15 AM **474** *Layer Stacking Determination in Topological Semimetal MoTe₂ via STEM Imaging, Liquid He TEM, and Quantitative Electron Diffraction*; **James Hart**, Lopa Bhatt, Myung-Geun Han, David Hynek, John Schneeloch, Yu tao, Despina Louca, Yimei Zhu, Lena Kourkoutis, Judy Cha
- 9:30 AM **475** *Probing Changes in the Electronic Structure and Chemical Bonding of Ti₃C₂ MXene Sheets with Electron Energy-Loss Spectroscopy*; **Asra Hassan**, Josh Kennedy, Hilmar Koerner, Jinwoo Hwang, David McComb
- 9:45 AM **476** *Mapping pm-scale Lattice Distortions and Measuring Interlayer Separations in Stacked 2D Materials by Interferometric 4D-STEM*; **Michael Zachman**, Jacob Madsen, Xiang Zhang, Pulickel Ajayan, Toma Susi, Miaofang Chi

P05.5

In Situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

PLATFORM SESSION

Wednesday 8:30 AM • Room: C123

- 8:30 AM **516** *In-situ Liquid Phase TEM of Soft and Active Matter*; (invited) **Joseph Patterson**
- 9:00 AM **515** *Operando Quantitative Electrochemical STEM Studies of Cu Underpotential Deposition on Nanocrystal Surfaces*; **Yao Yang**, Yu-Tsun Shao, Héctor Abruña, David Muller

- 9:15 AM **517** *Detection of Adsorbates Induced Changes on Pt/CeO₂ Catalyst using In Situ Electron Holography*; **Piyush Haluai**, Martha McCartney, Peter Crozier
- 9:30 AM **518** *In-situ Electrokinetics Using Liquid Phase Transmission Electron Microscopy*; **Mads Larsen**, Murat Larsen, Kristian Speranza Mølhave
- 9:45 AM **519** *Capturing High-Entropy Alloy Particle Growth by Liquid-Phase Transmission Electron Microscopy*; **Jiayue Sun**, Asher Leff, Taylor Woehl

P07.4

Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Wednesday 8:30 AM • Room: B118-119

- 8:30 AM **572** *Bridging the Atomic Scale and the Mesoscale in the Characterization of Defect Production and Evolution in High Entropy Alloys*; (invited) **Farida Selim**, Geoffrey Beausoleil, Djamel Kaoumi, Khalid Hattar
- 9:00 AM **571** *Quantifying Defect Pathways for Disorder in La_{1-x}Sr_xFeO₃ / SrTiO₃ Thin Films*; **Bethany Matthews**, Kayla Yano, Sarah Akers, Michel Sassi, Sandra Taylor, Le Wang, Rajendra Paudel, Ryan Comes, Yingge Du, Eric Lang, Khalid Hattar, Steven Spurgeon
- 9:15 AM **569** *3D Nanoscale Analysis of Implanted Deuterium in Tungsten using Atom Probe Tomography*; **Martin Meier**, Anthony Hollingsworth, Anke Wohlers, Paul Bagot, Michael Moody, Daniel Haley
- 9:30 AM **570** *Advanced Characterization of Fuel Cladding Chemical Interaction between U-10Zr Fuel and HT9 Cladding Tested in Fast Flux Test Facility*; **Yachun Wang**, Brandon Miller, Jason Harp, Mukesh Bachhav, Luca Capriotti, Tiankai Yao
- 9:45 AM **576** *Integration of Gas-Cell TEM, Nano-calorimetry and RGA on Oscillating phenomena at High Temperatures in Catalysis*; **Dan Zhou**, Ronald Spruit, Merijn Pen, Tian Qian, Xiaben Zhang, Fan Zhang, Xi Liu, Wei Liu, Hector Hugo Perez Garza

P

Physical Sciences Symposia - Wednesday Morning cont.

P09.5 Phase Transitions II

PLATFORM SESSION

Wednesday 8:30 AM • Room: A106

- 8:30 AM **628** *Imaging Stress Induced Domain Movement and Crack Propagation by In Situ Loading in the Transmission Electron Microscope*; Oriol Gavalda-Diaz, Shelly Michele Conroy, **Finn Giuliani**
- 8:45 AM **629** *Adventures in Atomic Resolution In Situ STEM*; Andreas Postl, Thuy An Bui, Fabian Kraft, Alexandru Chirita, Gregor Leuthner, Heena Inani, Clemens Mangler, Kimmo Mustonen, Jani Kotakoski, (invited) **Toma Susi**
- 9:15 AM **630** *Experimental Optimization and Data Analysis of In-Situ Electron Energy Loss Spectroscopy*; **Eoin Moynihan**, Temilade Adegoke, Kevin Ryan, Ursel Bangert, Shelly Michele Conroy
- 9:30 AM **631** *In Situ Pyrolysis of 3D Printed Microstructures – an ESEM Study*; Qing Sun, **Christian Dolle**, Chantal Kurpiers, Ruth Schwaiger, Peter Gumbsch, Yolita Eggeler
- 9:45 AM **632** *Modulating the O-binding Energies of Mn-based Perovskites to Maximize Solar Thermochemical Hydrogen Production*; **Jamie Trindell**, Nicholas Strange, Sarah Shulda, Robert Bell, Tadashi Ogitsu, Anthony McDaniel, Joshua Sugar

P10.5 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Wednesday 8:30 AM • Room: B117

- 8:30 AM **660** *Modelling Spatially-Resolved Electron Energy-Loss Spectra in the Low-Loss Region*; (invited) **Andrea Konecna**, Jordan Hachtel, Pavel Gallina, Fadil Iyikanat, Juan Carlos Idrobo, Tomáš Šikola, F. Javier Garcia de Abajo
- 9:00 AM **661** *Fine Structure Mapping in Graphene: From Electronic Transitions to Atomic Orbitals*; **Matthieu Bugnet**, Manuel Ederer, Vlado Lazarov, Lian Li, Quentin Ramasse, Stefan Löffler, Demie Kepaptsoglou
- 9:15 AM **662** *The Interface of the Most Polar Layered Oxide Superconductor Solved by Coordinated Experiments and Theory*; **Berit Goodge**, Benjamin Geisler, Kyuho Lee, Motoki Osada, Bai Yang Wang, Danfeng Li, Harold Hwang, Rossitza Pentcheva, Lena Kourkoutis

- 9:30 AM **663** *Exploration of Chemical Ordering in Ternary Pnictides Using Electron-Channelling-Based Methods*; **Allison Mis**, Geoff Brennecke, Adele C Tamboli, Nestor Zaluzec

- 9:45 AM **664** *Combining Atomic-Scale EDX with Inelastic Multislice Simulations for Quantitative Chemical Analysis of AlGaIn/GaN 1 nm-thick Quantum Wells*; **Florian Castioni**, Sergi Cuesta, Nicolas Bernier, Patrick Quéméré, Eric Robin, Vincent Delaye, Eva Monroy, Pascale Bayle-Guillemaud

Scientific Program

A

Analytical Sciences Symposia - Wednesday Late Morning

A02.5

Beyond Visualization with In Situ and Operando TEM

PLATFORM SESSION

Wednesday 9:15 AM • Room: B111

- 10:30 AM **41** *Probing Response and Functionality in Active Materials Systems with In Situ Electron Microscopy; (invited) Peter Crozier*
- 11:00 AM **42** *Beyond In Situ ETEM Imaging: Unveiling the Size-dependent Oxidation Mechanism of Metallic Nanoparticles by Individual Nanoparticle-level Oxidation Kinetic Analysis; Rajat Sainju, Dinithi Rathnayake, Haiyan Tan, George Bollas, Avinash Dongare, Steven Suib, Yuanyuan Zhu*
- 11:15 AM **43** *Oscillatory Behavior of NiAu Nanocatalyst in Wet Gas Environment; Xiaoben Zhang, Fan Zhang, Shaobo Han, Dan Zhou, Wei Liu, Wenjie Shen*
- 11:30 AM **44** *Applications of Environmental SEM as In Situ Surface Science Tool with Atomic Layer Sensitivity; Marc Willinger*
- 11:45 AM **45** *Detecting and Characterizing the Fluxionality in Pt Nanoparticles; Advait Gilankar, Benjamin Miller, Adria Marcos-Morales, Piyush Haluai, Mai Tan, Joshua Vincent, Carlos Fernandez-Granda, Peter Crozier*

A04.3

4D STEM Computational Developments

PLATFORM SESSION

Wednesday 10:30 AM • Room: B113

- 10:30 AM **85** *Assisting 4D-STEM Data Processing with Unsupervised Machine Learning; (invited) Yimo Han, Chuqiao Shi, Michael Cao, Yi Jiang*
- 11:00 AM **86** *Utilising Unsupervised Machine Learning on Correlated EDS and 4DSTEM Data for Investigating the Structural Ordering Within Co₂FeSi Thin Films; Ercin Duran, Irene Azaceta, Adam Kerrigan, Vlado Lazarov, Alexander Eggeman*

- 11:15 AM **87** *Exploring the Validity Limits of Direct Ptychographic Methods to Analyse 4D Scanning Transmission Electron Microscopy Datasets; Laura Clark, Gerardo Martinez, Emanuela Liberti, Colum M. O'Leary, Timothy Petersen, David Paganin, Professor Kirkland, Scott Findlay, Peter Nellist*

- 11:30 AM **88** *100,000 Diffraction Patterns per Second with Live Processing for 4D-STEM; Benjamin Plotkin-Swing, Benedikt Haas, Andreas Mittelberger, Niklas Dellby, Michael Hotz, Petr Hrnčirik, Chris Meyer, Pietro Zambon, Christoph Hoermann, Matthias Meffert, Darya Bachevskaya, Luca Piazza, Ondrej Krivanek, Tracy Lovejoy*

- 11:45 AM **89** *Parallelizing py4DSTEM: 4D-STEM Analysis from Hours to Minutes; Alexander M Rakowski, Benjamin Savitzky, Steven Zeltmann, Matthew L Henderson, Colin Ophus*

A09.2

Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interactions

PLATFORM SESSION

Wednesday 10:30 AM • Room: A105

- 10:30 AM **188** *Probing Material Dynamics with an SEM at Nanometer Length and Picosecond Time-Scales; (invited) Vasudevan Iyer, Benjamin Lawrie*
- 11:00 AM **189** *The Preparation of Large Area Transmission Kikuchi Diffraction Samples From Bulk Material Without Requiring Lift Out; Pat Trimby, Kim Larsen, Michael Hjelmstad, Ali Gholinia*
- 11:15 AM **190** *Opportunities and Challenges of Ultra Short Pulsed Lasers with Dual Focused Ion Beams for Characterization of Full-Scale Electronic Devices; Julia Deitz, Daniel Perry, Andrew Polonsky, Tim Ruggles, Katherine Jungjohann, Katharine Harrison, Josefine McBrayer, Joseph Michael*
- 11:30 AM **191** *A Multislice Approach to Quantify Laser-Induced Lattice Temperature from Ultrafast Electron Diffraction Measurements of Single-Crystal Films; Daniel Durham, Khalid Siddiqui, Colin Ophus, Andrew M Minor, Daniele Filippetto*
- 11:45 AM **192** *Fast Fabrication of Micropillars for Micromechanical Testing Using a Combined fs-Laser - FIB/SEM Approach; Tim Schubert, Fang Zhou, Renato Pero, Nicholas Randall, Timo Bernthaler, Gerhard Schneider*

A

Analytical Sciences Symposia - Wednesday Late Morning

A10.2

Organic, Polymer, and Biological Systems

PLATFORM SESSION

Wednesday 10:30 AM • Room: B115

- 10:30 AM **205** *Expanded Materials Sample Platforms for Advanced Surface Analysis of Energy Materials*; **Chris Moffitt**, S.J. Coultas, A.J. Roberts, Jonathan Counsell
- 11:00 AM **199** *Spectro-Nanoscopy of Ultrathin Films of Organic and Biological Specimens via Infrared Photo-induced Force Microscopy (IR PiFM)*; Padraic O'Reilly, Beihang Yu, **Derek Nowak**
- 11:15 AM **200** *nano-FTIR Correlation Nanoscopy for Organic and Inorganic Material Analysis*; **Tobias Gokus**
- 11:30 AM **201** *Predicting Prostate Cancer Directly from Tissue Images using Deep Learning on Mass Spectrometry Imaging and Whole Slide Imaging Data*; **Md Inzamam Ul Haque**, Debangshu Mukherjee, Sylwia Stopka, Nathalie Agar, Jacob Hinkle, Olga Ovchinnikova
- 11:45 AM **202** *Imaging Biological Specimens by STEM-in-SEM and Comparison with TEM*; **Erich Müller**, Milena Hugenschmidt, Heike Störmer, Lukas Grünewald, Susanne Fritsch-Decker, Carsten Weiss, Dagmar Gerthsen

Wednesday, August 3

Scientific Program

B

Biological Sciences Symposia - Wednesday Late Morning

B03.3 Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Wednesday 10:30 AM • Room: D136

- 10:30 AM **257** *CryoDRGN2: Ab Initio Neural Reconstruction of Dynamic Macromolecular Machines;* (invited) **Ellen Zhong**, Adam Lerer, Joseph Davis, Bonnie Berger
- 11:00 AM **258** *3D Flexible Refinement: Structure and Motion of Flexible Proteins from Cryo-EM;* **Ali Punjani**, David Fleet, Jan Böhring, Tanmay Bharat
- 11:15 AM **259** *Second-order Total Variation for Compressed Sensing Cryo-ET and Subtomogram Averaging;* **Sean Collins**
- 11:30 AM **260** *Montage Cryo-Electron Tomography: A High Throughput and Flexible Data Collection Scheme to Explore In-Situ Cellular Landscapes While Preserving High-Resolution Data;* **Jae Yang**, Matthew Larson, Bryan Sibert, Elizabeth Wright
- 11:45 AM **261** *Phantoms Improve Robustness of Deep Learning Automated Segmentation in Cryotomography;* **Jessica Heebner**, Carson Purnell, Mike Marsh, Matthew Swulius

B05.2 Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals

PLATFORM SESSION

Wednesday 10:30 AM • Room: D137

- 10:30 AM **303** *A Career Filled with Viruses;* (invited) **Cyntha Goldsmith**
- 11:00 AM **304** *Understanding the Host-Pathogen Interactions of Pseudomonas aeruginosa with Lung Epithelial Cells;* **Deepali Luthra**, Marianna patrauchan, Erika Lutter
- 11:15 AM **305** *Utilizing Liquid-Electron Microscopy to Visualize SARS-CoV-2 Assemblies from COVID-19 Patients;* **Samantha Berry**, Liza-Anastasia DiCecco, William Dearnaley, Maria Solares, Jennifer Gray, Deb Kelly
- 11:30 AM **306** *NanoSuit Method for the Observation of Living/Hydrous Organisms in an SEM;* (invited) **Yasuharu Takaku**

B08.2

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

PLATFORM SESSION

Wednesday 10:30 AM • Room: D135

- 10:30 AM **346** *Visualizing Early HCoV-229E Viral Infection Events Using Correlative 2D Light and 3D Electron Microscopy Techniques;* **Alyssa Williams**, Maria Davola, Karen Mossman, Kathryn Grandfield, Michael Phaneuf, Nabil Bassim
- 10:45 AM **347** *Deconstructing the Nucleus to Elucidate Cellular Pliancy in the Retina;* (invited) **Marybeth Lupo**, Abbas Shirinifard, Daniel Stabley, Sharon King, Jongrye Jeon, Sharon Frase, Randall Wakefield, Amanda Johnson, Camenzind Robinson, Michael Dyer
- 11:15 AM **348** *Quantitative Morphological Analysis of Super-resolution Images Provides Validation of Novel Therapies to Prevent Atrial Fibrillation;* **Louisa Mezache**, Andrew Soltisz, Scott Johnstone, Brant Isakson, Rengasayee Veeraraghavan
- 11:30 AM **349** *Real-time 3D Tomographic Imaging of Biological Samples with Zooming to Features of Interest;* (invited) **Viktor Nikitin**, Pavel Shevchenko, Francesco De Carlo

B10.2

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

SESSION CHAIRS:

Yongxin (Leon) Zhao

PLATFORM SESSION

Wednesday 10:30 AM • Room: D133-134

- 10:30 AM **359** *Super-Resolution Microscopy Made Simple;* (invited) **Joshua Vaughan**
- 11:15 AM **360** *Two-Color Fixed Cell Imaging Using Engineered Point Spread Functions – XPSF Family;* **Sanduni Fernando**, Jason Martineau, Robert Hobson, Erik Jorgensen, Jordan Gerton
- 11:30 AM **361** *Nanoscale Imaging of Biomolecules Using Molecule Anchorable Gel-enabled Nanoscale In-situ Fluorescence Microscopy;* **Aleksandra Klimas**, (invited) **Brendan Gallagher**, Piyumi Wijesekara, Sinda Fekir, Donna Stolz, Simon Watkins, Alison Barth, Christopher Moore, Xi Ren, Yongxin Zhao

C

Cross-Cutting Symposia - Wednesday Late Morning

C04.6

Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

SESSION CHAIRS:

Robert Hovden

PLATFORM SESSION

Wednesday 10:30 AM • Room: B116

- 10:30 AM **407** *Maximizing Neural Net Generalizability and Transfer Learning Success for Transmission Electron Microscopy Image Analysis in the Face of Small Experimental Datasets;* Katherine Sytwu, Luis Rangel DaCosta, Kate Groschner, (invited) **Mary Scott**
- 11:00 AM **408** *Tomviz: An Open-Source Platform for Electron Tomography;* (invited) **Jonathan Schwartz**, Chris Harris, Jacob Pietryga, Jonathan Rowell, Brianna Major, Patrick Avery, Utkarsh Ayachit, Berk Geveci, Alessandro Genova, Cory Quammen, Peter Ercius, Yi Jiang, Richard Robinson, Marcus Hanwell, Robert Hovden
- 11:30 AM **409** *Exploring Local Crystal Symmetry with Rotationally Invariant Variational Autoencoders;* **Mark Oxley**, Sergei Kalinin, Sai Valleti, Junjie Zhang, Raphael Hermann, Hong Zheng, Wenrui Zhang, Gyula Eres, Rama Vasudevan, Maxim Ziatdinov
- 11:45 AM **410** *Gated Dense Convolutional Neural Networks for Unbalanced Representations in STEM Tomography;* **Arda Genc**, Libor Kovarik, Hamish Fraser

Wednesday, August 3

Scientific Program

P

Physical Sciences Symposia - Wednesday Late Morning

P02.6 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Wednesday 10:30 AM • Room: A107-108

- 10:30 AM **477** *Probing Sources of Decoherence at Defects and Interfaces in Superconducting Quantum Materials and Devices;* **Akshay Murthy**, Roberto dos Reis, Stephanie Ribet, Mattia Checchin, Anna Grassellino, Vinayak Dravid, Alexander Romanenko
- 10:45 AM **478** *Uncovering the Role of Ordering in Mose Superconducting Nanowire Single Photon Detectors with 4DSTEM;* **George Burton**, Adriana Lita, Andrew Herzing, Sae-Woo Nam, Alexana Roshko
- 11:00 AM **479** *Autonomous Detection and Identification of Defects in Nanoscale Devices using Electron Diffraction Imaging;* (invited) **Jian-Min Zuo**, Renliang Yuan, Jiong Zhang
- 11:30 AM **480** *Direct Measurement of Atomic Reconstruction, Strain, and Disorder in Moiré Materials using 4D-STEM;* **Madeline Van Winkle**, Nathanael Kazmierczak, Colin Ophus, Karen C Bustillo, Stephen Carr, Hamish Brown, Jim Ciston, D. Kwabena Bediako
- 11:45 AM **481** *Extending Bragg Interferometry for the Study of Magic Angle Trilayer Graphene;* **Kate Groschner**, Isaac Craig, Madeline Van Winkle, Colin Ophus, Karen C Bustillo, Jim Ciston, D. Kwabena Bediako

P05.6 In Situ TEM Characterization of Dynamic Processes During Materials Synthesis and Processing

PLATFORM SESSION

Wednesday 10:30 AM • Room: C123

- 10:30 AM **514** *Atomic Scale Insights into Dynamic Phase Changes in 2D Materials during In-situ Thermal Processing;* **Jamie Warner**
- 11:00 AM **520** *First Steps Towards In-Situ Heating Experiments of Monolithic LiNiO₂ Particles in O₂ Atmosphere;* **Thomas Demuth**, Michael Malaki, Shamil Ahmed, Philipp Kurzhals, Andreas Beyer, Jürgen Janek, Kerstin Volz
- 11:15 AM **521** *Strain Distribution Analysis during Tensile Deformation of Silicon Nanowire with 4D-STEM;* **Sihan Wang**, Hongyu Wang, Xiaotian Fang, Yong Zhu, Wenpei Gao

11:30 AM **522** *In-situ TEM Laser Heating for Manipulation of Cooling Rates and Observation of Precipitate Dissolution Kinetics;* **Kathryn Small**, Jeff Rodelas, Erin Barrick, Ryan DeMott, Khalid Hattar

11:45 AM **524** *Accessing chemically ordered phase in TaS₂ via High Temperature In-situ TEM;* **Nishkarsh Agarwal**, Suk Hyun Sung, Jonathan Schwartz, Robert Hovden

P07.5 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Wednesday 10:30 AM • Room: B118-119

- 10:30 AM **574** *In situ 4D-STEM Imaging to Develop a Fundamental Understanding of Coupled Transport of Vacancies;* (invited) **Sean Mills**, Steven Zeltmann, Peter Ercius, Aaron Kohnert, Blas Uberuaga, Andrew Minor
- 11:00 AM **575** *Real-Time and Correlative Imaging of Localised Corrosion Events by High-Speed Atomic Force Microscopy;* **Stacy Moore**, Robert Burrows, Loren Picco, Oliver Payton, Tomas Martin
- 11:30 AM **577** *Correlative Multimodal Microscopy using AFM-in-SEM in Material Science;* **Veronika Hegrova**, Radek Dao
- 11:45 AM **578** *Correlative Microscopy Reveals Air-Stable 2D Gallium-Intercalated Monolayer; Epitaxial Graphene,* Hesham El-Sherif, Furkan Turker, Natalie Briggs, Brian Bersch, Joshua Robinson, **Nabil Bassim**

P

Physical Sciences Symposia - Wednesday Late Morning cont.

P09.6 Phase Transitions III

PLATFORM SESSION

Wednesday 10:30 AM • Room: A106

- 10:30 AM **633** *Role of Nanoscale Coherent Precipitates in Microstructure Evolution of NiTi-based Shape Memory Alloys*; **Eitan HersHKovitz**, Yang Yang, Michele Manuel, Honggyu Kim
- 10:45 AM **634** *In situ Cryogenic STEM of Correlated Electronic Materials*; (invited) **Ismail El Baggari**, Patrick Singleton
- 11:15 AM **635** *Melting of Polar Vortex Arrays in an Oxide Superlattice Probed by In Situ STEM EELS*; **Noah Schnitzer**, Berit Goodge, Benjamin Miller, Sujit Das, Yu-Tsun Shao, David Muller, Ramamoorthy Ramesh, Lena Kourkoutis
- 11:30 AM **636** *Role of Defects and Structure Evolution Across Ferroelectric Phase Transitions Studied by Quantitative Aberration-Corrected STEM*; **Albina Borisevich**, Rama Vasudevan, Kyle Kelley, Sabine Neumayer, Michael Susner, Michael McGuire, Anna Morozovska, Eugene Eliseev, Panchapakesan Ganesh, Andrew O'Hara, Blair Tuttle, Sokrates Pantelides, Nina Balke, Petro Maksymovych
- 11:45 AM **637** *Engineering Charge Density Waves using Interleaved Polytype Heterostructures*; **Suk Hyun Sung**, Yin Min Goh, Nishkarsh Agarwal, Noah Schnitzer, Ismail El Baggari, Kai Sun, Lena Kourkoutis, Robert Hovden

P10.6 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Wednesday 10:30 AM • Room: B117

- 11:00 AM **666** *Advances in Imaging Magnetic Domains in Functional Materials using Lorentz Microscopy*; (invited) **Charudatta Phatak**, Arthur McCray, Yue Li, Tao Zhou, Mathew Cherukara, Mercouri Kanatzidis, Amanda Petford Long
- 11:30 AM **667** *Imaging Nanomagnetism in 3D: Potential Improvements for Vector Electron Tomography Reconstruction*; **George Lewis**, Emilie Ringe, Paul Midgley
- 11:45 AM **668** *Emergent Interfacial Magnetism in Superconducting Cuprate-Manganate Superlattices*; **Nicolas Bonmassar**, Georg Christiani, Soltan Soltan, Tobias Heil, Gennady Logvenov, Peter A. van Aken

Scientific Program

TF

**Technologists' Forum Sessions -
Wednesday Late Morning**

X44

Precession Electron Diffraction: A Little Bit of History, Basics, and Recent Developments in Projected Crystal Symmetry Quantifications

PLATFORM SESSION

Wednesday 11:00 AM • Room: B110

11:00 AM **730** *Precession Electron Diffraction for Electron
Crystallography; (invited) Peter Moeck*

A

Analytical Sciences Symposia - Wednesday Afternoon

A02.6

Beyond Visualization with In Situ and Operando TEM

PLATFORM SESSION

Wednesday 1:30 PM • Room: B111

- 1:30 PM Quantitative Analysis of Environmental Transmission Electron Microscopy Data; (invited) **Renu Sharma**
- 2:00 PM **47** In-Situ TEM Study of Chemo-Mechanical Degradation Pathways of LiNiO₂-Derived Layered Oxide Cathodes for Lithium-Ion Batteries; **Chunyang Wang**, Rui Zhang, Linqin Mu, Feng Lin, Huolin Xin
- 2:15 PM **48** In Situ TEM Observation of Spinel-Structured ZnFe₂O₄ as a Low-Temperature CO₂ Splitting Agent; **Mengsha Li**, Yangfan Xu, Chenyue Qiu, Stas Dogel, Hooman Hosseinkhannazer, Doug Perovic, Geoffrey Ozin, Jane Howe
- 2:30 PM **49** Controlled Growth of High-Index Faceted Nanoparticles Using the Gas Phase Environmental Cell TEM; **Kunmo Koo**, Stephanie Ribet, Roberto dos Reis, Xiaobing Hu, Vinayak Dravid
- 2:45 PM **50** In-situ Observation of the Degeneration Dynamics of Cu Nanowires under Carbon Dioxide Environment; **Xiaobing Hu**, Kun He, Cesar Villa, Stephanie Ribet, Paul Smeets, Roberto dos Reis, Vinayak Dravid

A04.4

4D STEM Applied to Materials Science Problems I

PLATFORM SESSION

Wednesday 1:30 PM • Room: B113

- 1:30 PM **90** Fluctuation Cepstral STEM for Imaging Disordered Materials; (invited) Saran Pidaparthi, Haoyang Ni, Hanyu Hou, Daniel Abraham, **Jian-Min Zuo**
- 2:00 PM **91** 4D STEM with an Ultrafast Camera Reveals Mesoscale Structure in Anisotropic Molecular Glass Thin Films; **Debaditya Chatterjee**, Shuoyuan Huang, Kaichen Gu, Junguang Yu, Harald Bock, Lian Yu, Mark Ediger, Paul Voyles
- 2:15 PM **92** A Quantitative Understanding of the Short Range order in Disordered Rocksalt Cathode Materials; **Emma Hedley**, Liquan Pi, Mohsen Danie, Weixin Song, Emanuela Liberti, Peter Bruce, Peter Nellist
- 2:30 PM **93** Relaxation and Strain in Moiré Superlattices; (invited) **D. Kwabena Bediako**

A10.3

Instrumentation Development for Surface Analysis

PLATFORM SESSION

Wednesday 1:30 PM • Room: B115

- 1:30 PM **203** Recent innovations and perspectives in TOF-SIMS; (invited) **Felix Kollmer**, Alexander Pirkl, Henrik Arlinghaus, Rudolf Möllers, Nathan Havercroft, Ewald Niehuis
- 2:00 PM **204** SIMS Imaging Performed on Focused Ion Beam-Based Platforms; (invited) **Jean-Nicolas Audinot**, Alexander Ost, Charlotte Stoffels, Patrick Philipp, Olivier De Castro, Antje Biesemeier, Hung Quang Hoang, Tom Wirtz
- 2:30 PM **198** The Spatially-Resolved Illumination of Chemical Processes by Means of Mass Spectrometry Imaging: from Click-Chemistry to Biogenesis; **Gregory Fisher**

Scientific Program

B

Biological Sciences Symposia - Wednesday Afternoon

B03.4

Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Wednesday 1:30 PM • Room: D136

- 1:30 PM **262** *Improving Cryo-EM Ice Thicknesses Workflows on the Chameleon Sample Preparation Device; (invited) Eugene Chua, Hui Wei, Mahira Aragon, Clint Potter, Bridget Carragher*
- 2:00 PM **263** *Measurelce: Accessible Ice Thickness Measurement for Single Particle Cryogenic Transmission Electron Microscopy; Hamish Brown, Eric Hanssen*
- 2:15 PM **264** *Optimization of CryoEM Sample Preparation: A New Freezing Strategy to Reduce the Time to Structure Loop; Ouliana Panova, Herve Vandekerckhove, Nicolas Marro, Stefanie Rajasooriya, Tim Booth, Michele C. Darrow*
- 2:30 PM **265** *Effects of Chameleon Dispense-to-Plunge Time on Grid Characteristics, Sample Distribution, and Complex Denaturation of the Neisseria gonorrhoeae Ribonucleotide Reductase Inactive Complex; Talya Levitz, Edward Brignole, Ivan Fong, Michele C. Darrow, Catherine Drennan*
- 2:45 PM **266** *Cryo-EXLO for Cryo-TEM of FIB Specimens; Lucille Giannuzzi, Michael Colletta, Yue Yu, Lena Kourkoutis, Andrew Iams, Kyle Beggs, Alain Kassab*

B05.3

Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals

PLATFORM SESSION

Wednesday 1:30 PM • Room: D137

- 1:30 PM **307** *Microwave Brain Tissue Processing: Making Life Easier for Ultrastructural Immunohistochemical Analysis of Synapses in Rodent Models of Neurodegeneration; Cindy Moore, (invited) Charles Meshul*
- 2:00 PM **308** *Freeze Substitution and Low Temperature Processing of Cryo Protected Tissues into Lowicryl HM23 Resin for Correlated Light and Immunogold Electron Microscopy in Drug Discovery and Safety Assessment Research; Mike Reichelt, Anand Katakam, Meredith Sagolla*
- 2:30 PM **309** *Using Computational Methods and 3D Volume EM Reconstructions to Examine Interactions Between Microglia and Oligodendrocyte Precursor Cells in Mouse Cortex; (invited) JoAnn Buchanan, Jenna Schardt, Forrest Collman, Stephen Smith, Jenna Glatzer, Dwight Bergles, H. Sebastian Seung, Clay Reid, Nuno da Costa*

B10.3

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

SESSION CHAIRS:

Adam Glaser

PLATFORM SESSION

Wednesday 1:30 PM • Room: D133-134

- 1:30 PM **362** *Towards Quantitative Mapping of Organ-Wide Patterns with Whole Mount Imaging; (invited) Zhuhao Wu*
- 2:15 PM **363** *Nearest Neighbor-Based Spatial Analysis of Fluorescence Microscopy Data Reveals Increased Association of Nav1.6 with Cardiac Dyads in Mouse Model of Type-2 Diabetes; Andrew Soltisz, Heather Struckman, Przemysław Radwański, Rengasayee Veeraraghavan*
- 2:30 PM **364** *Napari: a Python Multi-Dimensional Image Viewer Platform for the Research Community; (invited) Chi-Li Chiu, Nathan Clack*

C

Cross-Cutting Symposia - Wednesday Afternoon

C01.1

Microscopy Infrastructures: Architectures, Avenues and Access

SESSION CHAIRS:

Steven Spurgeon

PLATFORM SESSION

Wednesday 1:30 PM - Room: B116

- 1:30 PM **367** *e-DREAM - the European Distributed Research infrastructure for Advanced electron Microscopy*; (invited) **Regina Ciano**, Rafal Dunin-Borkowski, Etienne Snoeck, Mathieu Kociak, Randi Holmestad, Johan Verbeeck, Angus Kirkland, Gerald Kothleitner, Jordi Arbiol
- 2:00 PM **368** *Improving the Noise Floor and Speed of Your Detector: A Modular Hardware Approach for Under \$1000*; **Jonathan J.P. Peters**, Tiarnan Mullarkey, Lewys Jones
- 2:15 PM **369** *Seamless Communication Between High-Performance Computing System and Electron Microscopes for On-Demand Automated Data Transfer and Remote Control*; **Debangshu Mukherjee**, Anees Al-Najjar, Kevin Roccapiore, Jacob Hinkle, Andrew Lupini, Chris Meyer, Sergei Kalinin, Olga Ovchinnikova, Nageswara Rao
- 2:30 PM **370** *Lessons Learned in Building a Modern Microscopy Data Ecosystem at NIST*; (invited) **Joshua Taillon**

Wednesday, August 3

Scientific Program

P

Physical Sciences Symposia - Wednesday Afternoon

P02.7 Quantum Materials Under Electron Beam: From Atomic Structures to Working Devices

PLATFORM SESSION

Wednesday 1:30 PM • Room: A107-108

- 1:30 PM **482** *Probing Three-Dimensional Chiral Domain Walls in Polar Vortices*; Sandhya Susarla, Shanglin Hsu, Piush Behera, Benjamin Savitzky, Sujit Das, Peter Ercius, Colin Ophus, Ramamoorthy Ramesh, Hesham El-Sherif, **Margaret Anderson**, Johanna Nordlander, Elise Koskelo, Charles Brooks, Megan Holtz, Julia Mundy
- 1:45 PM **483** *Multi-scale Visualization of Ferroelectric Domains in a Magnetically Frustrated TblnO₃ Thin Film*; **Ismail El Baggari**
- 2:00 PM **484** *In-situ Magnetic Domain Behavior in van der Waals Fe₃GeTe₂*; **Yue Li**, Rabindra Basnet, Krishna Pandey, Jin Hu, Wei Wang, Xuedan Ma, Arthur McCray, Amanda, Petford Long, Charudatta Phatak
- 2:15 PM **485** *Disentangling Exciton Linewidth Broadening Factors in Transition Metal Dichalcogenide Monolayer with Electron Energy Loss Spectroscopy*; **Fuhui SHAO**, Steffi Woo, Nianheng Wu, Robert Schneider, Andrew J. Mayne, Steffen Michaelis, Ashish Arora, Benjamin Carey, Johann Preuß, Noémie Bonnet, Cecilia Mattevi, Kenji Watanabe, Takashi Taniguchi, Luiz Tizei, Rudolf Bratschitsch
- 2:30 PM **486** *In-situ Lorentz Imaging of Room-Temperature Ferromagnetic Domains in Monolayer Vanadium-Doped WS₂*; **Ariana Ray**, Mingzu Liu, Boyang Zheng, Da Zhou, Vincent Crespi, Mauricio Terrones, David Muller
- 2:45 PM **487** *Atomic Resolution STEM Imaging of Novel Van Der Waals Materials Synthesized by Soft Chemical Methods*; **Guangming Cheng**, Nan Yao

P03.1 Imaging Chemical Reactions using High Speed Electron Microscopy (EM)

SESSION CHAIR:

Angus Kirkland

PLATFORM SESSION

Wednesday 1:30 PM • Room: C123

- 1:30 PM **489** *Time-Resolved Analytical Electron Microscopy with Single Nanosecond Electron Pulses*; (invited) **Florian Banhart**, Matthieu Picher, Shyam Sinha, Yaowei Hu, Thomas LaGrange
- 2:00 PM **490** *Harnessing High Temporal Resolutions to Explore Fluxional Behavior on CeO₂ Nanoparticles under Reducing Conditions*; (invited) **Peter Crozier**, Ramon Manzorro, Yuchen Xu, David Matteson
- 2:30 PM **491** *Probing Graphene Defect Kinetics at Millisecond Time Resolution Using Direct Detection and Machine Learning*; **Chen Huang**, Chris Allen, Stephen Skowron, Ivan Lobato, Takeo Sasaki, Sandra Van Aert, Elena Besley, Angus Kirkland

P06.1 Correlative Studies of Optical Properties

SESSION CHAIRS:

Luiz Tizei, Sean Collins

PLATFORM SESSION

Wednesday 1:30 PM • Room: A106

- 1:30 PM **529** *Multimodal Correlative Microscopy to Study the Chemical and Energetic Landscape of Alloyed Halide Perovskites*; (invited) **Kyle Frohna**, Miguel Anaya, Stuart Macpherson, Jooyoung Sung, Tiarnan A.S. Doherty, Yu-Hsien Chiang, Andrew Winchester, Kieran W.P. Orr, Julia E. Parker, Paul D. Quinn, Keshav M. Dani, Akshay Rao, Samuel D. Stranks
- 2:00 PM **530** *Correlation Of Atomic Structure and Luminescence Of Two-dimensional MoSe₂/WSe₂ In-plane Nanodot Heterostructures*; **Saiphaneendra Bachu**, Steffi Woo, Benjamin Huet, Nicholas Trainor, Danielle Reifsnnyder Hickey, Joan Redwing, Mathieu Kociak, Luiz Tizei, Nasim Alem
- 2:15 PM **531** *(S)TEM Characterization of Functionalized Adamantanes by Low Dose EELS and PDF Analysis in their Pristine and Laser Irradiated States*; **Jürgen Belz**, Andreas Beyer, Franziska Hüppe, Johannes Haust, Kerstin Volz

P

Physical Sciences Symposia - Wednesday Afternoon cont.

2:30 PM **532** *Unveiling Single Particle Coupling of Metallic Nanoparticles and Whispering Gallery Mode Resonators*; **Yves Auad**, Cyrille Hamon, Marcel Tencé, Hugo Lourenço-Martins, Vahagn Mkhitarian, Odile Stéphan, F. Javier García de Abajo, Luiz Tizei, Mathieu Kociak

2:45 PM **533** *Thermal Effects on the Phonon Polariton Response of Nanoscale Cavities*; **Maureen Joel Lagos**, Connor Wong, Yao-Wen Yeh, Isobel Bicket, Babafemi Agboola, Nabil Bassim

P07.6 Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

PLATFORM SESSION

Wednesday 1:30 PM • Room: B118-119

1:30 PM **568** *High Throughput Studies on Irradiated High Entropy Alloys*; (invited) **Mukesh Bachhav**, (invited) **Bethany Matthews**, Alan Albrecht, Daniel Murray, Michael Moorehead, Adam Denny, Christopher Barrett, Adrien Couet, Benoit Queylat, David Senor, Calvin Parkin, Nathan Curtis, Phalgun Nelaturu, Dane Morgan, Dan Thoma

1:45 PM **565** *Multi-Scale Characterisation Of Heat Treatment In Single Crystal Ni-based Superalloys*; **Victoria Strutt**, Paul Bagot, Matthew Appleton, Michael Moody, Jane Woolrich, David Rugg, Anna Radecka

2:00 PM **566** *Analysing the Static Corrosion of T91 in Liquid Lead and Bismuth Eutectic at the Atomic Scale*; **Minyi Zhang**, Mark Lapington, Weiyue Zhou, Michael Short, Paul Bagot, Michael Moody, Felix Hofmann

2:15 PM **567** *Correlative Micro-CT and FIB-SEM Tomography for Refined Macro-scale Pore Volume Measurements in TPBAR LiAlO₂ Pellets*; **Bethany Matthews**, Alan Albrecht, Adam Denny, Christopher Barrett, David Senor

2:30 PM **564** *High Throughput Characterization to Quantify Microstructural Heterogeneities in Additively Manufactured Haynes 282*; **Avantika Gupta**, Sriram Vijayan, Olivia Schmid, Joerg Jinschek, Carolin Fink

P10.7 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Wednesday 1:30 PM • Room: B117

1:30 PM **669** *Cryogenic Electron Microscopy on Strongly Correlated Quantum Materials*; (invited) **Yimei Zhu**, Myung-Geun Han, Lijun Wu

2:00 PM **670** *Combining STEM Imaging and X-Ray Diffraction for Structure Determination of a New Highly Distorted Infinite-Layer Phase*; **Michelle Smeaton**, Woo Jin Kim, Berit Goodge, Kyuho Lee, Motoki Osada, Harold Hwang, Lena Kourkoutis

2:15 PM **671** *The Advanced Characterization and Structure-Property Correlation of BaMnO₃ for the Oxygen Reduction Reaction Using Electron Microscopy*; **Lucia Hughes**, Ahin Roy, Clive Downing, Michelle Browne, Ainur Zhussupbekova, Valeria Nicolosi

2:30 PM **672** *Atomic Scale Crystal Field Mapping of Polar Vortices In Oxide Superlattices*; **Sandhya Susarla**, Pablo Garcia-Fernandez, Colin Ophus, Sujit Das, Pablo Aguado-Puente, Margaret McCarter, Peter Ercius, Lane Martin, Ramamoorthy Ramesh, Javier Junquera

2:45 PM **673** *Tunable Microstructures in Entropy-Stabilized Oxide Thin Films Studied with Unsupervised Machine Learning Assisted Transmission Electron Microscopy*; **Leixin Miao**, George Kotsonis, Jon-Paul Maria, Nasim Alem

Scientific Program

A

Analytical Sciences Posters - Wednesday Afternoon

A09.1P Ultrashort Pulse Lasers: Microscopy, Simulations, and Material Interaction

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #93

3:00 PM **842** *Application of a Correlative fs-Laser Workflow for Fast and Easy Feature Access in Failure Analysis of Recycled Automotive Body Parts*; **Tim Schubert**, Timo Bernthaler, Torben Wulff, Benjamin Tordoff, Gerhard Schneider

POSTER #94

3:00 PM **843** *Observations of Damage, Defects, and Structuring in Femtosecond Laser Ablated Surfaces*; **McLean Echlin**, Andrew Polonsky, William Lenthe, Mike Titus, Remco Geurts, Aurelien Botman, Peter Gumbsch, Tresa Pollock

POSTER #95

3:00 PM **844** *Preparing High-Quality Cross-Section Surfaces by Ultrashort Pulse Laser Ablation and Plasma FIB*; **Remco Geurts**

A04.2P Developments of 4D-STEM Imaging—Enabling New Materials Applications

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #46

3:00 PM **789** *Ab Initio Electrostatic Potentials for 4D-STEM Ptychographic Reconstruction*; Jacob Madsen, Christoph Hofer, Thomas Pekin, Marcel Schloz, Thuy An Bui, Christoph Koch, **Toma Susi**

POSTER #48

3:00 PM **791** *Crystallization by Amorphous Particle Attachment and the Evolution of Texture in Biogenic Calcium Carbonate*; **Vanessa Schoeppler**, Igor Zlotnikov, Deborah Sier, Benjamin Savitzky, Colin Ophus, Matthew Marcus

POSTER #49

3:00 PM **792** *Examining the Relationship between Local Polarization and Modulation Variations in a Relaxor Ferroelectric Tetragonal Tungsten Bronze by 4D STEM*; **Stephen Funni**, Elizabeth Dickey

POSTER #50

3:00 PM **793** *Exploring the 3D Resolution of Parallax Phase Reconstruction from 4D STEM: A Dopant Depth Case Study*; **Emmanuel Terzoudis-Lumsden**, Timothy Petersen, Hamish Brown, Philipp Pelz, Colin Ophus, Scott Findlay

POSTER #51

3:00 PM **794** *Momentum- and Energy-Resolved STEM at Atomic Resolution*; **Benedikt Haas**, Christoph Koch

POSTER #52

3:00 PM **795** *Segmentation of "Important" Features in High Dimensional Nanodiffraction Datasets*; **Carter Francis**, Paul Voyles

A05.3P Quantitative and Qualitative Mapping of Materials

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #77

3:00 PM **817** *Electro-Catalytic Behavior of High Entropy Alloy-Graphene (HEA:G) Composite*; **Ashwini Ravi**, Rekha M Y, M S Santosh, Chandan Srivastava

POSTER #78

3:00 PM **818** *Electron Backscattered Diffraction Analysis of Electrodeposited Copper Coatings for Canada's Used Nuclear Fuel Containers*; **Sang Bum Yi**, Jason Tam, Jason Giallonardo, Jane Howe, Uwe Erb

POSTER #79

3:00 PM **819** *Microstructure Change of an Additively Manufactured High-Strength Titanium Alloy Over Large Areas Using Mapping and EBSD*; **Daniel Veghte**, Brian Welk, Nevin Taylor, Hamish Fraser

POSTER #76

3:00 PM **822** *Phase Differentiation based on X-Ray Energy Spectrum Correlation with an Energy Dispersive Spectrometer (EDS)*; **Nicolas Brodusch**, Raynald Gauvin

POSTER #80

3:00 PM *Precision Energy Dispersive Spectroscopy (EDS): Looking for Chemical Shifts*; **Rebekah Jin**, Jared Lodico, Tristan O'Neill, Yueyun Chen, Brian Zutter, B. C. Regan

POSTER #81

3:00 PM **820** *Probing Grain-Boundary Structure and Electrostatic Characteristics in a SrTiO₃ Bi-Crystal by 4D-STEM*; **Chao Yang**, Yi Wang, Wilfried Sigle, Peter A. van Aken

POSTER #82

3:00 PM **821** *TEM Study on the Middle Temperature Brittleness of HiSiMo Cast Irons at 400°C*; **Wenhui Zhu**, Larry Godlewski, Simon Lekakh, Bitu Ghaffari, Carlos Engler-Pinto, Mei Li

B

Biological Sciences Posters - Wednesday Afternoon

B05.1P

Challenges and Advances in Electron Microscopy Research and Diagnosis of Diseases in Humans, Plants and Animals

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #133

3:00 PM **901** *Antifungal Activity Changes of Zinc Oxide and Zinc Peroxide Nanoparticles; Iliana Ruiz-Leyva*, Luis Hermida Montero, Francisco Paraguay-Delgado, Laila Muñoz-Castellanos, D. Lardizabal-Gutiérrez, Cindy Villalba-Bejarano

POSTER #134

3:00 PM **902** *Antifungal Evaluation of Zn and Zn-Cu Oxychloride Nanoparticles; Luis Hermida Montero, Iliana Ruiz-Leyva*, Francisco Paraguay-Delgado, D. Lardizabal-Gutiérrez, Laila Muñoz-Castellanos, Cindy Villalba-Bejarano

POSTER #135

3:00 PM **903** *Automatic Sample Processing for vEM in a Mouse Model of Breast Cancer; Erin Stempinski*, Jessica Riesterer, Claudia Lopez

POSTER #132

3:00 PM **904** *Comparison of Different Microscopic Sample Preparation and Imaging Techniques for Visualization of Connective Tissue Components in Peripheral Nerve; Hao Fu*, Tsengming Chou

POSTER #136

3:00 PM **905** *Defects in Cytoplasmic Assembly and Sorting of US9 Pseudorabies Virus Mutants; Steven Adamou*, Grayson DuRaine, Adam Vanarsdall, David Johnson

POSTER #137

3:00 PM **906** *Detection and Identification of SARS-CoV-2 in Placental and Neonate Tissues; Hannah Bullock*, Cynthia Goldsmith, Rosecelis Martinez

B03.1P

Technical Advances in Cryo-EM

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #123

3:00 PM **889** *Improvements in Speed and Hole Finding in Leginon; William Rice*, Anchi Cheng

POSTER #125

3:00 PM **890** *Workflow Optimization for Cryo Electron Microscopy using Side Entry Dual Grid Cryo Transfer Holder and Automated Cryogen Auto-Refilling System; Pushkarraj Deshmukh*, Jake Schade, Hans Tietz, Mrunal Vaze, **Matthias Stumpf**

POSTER #124

3:00 PM **256** *Training Opportunities at the Pacific Northwest Cryo-EM Center; Janette Myers*, Nancy Meyer, Sean Mulligan

Scientific Program

C

Cross-Cutting Posters - Wednesday Afternoon

C04.3P

Artificial Intelligence, Instrument Automation, and High-Dimensional Data Analytics for Microscopy and Microanalysis

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #171

3:00 PM **946** *A Comparison of 3D and 2D U-Net Convolutional Networks for Segmentation in FIB-SEM Imagery;* **Rengarajan Pelapur**

POSTER #172

3:00 PM **947** *Automated Design of Electron Mirrors for Multipass Electron Microscopy and 4D-STEM+EELS;* **Tyler Harvey**, Colin Ophus

POSTER #173

3:00 PM **948** *Automatic Nondestructive Detection of Damages in Thermal Barrier Coatings Using Image Processing and Machine Learning;* **Andrew Sprague**, Pouya Tavousi, Sina Shahbazmohamadi, Zahra Shahbazi

POSTER #174

3:00 PM **949** *Data Analytics: Quality Measures for Image Information Content;* **Carol Heckman**

POSTER #200

3:00 PM **950** *Fast Automatic PSFD (Point Spread Function Deconvolution) Using Edge Detection;* **Zach Russell**, Mathieu Therezien, Tomas McIntee, Shane DiDona, Jeffrey Hagen, Edward Principe

POSTER #175

3:00 PM **952** *Machine Learning Prediction of Valence and Coordination from EELS Spectra of Iron Containing Compounds;* **Samuel Gleason**, Deyu Lu, Jim Ciston

POSTER #177

3:00 PM **953** *Software Package for Efficient Creation of Training Data for Machine Learning Classifiers from Micrographs;* **Mathieu Therezien**, Tomas McIntee, Zach Russell

POSTER #178

3:00 PM **954** *Traceable Measurements using a Metrology Scanning Electron Microscope;* **Bradley Damazo**, András Vladár, Olivier Marie-Rose, John Kramar

POSTER #179

3:00 PM *Workflow Automation of SEM Grid Acquisitions for Nanoparticle Analysis;* **Sabrina Clusiau**, Nicolas Piché, Nicolas Brodusch, Mike Strauss, Raynald Gauvin

POSTER #180

3:00 PM **955** *High Throughput 3D Volumes Data Acquisition using AI;* **Tereza Konecna**, Daniela Slamkova, Ondrej Machek

C02.1P

Microscopy and Education

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #150

3:00 PM **924** *Broad Applications of Scanning Electron Microscopy and Energy-Dispersive Spectroscopy in Art Conservation;* **Jeffrey Pigott**, Dean Yoder, Sarah Scaturro, Beth Edelstein, Elena Mars, Julianna Iy, Colleen Snyder, Katelyn Rovito, Ina Martin

POSTER #151

3:00 PM **925** *Identification of Increased Blood Brain Barrier Permeability in the Visual Cortex of the HIV-1 Transgenic Rat;* **Myla Worthington**, Sumiko Williams, Francesca Benedetti, Davide Zella, Davide Davis, Joseph Bryant

POSTER #152

3:00 PM **926** *Microscopy Education In The Fourth Industrial Revolution;* **Mehdi Bolorizadeh**

POSTER #153

3:00 PM **927** *On the Role of Microscopy in Mechanical Engineering Education;* **Constantin Solomon**

POSTER #154

3:00 PM **928** *Ray-Tracing Electrons through a Magnetic Lens;* **David Landers**, Ian Clancy, Dieter Weber, Rafal Dunin-Borkowski, Andrew Stewart

POSTER #155

3:00 PM **929** *The Application of Micro-Scale Analysis Tools in Industrial Problem Solving;* **Jeanette vajki Vass**

POSTER #438

3:00 PM *Virtual Microscopy - Nature Experience Radical Design (NERD) Jam;* **Sue Okerstrom**, Daniela Esponda

POSTER #330

3:00 PM *Identification of Increased Blood Brain Barrier Permeability in the Substantia Nigra of the HIV-1 Transgenic Rat;* **Frank Denaro**, Myla Worthington, Sumiko Williams, Francesca Benedetti, Davide Zella, Davide Davis, Joseph Bryant

POSTER #331

3:00 PM *Teaching Histology During Covid-19 Restrictions;* **Frank Denaro**, Simon Nyaga, Myla Worthington, Sumiko Williams, A Akingbade, A Allen, A Talind, D Ajaynae, C Jones, D Manning, J Moore, O Justice, S Stone

P

Physical Sciences Posters - Wednesday Afternoon

P10.2P

Advanced Imaging and Spectroscopy for Nanoscale Materials

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #264

3:00 PM **1042** *Characterization of Embedded Secondary Phase Carbides in Low-Alloyed Martensitic Steels Using a Combination of High-Resolution Techniques*; **Fredrik Gustavsson**, Fredrik Gustavsson, Fredrik Lindberg, Hans Magnusson

POSTER #265

3:00 PM **1043** *Complex Core-Shell Nanoparticles Embedded in a Perovskite Complex Concentrated Oxide Film Synthesized in One Step*; **Huiming Guo**, Xin Wang, Mingjie Xu, Soham Shah, Kandis Abdul-Aziz, William Bowman

POSTER #266

3:00 PM **1044** *Deactivation Study on Zeolite Materials Using XPS and STEM Characterization*; **Biva Talukdar**, Harry Meyer, III, Calvin Mukarakate, Kristiina Lisa, Michael Griffin, Susan Habas

POSTER #267

3:00 PM **1045** *Development of a Stable Low Temperature Sample Holder for the Side-Entry Transmission Electron Microscope*; **Alexander Reifsnnyder**, David McComb

POSTER #268

3:00 PM **1046** *Dispersion Analysis of Silicon Carbide Nanoparticles in Polyvinyl Alcohol Polymeric Matrix by Electronic Microscopy Techniques*; Cesar Isaza, Andrés E. Zapata, Yamile Cardona-Maya, Juan Rudas, **C. Carreño-Gallardo**, Juan Meza, José Herrera-Ramirez

POSTER #269

3:00 PM **1047** *Epitaxy of the Metal and Oxide Phases in Pt-Pd 'Janus' Particles in 800 °C Air-Aged Diesel Oxidation Catalysts*; **Stephen Porter**, Chih Han Liu, Hien Pham, Arnab Ghosh, John Watt, Eleni Kyriakidou

POSTER #270

3:00 PM **1048** *Fast Solid-State Segmented Detectors: Improvements and Implications for DPC-STEM*; **Tiarnan Mullarkey**, Jonathan J.P. Peters, Grigore Moldovan, Jonathan Garel, Lewys Jones

POSTER #271

3:00 PM **1049** *Imaging of Defect Rich Heterogeneous Interfaces using Compressive Sensing STEM*; **Daniel Nicholls**, Jack Wells, Mounib Bahri, Nigel Browning

POSTER #272

3:00 PM **1050** *Insights into Thermal Degradation of Hot Melt Pressure-Sensitive Adhesive (PSA) with Atomic Force Microscopy - Infrared Spectroscopy (AFM-IR) Analysis*; **Hu Duan**, Brian R Strohmeier, Yunli Fang

POSTER #273

3:00 PM **1051** *Measuring Local Polarization by Differential Phase Contrast*; **Sebastian Calderon**, Stephen Funni, Elizabeth Dickey

POSTER #274

3:00 PM **1052** *Multiphysics Simulation for TEM Objective Lens Evaluation & Design*; Patrick McBean, Zachary Milne, Arjun Kanthawar, Khalid Hattar, Katherine Jungjohann, **Lewys Jones**

POSTER #275

3:00 PM **1053** *Objective Point Symmetry Classifications/Quantifications of an Electron Diffraction Spot Pattern with Pseudo-Hexagonal Lattice Metric*; **Peter Moeck**, Lukas von Koch

POSTER #276

3:00 PM **1054** *Parallel Acquisition of Real and Reciprocal Space Data in Transmission SEM*; **Peter Denninger**, Peter Schweizer, Erdmann Spiecker

POSTER #277

3:00 PM **1055** *Qualitative Phase Contrast Imaging using Interferometric 4DSTEM*; **Andrew Ducharme**, Philipp Pelz, Levi Brown, Peter Ercius, Benjamin McMorran

POSTER #278

3:00 PM **1056** *Quantification of Metal Atom Ordering in Engineered W1-xMoxS2 Monolayers*; **Danielle Reifsnnyder Hickey**, Leixin Miao, Mikhail Chubarov, Saiphaneendra Bachu, Tanushree Choudhury, Joan Redwing

POSTER #279

3:00 PM **1057** *Separation of EBIC Modes with Two-Channel STEM EBIC*; **William Hubbard**, Ho Leung Chan, Matthew Mecklenburg, B. C. Regan

POSTER #280

3:00 PM **1058** *Statistical Determination of Atomic-Scale Characteristics of Gold Nanocrystals Based on Correlative Multiscale Transmission Electron Microscopy*; **Stefan Neumann**, Azita Rezvani, Matthäus Barasinski, Georg Garnweitner, Doris Segets, David Rafaja

POSTER #281

3:00 PM **1059** *Structural Analysis for Highly Aligned Graphene Fold on Cu(111) Substrate*; **Myeonggi Choe**, Luo Da, Meihui Wang, Ming Huang, Sunghwan Jin, Yunqing Li, Rodney S. Ruoff, Zonghoon Lee

POSTER #282

3:00 PM **1060** *Turn-Key Compressed Sensing System For Electron Microscopy*; **Edward Principe**

Scientific Program

P

Physical Sciences Posters - Wednesday Afternoon cont.

P11.1P

Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #285

3:00 PM **1065** *Correlative Analysis of P-bearing Assemblages in the QUE 97008 and Orgueil Chondrites;* **Maizey Benner**, Tom Zega, Lucy Ziurys

P09.2P

Insights into Phase Transitions in Functional Materials by In Situ/ Operando TEM: Experiment meets Theory

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #237

3:00 PM **1013** *Enhanced Preparation Technique of Plan-view Specimens for in situ TEM Heating Experiments based on the Synergy of Wedge-polishing and FIB;* **Alexey Minenkov**, Natalija Šantić, Heiko Groiss

POSTER #236

3:00 PM **1017** *In-situ TEM Imaging of Novel Edge Reconstruction in Bilayer Phosphorene;* **Sol Lee**, Yangjin Lee, Li Ping Ding, Kihyun Lee, Feng Ding, Kwanpyo Kim

POSTER #238

3:00 PM **1014** *Orientation-Specific CDW Phase Transition Temperatures in 1T-TaS₂;* **Paige Engen**, David Flannigan

POSTER #239

3:00 PM **1015** *Reversible Intercalation of Mg²⁺ in V₂O₅ at Elevated Temperatures Leads to Enhanced Electrochemical Performances;* **Yingjie Yang**, Robert Klie

POSTER #240

3:00 PM **1016** *Transition of Deformation Mechanism in Single Crystalline Metallic Nanowires;* **Guangming Cheng**, Nan Yao, Yong Zhu

P07.2P

Correlative Microscopy and High-Throughput Characterization for Accelerated Development of Materials in Extreme Environments

POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

POSTER #212

3:00 PM **989** *Radiation-Corrosion Characterization of a 309L Stainless-Carbon Steel Weld Produced by Laser Directed Energy Deposition;* **Scott Bozeman**, Burkan Isgor, Julie Tucker

POSTER #213

3:00 PM **990** *Towards Optimized Characterization of Dislocation Loops in Irradiated FCC Alloys Using On-Zone STEM Techniques;* **Pengyuan Xiu**, Hongbin Bei, Yanwen Zhang, Lumin Wang, Kevin G. Field

POSTER #214

3:00 PM **991** *Transmission EBSD of Aluminide Coatings on Stainless Steel in a Scanning Electron Microscope;* **Joshua Silverstein**

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Analytical Sciences Symposia - Thursday Morning

A04.5 4D STEM Applied to Materials Science Problems II

PLATFORM SESSION

Thursday 8:30 AM • Room: B113

- 8:30 AM **94** *Seeing the Structure and Structural Evolution of Nano-crystallites in Soft Materials Using 4D Scanning Confocal Electron Diffraction; (invited) Mingjian Wu, Christina Harreiss, Colin Ophus, Manuel Johnson, Rainer Fink, Erdmann Spiecker*
- 9:15 AM **96** *Accuracy, Reproducibility, and Calibration in 4D-STEM; Benjamin Savitzky, Colin Ophus*
- 9:30 AM **97** *Measuring Antiferromagnetism at the Angstrom Scale using 4D-STEM; Jeffrey Huang, Kayla Nguyen, Manohar Karigerasi, Kisung Kang, André Schleife, Daniel Shoemaker, David Cahill, Jian-Min Zuo, Pinshane Huang*
- 9:45 AM **98** *Polar Nano-Domains in Barium Hexaferrite Revealed with Multislice Electron Ptychography; Harikrishnan K.P., Yilin Li, Yu-Tsun Shao, Zhen Chen, Jiaqiang Yan, Christo Gugushev, Darrell Schlom, David Muller*

A07.1 Science of Metrology with Electrons

PLATFORM SESSION

Thursday 8:30 AM • Room: A105

- 8:30 AM **157** *Imaging the Electronic Structure of Strained Epitaxial Monolayer Graphene; Sujitra Pookpanratana, Falk Niefind, Henry Bell, Thuc Mai, Angela Hight Walker, Randolph Elmquist*
- 8:45 AM **158** *Imaging Atomically Thin Transition Metal Dichalcogenides Using Deep Ultraviolet Photoelectron Emission Microscopy; Alex Boehm, Morgann Berg, Cherrelle Thomas, Fangze Liu, Sean Smith, Calvin Chan, Aditya Mohite, Thomas Beechem, Jose Fonseca, Catalin Spataru, Jeremy Robinson, Taisuke Ohta*
- 9:00 AM **159** *Metrology of Sample Preparation for Electron Microscopy: Application to Strain Measurements; Pawel Nowakowski, Mary Ray, Paul Fischione*
- 9:15 AM **160** *The Reproducibility Crisis, a Comprehensive Set of Guides on XPS, and Better Data Fitting/ Chemometrics of XPS Data; Tahereh Avval, George Major, (invited) Matthew Linford*

A08.1 From Operando Microcell Experiments to Bulk Devices

SESSION CHAIRS:

Prof. Layla Mehdi

PLATFORM SESSION

Thursday 8:30 AM • Room: A107-108

- 8:30 AM **168** *Towards Quantification of the Reaction Product in Oxygen-Evolving Oxides by Operando Electron Energy-Loss Spectroscopy in Liquids; Tzu-Hsien Shen, Vasiliki Tileli*
- 8:45 AM **169** *Benefits of Nanoscale Operando Experiments in Environmental Transmission Electron Microscopy for Solid Oxide Fuel Cell Devices; Quentin Jeangros, Matthieu Bugnet, Thierry Epicier, Cedric Frantz, Stefan Diethelm, Dario Montinaro, Elizaveta Tyukalova, Yevheniy Pivak, Jan Van Herle, Aicha Hessler, Martial Duchamp*
- 9:00 AM **184** *High Angle Liquid Cell TEM Tomography for In Situ Observation and 3D Reconstruction in Liquid; Stavros Nicolopoulos, Partha Pratim Das, Jennifer Cookman, Alejandro Gomez-Perez, Sergi Plana-Ruiz, Miguel Lopez-Haro, Jose Calvino, Jesus Gonzalez Casablanca, Evangelos Grivas, Georgios S.E. Antipas, Nikolaos A. Ntallis*
- 9:15 AM **171** *Effect of Induced Stimuli on the Leakage Current of Operative Oxide-based Devices Inside a TEM; Oscar Recalde, Tianshu Jiang, Robert Eilhardt, Alexander Zintler, Yating Ruan, Alexey Arzumanov, Tijn van Omme, Yevheniy Pivak, Hector Hugo Perez Garza, Philipp Komissinskiy, Lambert Alff, Leopoldo Molina-Luna*
- 9:30 AM **172** *Probing Structural Changes in Nanoparticles During CO-Oxidation Reaction via In Situ TEM; (invited) Utkur Mirsaidov*

Scientific Program

A

Analytical Sciences Symposia - Thursday Morning cont.

A10.4 Minerals, Alloys and Metal Oxides

PLATFORM SESSION

Thursday 8:30 AM • Room: B115

- 8:30 AM **206** *Application of Electron Back Scattering Diffraction in Facet Crystalline Orientation Analysis*; **Josiah Dubovi**, Clay Klein, Chunfei Li
- 8:45 AM **207** *Quick and Correlative TOF-SIMS Analysis of Dispersoid Content in Powder Feedstock and Printed Oxide Dispersion Strengthened Alloys*; **Laura Wilson**, David Ellis, Timothy Smith, Tae Kyong John Kim, Jennifer Carter
- 9:00 AM **208** *New Horizons in Multi-technique Auger Electron Spectroscopy: Surface Sensitive Chemical Imaging on the Nano-scale of Additive Manufacturing Materials*; (invited) **Ashley Maloney**, Kateryna Artyushkova, Eric De Vito, Olivier Renault
- 9:30 AM **209** *Multi-Modal Identification of Feldspar and Iron Oxide Phases in Granite Using Raman Spectroscopy in the Electron Microscope*; **Justin Morrow**, Stephen Seddio, Melodie Fickenscher
- 9:45 AM **210** *Mapping Surface Corrosion Damages of C1018 Carbon Steel When Exposed to High Temperature Environment*; **Mohammad Haque**, Rajesh Saini, Khaled Muhammadi, Ahmed Bukhamseen

Thursday, August 4

B

Biological Sciences Symposia - Thursday Morning

B03.5 Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Thursday 8:30 AM • Room: D136

- 8:30 AM **267** *New Cryo-EM Methods for Studying Native Biological Complexes, In Situ and in Action;* (invited) **Z. Hong Zhou**
- 9:00 AM **268** *National Center for In-situ Tomographic Ultramicroscopy and the Waffle Method: An Approach for Cryo-FIB/SEM Thin Lamellae Preparation;* **Daija Bobe**, Misha Kopylov, Alex Noble, Oleg Klykov, Bridget Carragher, Clint Potter
- 9:15 AM **269** *A Next Generation Cryo-FIB Microscope for High-Throughput Cryo-Electron Tomography;* **Alexander Rigort**, Abhay Kotecha, Steve Reyntjens, John Mitchels
- 9:30 AM **270** *Expediting Cryo-EM Grid Optimization by Utilizing Statistical Analysis with JMP;* **Rose Marie Haynes**
- 9:45 AM **271** *CryoDiscovery™: Public Data based AI/ML model enhancements for Cryogenic Electron Microscopy Image Analysis;* **Narasimha Kumar**, Ryan Dehart, Elliot Gray, Hitha Yeccaluri

B04.1 Correlative and Multimodal Microscopy and Analysis

PLATFORM SESSION

Thursday 8:30 AM • Room: D133-134

- 8:30 AM **283** *Resolving Subcellular Organelle Interactions with Correlative Live-Cell – Volume Electron Microscopy Analysis;* (invited) **Nalan Liv**
- 9:00 AM **284** *3D Fluorescence Localization in Frozen Cells for Targeted Lamella Milling for Electron Cryo-Tomography;* **Ernest van der Wee**, Daan Boltje, Arjen Jakobi, Jacob Hoogenboom
- 9:15 AM **285** *Correlative Cryo-FIB Milling using METEOR, an Integrated Fluorescent Light Microscope;* **Marit Smeets**, Cristina Capitani, Oda Schiøtz, Anna Bieber, Philipp Erdmann, Jürgen Plitzko

- 9:30 AM **286** *(Cryo-) Electron Microscopy Workflows of Interactions between Airborne Pollution Particles and Nasal Epithelial Cells;* **Victoria Garcia Giner**, Sharon Mumby, Ramzi Lakhdar, Ian Mudway, Ian Adcock, Fan Chung, Alexandra Porter

- 9:45 AM **287** *Correlating Multi-Pass Microscopy and Transmission Electron Microscopy for Biological Materials;* **Cheri Hampton**, Brannon Klopfer, Mark Kasevich, Lawrence Drummy

B06.1 Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products—Research, Development, Analysis, Regulation, and Commercialization

PLATFORM SESSION

Thursday 8:30 AM • Room: D137

- 8:30 AM **313** *Super Resolution of gammaH2AX Substructure in Chromatin in GBM cells;* **Linda Yasui**, Nicholas Cirone
- 8:45 AM **314** *Application of X-ray Computed Tomography for High-Throughput Analysis in Drug Product Development at Micrometer and Nanometer Scale;* (invited) **Somya Singh**, Daniel Skomski
- 9:15 AM **315** *Quantitative Bioimaging of Therapeutic Responses in the Brain Using Deep Learning;* (invited) **Meredith Calvert**, David Joy, Dan Xia, Pascal Sanchez, Kathryn Monroe
- 9:45 AM **316** *Interferometric Scattering Microscopy of Albumin-Bound Paclitaxel Nanoparticles;* **Taylor Woehl**, Matt Licausi, Aengus Vervier, Shakiba Nikfarjam

Scientific Program

C

Cross-Cutting Symposia - Thursday Morning

C01.2

Microscopy Infrastructures: Architectures, Avenues and Access

SESSION CHAIR:

Lewys Jones

PLATFORM SESSION

Thursday 8:30 AM • Room: B116

- 8:30 AM **371** *Improved Throughput, Statistics, and Instrument Utilization with Automated Analytical Electron Microscopy; (invited)*
David Cullen, Haoran Yu, Michael Zachman, Shawn Reeves, Jaehyung Park, Nancy Kariuki, Deborah Myers, Leiming Hu, Kenneth Neyerlin, Rangachary Mukundan
- 9:00 AM **372** *Pivot Point: The Key to TEM Automation;*
Matthew Olszta, Kevin Fiedler, Derek Hopkins, Kayla Yano, Christina Doty, Marjolein Oostrom, Sarah Akers, Steven Spurgeon
- 9:15 AM **374** *Machine Learning-Driven Automated Scanning Probe Microscopy for Ferroelectrics;* **Yongtao Liu**, Kyle Kelley, Rama Vasudevan, Hiroshi Funakubo, Shelby Fields, Takanori Mimura, Susan Troler-McKinstry, Jon Ihlefeld, Maxim Ziatdinov, Sergei Kalinin
- 9:30 AM **373** *Automated Spectrum Imaging Using Hybridized DMScript and Python Code in DigitalMicrograph; (invited)* **Liam Spillane**, (invited) **Yongtao Liu**, Kyle Kelley, Bernhard Schaffer, Rama Vasudevan, Hiroshi Funakubo, Shelby Fields, Takanori Mimura, Susan Troler-McKinstry, Jon Ihlefeld, Maxim Ziatdinov, Sergei Kalinin

P

Physical Sciences Symposia - Thursday Morning

P03.2 Imaging Chemical Reactions using High Speed Electron Microscopy (EM)

SESSION CHAIRS:
Angus Kirkland

PLATFORM SESSION
Thursday 8:30 AM • Room: C123

- 8:30 AM **492** *Towards Microsecond Time-Resolved Cryo-Electron Microscopy; (invited) Ulrich Lorenz*
- 9:00 AM **493** *Room Temperature Decoding of Catalyst Nanoparticles Using Localized Surface Plasmon Resonance Energy; (invited) Wei-Chang Yang, Amit Agrawal, Renu Sharma*
- 9:30 AM **494** *Advancements in UltraFast Electron Microscopy; Darrin Leonhardt, Eric Montgomery, Chunguang Jing, Bart Wyderski, Yubin Zhao, Spencer Reisbick, Yimei Zhu, June Lau, John Roehling*

P06.2 Time and Phase Effects in Optical Excitations

SESSION CHAIRS:
Didem Dede

PLATFORM SESSION
Thursday 8:30 AM • Room: A106

- 8:30 AM **534** *The Prospect of Quantum-Optical Information Transfer using an Electron*
- 9:15 AM **536** *Defocus Phase Contrast in Photon-Induced Near-field Electron Microscopy; John Gaida, Lourenço-martins Hugo, Sergey Yalunin, Armin Feist, Murat Sivis, Thorsten Hohage, F. Javier García de Abajo, Claus Ropers*
- 9:30 AM **537** *Inelastic Holography and Interaction-Free Measurements with Interferometric STEM; Benjamin McMorran, Cameron Johnson, Amy Turner, F. Javier García de Abajo*
- 9:45 AM **538** *Nanoscale Imaging of Plasmonic Hot Spots in Au Nanocapsule Dimers by Ultrafast Electron Microscopy; Ilke Arslan, Prem Singh, Amit Jaiswal, Thomas Gage, Ilke Arslan*

P10.8 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION
Thursday 8:30 AM • Room: D135

- 8:30 AM **674** *Application of 4D STEM and DPC Techniques to Study Surface Reconstruction of Transition Aluminas; Libor Kovarik, Konstantin Khivantsev, Janos Szanyi*
- 8:45 AM **675** *Effect of Ca Doping on the Microstructure and Mechanical Properties of Magnesium Aluminate Spinel; Alexander Campos Quiros, Animesh Kundu, Masashi Watanabe*
- 9:00 AM **676** *Crystal Surfaces and Their Role on Electrochemical Activity in MgV₂O₄ Crystals; Francisco Lagunas Vargas, Grant C.B. Alexander, Adrianna Lee Punaro, Christian Moscova, Jordi Cabana, Robert Klie*
- 9:15 AM **677** *Imaging Structural Defects and Associated Oxygen Positions in Li-rich Li_{1.2}Ni_{0.13}Mn_{0.54}Co_{0.13}O₂; Weixin Song, John Marie, Robert House, Peter Bruce, Peter Nellist*
- 9:30 AM **678** *4D-STEM Mapping of Nanoscale Structural Ordering in Cathode Materials; Wenxiang Chen, Xun Zhan, Renliang Yuan, Saran Pidaparthi, Zhichu Tang, Jian-Min Zuo, Qian Chen*
- 9:45 AM **679** *Correlating Surface Strain with Activity in Commercial Platinum Catalysts; Daniel Kelly, Benedikt Brandes, Pei Liu, Thomas Willum Hansen*

P11.2 Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis

PLATFORM SESSION
Thursday 8:30 AM • Room: DB114

- 8:30 AM **697** *The Unrestrained use of Python Libraries for Bridging the Gap between Planetary and Material Sciences; (invited) Pierre-marie Zanetta*
- 9:00 AM **698** *Electron Microscopy Investigations of Organic-Mineral Relationships in Returned Samples from Asteroid Ryugu; Rhonda Stroud*
- 9:15 AM **699** *A Correlative Electron Microscopy Study of a Ru-rich Metal Grain from a Calcium-Aluminum-Rich Inclusion; Tarunika Ramprasad, Laura Seifert, Prajcta Mane, Thomas Zega*
- 9:30 AM **700** *Investigating the Response of Sulfides and Fe-Oxides Under Space Weathering Conditions Through the Analysis of Returned and Experimental Samples; (invited) Laura Chaves, Michelle Thompson, Briony Horgan, Catherine Dukes, Mark Loeffler*

Scientific Program

A

Analytical Sciences Posters - Thursday Morning

A04.3P

Developments of 4D-STEM Imaging—Enabling New Materials Applications

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #53

10:00 AM **796** *4D-STEM Characterization of Low q Scattering in Conductive Polymers Used for Li-ion Battery Anodes; Hadas Sternlicht, Tianyu Zhu, Benjamin Savitzky, Colin Ophus, Gao Liu, Andrew Minor*

POSTER #54

10:00 AM *Analytic Dynamical Diffraction Solution for the Five-Beam Condition; Tristan O'Neill, B. C. Regan, Matthew Mecklenburg*

POSTER #55

10:00 AM **797** *Assisting Phase Unwrapping in Ptychography Through Minimal Phase Accumulation for Low Energy Electron Ptychography; Arthur Blackburn, Matthew Fitzpatrick, Cristina Cordoba*

POSTER #56

10:00 AM **798** *Automated Grain Segmentation for Crystal Orientation mapping in 4D Scanning Transmission Electron Microscopy; Daniel Zeitler, Ehsan Nikbin, Jane Howe, Jonathan Kong, Robert McLeod, R. J. Dwayne Miller, Doug Perovic*

POSTER #57

10:00 AM **799** *Fast Ptychographic Reconstruction for Sparse Binary Ptychography Data; Emma Hedley, Björn Eckert, Heike Soltau, Peter Nellist*

POSTER #58

10:00 AM **800** *Finding Optimal Imaging Parameters for Measuring Long-Range Electric Fields with 4DSTEM by Utilizing STEM Multislice Simulations; Damien Heimes, Andreas Beyer, Shamil Ahmed, Varun Chejarla, Kerstin Volz*

POSTER #59

10:00 AM **801** *In-Situ 4D-STEM Study of Amorphous Titanium Oxide for Water Splitting Application; Mehrdad Abbasi Gharacheh, Jun Meng, Yutao Dong, Dane Morgan, Xudong Wang, Jinwoo Hwang*

POSTER #61

10:00 AM **803** *Towards Spatial Mapping of Atomic Vibration Amplitudes in Thermoelectric Materials: Quantitative Convergent Beam Electron Diffraction (QCBED) Study of BiCuOQ ($Q = S, Se, Te$); Yukun Liu, Chi Zhang, Kenneth Poeppelmeier, Roberto dos Reis, Vinayak Dravid*

A07.1P

Science of Metrology with Electrons

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #90

10:00 AM **836** *A Straightforward Method for Measuring the Elastic and Inelastic Mean Free Paths for Scattering of Fast Electrons in Technologically Important Thin-Film Oxides; Adham Basha, George Levi, Yang Li, Guy Ankonina, Lior Kornblum, Ilan Goldfarb*

POSTER #91

10:00 AM **837** *Development of Observation Method for Spatial Electromagnetic Fields by Using Conventional Scanning Electron/Ion Microscope; Ken Harada, Keiko Shimada, Yoshio Takahashi*

POSTER #92

10:00 AM **838** *Simple Method to Determine the Rotation Between a TEM Image and Diffraction Pattern; Alexana Roshko, George Burton, Roy Geiss*

Analytical Science Posters

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #108

10:00 AM **867** *Characterization of Laundry Microplastics Through Automated Image Analysis; John Hegarty, Roberto dos Reis, Vikas Nandwana, Vinayak Dravid*

POSTER #109

10:00 AM **868** *Depth Profile Chemical State Analysis of Oxide Films on High Temperature Treated Stainless Steel Using EPMA with a Soft X-ray Spectrometer at Variable Accelerating Voltage; Shiori Kamijyo, Hideyuki Takahashi, Konomi Ikita, Vern Robertson, Peter McSwiggen*

POSTER #110

10:00 AM **869** *Hydrothermally Developed Nanomaterials and Their Surface Modification Using APTES And TEOS; Dharendra Kumar Tiwari, Dhananjay Tripathi*

POSTER #111

10:00 AM **870** *Structural Characterization of High Entropy Alloy (FeCoCrNiMn) Synthesized by Mechanical Alloying; Cintya Arroyo, Luis Bejar Gómez, Claudio Aguilar, Lada Domratheva*

POSTER #112

10:00 AM **871** *Synthesis & Characterization of Europium, Yttrium and Iron Based Nanoparticles; Nancy Gutiérrez, Ana Coria-Tellez, Dharendra Kumar Tiwari*

Thursday, August 4

A

Analytical Sciences Posters - Thursday Morning cont.

A10:1P

Surface and Subsurface Microscopy and Microanalysis of Physical and Biological Specimens

POSTER SESSION

Thursday 10:00 AM - Room: Exhibit Hall

POSTER #96

10:00 AM **Characterizing the Back-Contact Interface of Bi-Facial Poly-Crystalline CdTe Devices Using Transmission Electron Microscopy;** **John Farrell**, Robert Klie, Manoj Jamarkattel, Ebin Bastola, Michael Heben

POSTER #97

10:00 AM **Eggshell Nanoparticles and their Effect on Moisture Barrier Properties of Gellan Gum Films by Morphological Analysis;** **Benjamín Arredondo-Tamayo**, José Jorge Chanona-Pérez, Juan Méndez-Méndez, Josué Hernández-Varela, Susana Dianey Gallegos-Cerda, Liliana Edith Rojas Candelas

POSTER #98

10:00 AM **Electron Microscopy and Electrochemical Studies of WO_3 Thin Films Deposited by Pneumatic Spray Pyrolysis;** **Dwight Acosta**, Carlos Magaña

POSTER #99

10:00 AM **Elucidation of 3D Chemical and Physical Architecture of Soil Microstructures by Correlating Spectro-Microscopic Techniques and Developing Novel Computational Methods;** **Alexander Ost**, Tianyi Wu, Tom Wirtz, Carmen Höschel, Carsten Mueller, Jean-Nicolas Audinot

POSTER #100

10:00 AM **Graphene Coated Kapton Tape as a Sample Support Grid for Electron Microscopic Imaging;** **Prem Thapa-Chetri**, Noraida Martinez-Rivera, Wenjun Xian, Suprem Das, Eduardo Rosa-Molinar

POSTER #101

10:00 AM **Identification and Particle Size Determination of ^{238}Pu -bearing Particles via Alpha Spectrometry, Autoradiography and Scanning Electron Microscopy;** **Kimberly Wurth**, Benjamin Naes, Travis Tenner, Lisa Hudston, Zsuzsanna Macsik, Michael Harris, Stephen LaMont

POSTER #102

10:00 AM **Identifying Nanocrystalline Domains Identified Within Oxide Aerogels Using Inverse-Fast-Fourier-Transform Techniques: Comparing Automated Mask Generation with Hand-Segmentation;** **Todd Brintlinger**, Travis Novak, Paul DeSario, Debra Rolison, Rhonda Stroud

POSTER #103

10:00 AM **Investigation of Exfoliated Graphene Flakes and Their Self-Assembly Capabilities to Form Thin Coatings;** **Kaleb Hood**, Sarah Ahmed, Wen Qian, Roman Schmidt, Jun Jiao

POSTER #104

10:00 AM **Multi-Method Porosity Comparisons and Adjusted Image-Based Porosity for Source Rocks;** **Shannon Eichmann**, David Jacobi, Poorna Srinivasan, Kevin Kenga, Mohammed Khan, Qiushi Sun

POSTER #105

10:00 AM **Probing the Defect Landscape in $NdNiO_3$ Thin Films;** **Chao Yang**, Yi Wang, Daniel Putzky, Wilfried Sigle, Hongguang Wang, Roberto Ortiz, Eva Benckiser, Bernhard Keimer, Peter A. van Aken

POSTER #106

10:00 AM **Root Cause Spectroscopic Failure Investigation Aided by High Resolution SEM/EDS, FT-IR, XPS Instruments and Microscopes;** **Jeanette Vajki Vass**

POSTER #107

10:00 AM **Ti_3C_2TX MXene Hole Transport Layer for Polymer Non-Fullerene Solar Cells;** **Bhoj Gautam**, Sheenamelia Jones, Alisha Ware, Tia Wright, Danielle Keith, Shubo Han

Scientific Program

B

Biological Sciences Posters - Thursday Morning

B99.1P

Biological Sciences Posters

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #143

10:00 AM **916** *Comparison of Age-Related Tyramine Concentration in the Male Mouse Reproductive System*; Debra Page Baluch, **Solange Steadman**

POSTER #144

10:00 AM **917** *Estuarine Copepod Internal Anatomy: An SEM Evaluation of Microsurgery*; **Stan Kunigelis**

POSTER #145

10:00 AM **918** *Isolation of Striated Muscle Thick Filaments for Cryo-EM*; **Hosna Rastegarpouyani**, Dianne Taylor, Fatemeh Abbasi Yeganeh, Alimohammad Hojjatian, Kenneth Taylor

POSTER #146

10:00 AM **919** *Novel Gelatin-Based Bioplastic Materials Designed to Replace Polystyrene and Polypropylene in Single-Use Hard Plastics*; **Bhoj Gautam**, Kaitlyn Zuravel, Lauren Zuravel, Menuka Adhikari, Zhiping Luo

POSTER #147

10:00 AM **920** *Real-time GHz Ultrasonic Imaging of Nematodes at Microscopic Resolution*; **Anuj Baskota**, Justin Kuo, Amit Lal

POSTER #148

10:00 AM **921** *Transmission Electron Microscopy Using Hitachi's HILEM IL1000 Ionic Liquid as a Dispersion Agent for Fetuin-Mineral Complexes*; **Heather Berensmann**, Jenna Toohey, Erin Wilson

POSTER #329

10:00 AM *Role of Protein Kinase C in Melanocortin-3 Receptor Endocytosis*; **Iyinoluwa Sofowora**

B03.2P Technical Advances in Cryo-EM

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #126

10:00 AM **891** *Controlled Cryo-EM Sample Preparation using the VitroJet*; **Maike Schotman**, Giulia Weissenberger, Rene Henderikx, Frank Nijpels, Bart Beulen

POSTER #129

10:00 AM **894** *MerlinEM, Hybrid Pixel Array Counting Detector for Transmission Electron Microscopy*; **Matus Krajnak**

POSTER #127

10:00 AM **892** *CryoVR: A Virtual Reality Training System for CryoEM Hands-On Operations*; **Daoyi Li**, Jiahui Dong, Kadir Ozcan, Dayu Wan, Yingjie Chen, Wen Jiang

POSTER #128

10:00 AM **893** *Evaluating the Chameleon Sample Preparation Device: Case Studies*; **Mahira Aragon**, Hui Wei, Eugene Chua, Joshua Mendez, Bridget Carragher, Clint Potter

POSTER #130

10:00 AM **895** *Not All Vacuum Is Created Equal*; **Lambertus Alink**, Robert Gheorghita, Kashyap Maruthi, Huihui Kuang, Anchi Cheng, Edward Eng, Bridget Carragher

POSTER #131

10:00 AM **896** *Reproducible lamella Preparation for Electron Cryo-Tomography by In-Situ Thickness Estimation During Fluorescence-Guided FIB Milling*; **Radim Skoupy**, Daan Boltje, Jacob Hoogenboom, Arjen Jakobi

B06.1P Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products- Research, Development, Analysis, Regulation, and Commercialization

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #138

10:00 AM *Nanoscale Quantitative Molecular Mapping of Biodegradable Poly (ϵ - caprolactone)/Ascorbic Acid Blends via Infrared Photo-induced Force Microscopy (IR PiFM)*; **Derek Nowak**, Padraic O'Reilly, Mostafa Eesaee

POSTER #139

10:00 AM **911** *Zirconia vs Titanium Dental Implants Demonstrate Superior Early Healing in Mice Assessed with PEGASOS Tissue Clearing and Two-Photon Microscopy*; **William Stenberg**, Yating Yi, Hu Zhao

C

Cross-Cutting Posters - Thursday Morning

C05.1P

Vendor Symposium

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #181

10:00 AM **421** *Advanced In Situ TEM Nanomechanical Testing Options with the PI-95;* **Sanjit Bhowmick**, Eric Hintsala, Douglas Stauffer

C01.1P

Microscopy Infrastructures: Architectures, Avenues and Access

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #149

10:00 AM **923** *Benchmarking the Performance of a New Photoelectron Source;* **Frances Quigley**, Clive Downing, Cormac McGuinness, Lewys Jones

Thursday, August 4

Scientific Program

P

Physical Sciences Posters - Thursday Afternoon

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #287

10:00 AM **1067** *Al7075 Composites Reinforced with Al₂O₃ and CNT Particles*; Eusebio Cardoso-Lozano, Bertha Iaura Vargas-Rodríguez, Hugo Arcos-Gutierrez, C.D. Gómez-Esparza, Fernando Pérez-Bustamante, **Raúl Pérez-Bustamante**

POSTER #288

10:00 AM **1068** *Aluminium Matrix Composite (AA6061/CaSiO₃) Powders Obtained by Ball Milling*; **Ofelia Hernández Negrete**, Diego Aaron Blanchet Sanchez, Javier Hernández Paredes, Víctor E Alvarez Montaño, Francisco Brown Bojórquez, Guadalupe López Aviles, Hilda Esparza-Ponce

POSTER #289

10:00 AM **1069** *Aluminium Matrix Composites (AA6061/CaSiO₃) Fabricated by Powder Metallurgy*; **Ofelia Hernández Negrete**, Diego Aaron Blanchet Sanchez, Javier Hernández Paredes, Jesus Humberto Coronado Lopez, Alejandro Valenzuela Soto, Guillermo Tiburcio Munive, Eduardo Verdín López, Francisco Brown Bojórquez, Hilda Esparza-Ponce

POSTER #290

10:00 AM **1070** *An Expanded Graphite Used as Oil Adsorbent Prepared with an Alternative Green Route Based on the Classical Hummer Method*; **G. Tarango-Rivero**, C. Carreño-Gallardo, C.G. Garay-Reyes, I. Estrada-Guel, R. Martínez-Sánchez

POSTER #291

10:00 AM **1071** *BiOCl Nanosheets Supported onto Borosilicate Glass Prepared Using the AACVD Method*; **P. Pizá-Ruiz**, G. Tarango-Rivero, I. Estrada-Guel, A. Sáenz-Trevizo

POSTER #292

10:00 AM **1072** *Characterisation of Lead sulphide (PbS) films by Optical and Scanning Electron Microscopies*; **Carlos A Márquez Ibarra**, Ofelia Hernández Negrete, Víctor E Alvarez Montaño, Santos Jesus Castillo, Ramón Ochoa Landín, Hilda Esparza-Ponce

POSTER #293

10:00 AM **1073** *Characterization of a New Rare-Earth-Free Cu-based Bulk Metallic Glass*; **Tamara Koledin**, Jaskaran Saini, Donghua Xu, Melissa Santala

POSTER #294

10:00 AM **1075** *Color Etching of a MIG Welded Steel Joint*; José Antonio Medina-Mendoza, Jan Mayen-Chaires, Víctor Hugo Mercado-Lemus, **Raúl Pérez-Bustamante**

POSTER #295

10:00 AM **1076** *Development of an Aluminum Hybrid Metal Matrix Composite Processed Through Mechanical Milling (MM), with High Response to Yield Strength*; Isaí A. Sánchez-Molinar, D. Lardizabal-Gutiérrez, Claudia López, José Herrera-Ramirez, **C. Carreño-Gallardo**

POSTER #296

10:00 AM **1077** *Dispersion of CNTs into an Aerospace-Grade Aluminum Alloy*; **Fernando Pérez-Bustamante**, Felipe Ávalos-Belmontes, Gloria Rosales-Sosa, R. Martínez-Sánchez, Raúl Pérez-Bustamante

POSTER #297

10:00 AM **1078** *Dynamic Precipitation in Al-4Cu and Al-4Cu-4Mg cold-Rolled Alloys*; **J.L. García-Hernández**, G. Rodríguez-Cabiales, C.G. Garay-Reyes, I. Estrada-Guel, R. Martínez-Sánchez

POSTER #298

10:00 AM **1079** *Effect of Deuteration on Morphology of 2D Perovskite (CH₃NH₃)₂Pb(SCN)₂I₂*; Washat Ware, Sivasankara Rao Ede, Rachel Wells, Zhiping Luo, **Bhoj Gautam**

POSTER #299

10:00 AM **1080** *Effect of Etching Method on the Morphology and Stability of Ti₂CTx MXene*; Ona Udoh, Ashlynn Briles, Bhoj Gautam, **Daniel Autrey**

POSTER #300

10:00 AM **1081** *Effect of Sintering Temperature in Tungsten Carbides Bonded with High and Medium Entropy Alloys*; **M.A. Ruiz-Esparza-Rodriguez**, C.G. Garay-Reyes, I. Estrada-Guel, K. García-Aguirre, J.C. Guía-Tello, J.M. Mendoza-Duarte

POSTER #301

10:00 AM **1082** *Effect of the Cooling Rate on the Microstructure Evolution of Haynes® 282® Ni-based Superalloy Subjected to γ' Super-Solvus Heat Treatment*; **Anastasia Alexandratou**, Stavros Deligiannis, Christos Roussos, Nikolaos - Ioannis Makris, Petros Tsakiridis, George Fourlaris

POSTER #302

10:00 AM **1083** *Effect of Tungsten Carbide Reinforcing Particle on Wear Behavior in Aluminum Matrix Composites Synthesized through Powder Metallurgy*; **G. Rodríguez-Cabiales**, C.G. Garay-Reyes, J.L. García-Hernández, I. Estrada-Guel, R. Martínez-Sánchez

POSTER #303

10:00 AM **1085** *Expanded Graphite Prepared with Microwave Radiation: Time Effect on its Oil Adsorption Capacity*; **G. Tarango-Rivero**, A. Santos-Beltrán, Erique Rocha-Rangel, J.M. Mendoza-Duarte, C.G. Garay-Reyes, I. Estrada-Guel

Thursday, August 4

P

Physical Sciences Posters - Thursday Afternoon cont.

POSTER #304

10:00 AM **1086** *Failure Analysis of Conformal Cooling Inserts Fabricated by Additive Manufacturing*; **Hiram Flores**, Raúl Pérez-Bustamante

POSTER #305

10:00 AM **1087** *GaAs Substrate Reuse Using Molecular Beam Epitaxy of NaCl Layers*; **Jae Jin Kim**, Belron May, William McMahon, Aaron Ptak, David Young

POSTER #306

10:00 AM **1088** *Gamma Alumina Synthesis Following a Mechanochemical Process Obtained From Aluminum Residues*; G. Tarango-Rivero, C.D. Gómez-Esparza, P. Pizá-Ruiz, C.G. Garay-Reyes, **I. Estrada-Guel**, R. Martínez-Sánchez

POSTER #307

10:00 AM **1089** *Gas Shielding and Stand-Off-Distance Effects in Ti-6Al-4V Protective Coatings Deposited by Electric Arc Thermal Spraying for Aluminum Die Casting Molds*; Juan Muñoz Saldaña, **Mauricio Nango Blanco**, Natalia Brizuela-Colmenares, Luis-Alberto Cáceres-Díaz, Juan Manuel Alvarado-Orozco

POSTER #308

10:00 AM **1090** *Growth and Characterization of Boron Nitride/Diamond Heterostructures*; **Saurabh Vishwakarma**, Jesse Brown, Avani Patel, Martha McCartney, Robert Nemanich, David Smith

POSTER #309

10:00 AM **1091** *Hardness Behavior of CNT/Al7075 RRA Heat Treated Composites*; **Bertha Laura Vargas-Rodríguez**, Eusebio Cardoso-Lozano, Jan Mayen-Chaires, Hugo Arcos-Gutierrez, Isabel Pereyra-Laguna, Fernando Pérez-Bustamante

POSTER #310

10:00 AM **1092** *High Entropy Alloy AlCoFeNiMoTi Particles as Reinforcement in an Al 2024 Matrix Synthesized by Powder Metallurgy*; **Miguel Avila-Rubio**, Guadalupe Avila-Rubio, Jesus Baldenebro-Lopez

POSTER #311

10:00 AM **1093** *High Purity Graphene Prepared Via A Cheap Method Of Synthesis from a CO2 Atmosphere*; Eduardo Cuadros-Lugo, Harby Martinez-Rodríguez, D. Lardizabal-Gutiérrez, Claudia López, I. Estrada-Guel, José Herrera-Ramirez, **C. Carreño-Gallardo**

POSTER #312

10:00 AM **1094** *High-Temperature Growth of Mn5Ge3Cx Thin Films on Ge (001) Substrates: Reactive Deposition Epitaxy vs. Solid Deposition Epitaxy*; **Adriana Alvidrez-Lechuga**, Sion olive-Méndez, José Holguín-Momaca, Carlos Roberto Santillán-Rodríguez

POSTER #313

10:00 AM **1095** *Influence of Milling Time on Microstructure of AlCoCrMnMo High-Entropy Alloy Produced by Mechanical Alloying*; Guadalupe Avila-Rubio, Miguel Avila-Rubio, **Jesus Baldenebro-Lopez**, Francisco Baldenebro-Lopez

POSTER #314

10:00 AM **1096** *Influence of Rare Earths Additions on the Microstructure and Hardness of Heat-treated Nanostructured Superalloy Inconel 718*; **Hansel Medrano**, A. Santos-Beltran, C.G. Garay-Reyes, G. Rodríguez-Cabriaes, M.A. Ruiz-Esparza-Rodriguez, I. Estrada-Guel, H. Camacho-Montes, R. Martínez-Sánchez

POSTER #315

10:00 AM **1097** *Intermetallic Phases at a Resistance Spot Welded Fe-Al Interface*; **Hendrik Colijn**, Bryan Lara, Antonio Ramirez

POSTER #316

10:00 AM **1098** *Mechanical Reinforcement Of Aisi1018 Steel by a Ni-Based Self-Fluxing Alloy Coating Applied by Plasma Transferred Arc (PTA)*; **Luis-Alberto Cáceres-Díaz**, Omar González Ornelas, Raúl Pérez-Bustamante, John Edison-Garcia, Mauricio nango Blanco, Juan Manuel González Carmona, Juan Muñoz Saldaña

POSTER #317

10:00 AM **1099** *Microstructural Evolution and Strengthening Mechanisms in a 2xxx Series Modified Al Alloy*; **K. García-Aguirre**, José Holguín-Momaca, M.A. Ruiz-Esparza-Rodriguez, J.C. Guía-Tello, C.G. Garay-Reyes, I. Estrada-Guel

POSTER #318

10:00 AM **1102** *STEM Analysis of Vacancies in Magnetite Nanoparticles*; **Paul Sharp**, Adam Kerrigan, Philip Hasnip, Zlatko Nedelkoski, Sara Majetich, Quentin Ramasse, Vlado Lazarov

POSTER #319

10:00 AM **1103** *Stroboscopic Imaging Using RF Strip-Line Technology*; **Spencer Reisbick**, Myung-Geun Han, Chuhang Liu, Yubin Zhao, Eric Montgomery, Chunguang Jing

POSTER #320

10:00 AM **1104** *Study of Porosity in Heat Treated Aluminum 319 Alloys*; **Christian Reyes**, Luis Bejar Gómez, Ismeli Alfonso

POSTER #321

10:00 AM **1105** *Surface vs. Bulk Phonons in Off-Axis EELS*; **Hongbin Yang**, Xingxu Yan, Toshihiro Aoki, Xiaoqing Pan

Scientific Program

P

Physical Sciences Posters - Thursday Afternoon cont.

POSTER #322

10:00 AM **1106** *Synthesis by AACVD, Microstructural Characterization and Mechanical Properties of a Cr₂O₃/Fe₃O₄ Nanocomposite*; Kevin Isaac Contreras-Vargas, **C. Carreño-Gallardo**, Karla Campos-Venegas, Abel Hurtado-Macias, P. Pizá-Ruiz, Patricia Amázaga-Madrid

POSTER #323

10:00 AM **1107** *Synthesis of a Cr-Mn-Fe-Co-Ni-CNTs High Entropy Alloy*; Israel Macias-González, Oscar Ivan Raúl Torres-Hernández, Luis-Alberto Cáceres-Díaz, C.D. Gómez-Esparza, Fernando Pérez-Bustamante, **Raúl Pérez-Bustamante**

POSTER #324

10:00 AM **1108** *TEM Analysis of MBE Grown Model Li-Ion Cathodes*; **Bilash KC**, Jinglong Guo, John Farrell, D. Bruce Buchholz, Robert Klie

POSTER #325

10:00 AM **1109** *TEM Characterization of Complex Nanoprecipitates in Single-Phase V-Nb bearing Automotive Steels*; **Angelos Kaldellis**, Nikolaos - Ioannis Makris, Anastasia Alexandratou, Stavros Deligiannis, Petros Tsakiridis, George Fournalis

POSTER #326

10:00 AM **1110** *TEM Characterization of Retained Austenite Stabilization on TRIP Steel*; **Nikolaos-Ioannis Makris**, Angelos Kaldellis, Anastasia Alexandratou, Stavros Deligiannis, Petros Tsakiridis, George Fournalis

POSTER #328

10:00 AM **1112** *The Occurrence of Dolomite in Carbonate Organofacies and Its Relationship to Diagenesis and Catagenesis as Revealed by Mineral Maps Developed Using Energy Dispersive Spectroscopy and Back Scatter Electron*; **David Jacobi**, John Longo, Jennifer Rodriguez

P10.3P

Advanced Imaging And Spectroscopy For Nanoscale Materials

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #283

10:00 AM **1061** *Characterization of Electrospun ZnCr₂O₄ Spinel Nanofibers*; **Menuka Adhikari**, Tamela Moore, Zamari Morris, Shubo Han, Zhiping Luo

POSTER #284

10:00 AM **1063** *Observation of Electrospun Yttrium Cobalt Oxide YCoO₃ Nanofibers Calcined at Different Temperatures*; **Menuka Adhikari**, Zamari Morris, Taheerah Watson, Gibin George, Shubo Han, Zhiping Luo

P04.1P

Mechanisms Of High Strain Rate Plastic Deformation: Plasticity And Microstructural Evolutions Of Adiabatic Shear Bands

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #

10:00 AM **966** *Mechanical Properties of Bond Coatings and Ni-based Superalloys at Extreme Temperatures*; **Sanjit Bhowmick**, Eric Hintsala

POSTER #189

10:00 AM **967** *Mechanisms of Cracking in Pure Magnesium during High Strain Rate Plastic Deformation*; **Pawel Nowakowski**, Mary Ray, Paul Fischione

Thursday, August 4

P06.1P Nanoscale Optics with Electrons and Photons

POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

POSTER #203

10:00 AM **980** *Impact of the Nanoscale Gap Morphology on Plasmons in Doped Indium Oxide Nanostructure Dimers*; **Yina Wu**, Andrea Konečná, Shin Hum Cho, Delia Milliron, Jordan Hachtel, F. Javier García de Abajo

POSTER #204

10:00 AM **981** *In Situ Engineering and Characterization of Photonic Modes in Dielectric Nanocubes*; **Yifan Wang**, Piyush Haluai, Peter Crozier

POSTER #206

10:00 AM **983** *Optical Properties of Zinc Ferrite Nanoparticles Embedded in Zinc Oxide Thin Films Investigated by STEM, EELS and CL*; **Cana Elgvin**, Snorre Braathen Kjeldby, Kevin Both, Phuong Dan Nguyen, Øystein Prytz

POSTER #207

10:00 AM **984** *Pico-scale Distortions in Encapsulated Monolayer α -RuCl₃ Characterized with 3D Electron Diffraction*; **Yin Min Goh**, Suk Hyun Sung, Bowen Yang, Gaihua Ye, Sananda Biswas, David Kaib, Shaohua Yan, Chenghe Li, Shengwei Jiang

POSTER #208

10:00 AM **985** *Revealing Photonic Properties with High Spatial Resolution: An EELS Study on Ceria Nanocubes*; **Yifan Wang**, Shize Yang, Peter Crozier

POSTER #182

10:00 AM *Estimation of Elemental Pollution in Freshwater Sediment of Lerma River Using EDS and FRX Techniques (Assessment of Lerma River Bed Sediments Using EDS and FRX Techniques)*; Dharendra Kumar Tiwari, Diego ríos-Pérez, **Ana Coria-Tellez**, Dhananjay Tripathi, Kamal Uddin Ahamad

Scientific Program

A

Analytical Sciences Symposia - Thursday Afternoon

A04.6 4D STEM In-Situ

PLATFORM SESSION

Thursday 1:30 PM • Room: B113

- 1:30 PM **99** Quantitative Measurement of Electric Fields in Microelectronics Devices by In-Situ Pixelated STEM; (invited) **Victor Boureau**, Lucas Bruas, Matthew Bryan, Jean-Luc Rouvière, David Cooper
- 2:00 PM **100** Imaging Sensitive Catalyst Active Site Structure by 30 keV Electron Ptychography; **Michael Zachman**, Hasnain Hafiz, Dong Young Chung, Vojislav Stamenkovic, Edward F. Holby, David Cullen
- 2:15 PM **101** Investigating the Ferroelasticity Governing the Dynamics of Improper Ferroelectric Domain Walls by In-Situ Biasing 4D-STEM; **Michele Conroy**, Steven Zeltmann, Benjamin Savitzky, Sinead Griffin, Jim Ciston, Eileen Courtney, Elora McFall, Roger Whatmore, Ursel Bangert, Colin Ophus
- 2:30 PM **102** Correcting Scan Distortions in Cryogenic 4DSTEM Acquisitions using Affine Transformations; **Jacob Smith**, Wenpei Gao, Miaofang Chi, Guannan Zhang
- 2:45 PM **103** In Situ 4D-STEM of Martensitic Phase Transformation in NiTi; **Jennifer Donohue**, Andrew M Minor

A07.2 Science of Metrology with Electrons

PLATFORM SESSION

Thursday 1:30 PM • Room: A105

- 1:30 PM **161** Detectability & Sensitivity vs Incident Beam Energy in Modern Analytical Electron Microscopes; (invited) **Nestor Zaluzec**
- 2:00 PM **162** Effect of Sampling on Geometric Phase Analysis Sensitivity for Strain Measurement in Scanning Transmission Electron Microscopy; **Alexandre Pofelski**, Gianluigi Botton
- 2:15 PM **163** Integrated Nanophotonic Electron Beam Modulators Enable Ultra-High Precise Method for Calibrating EELS Spectrometers; Alexey Sapozhnik, Paolo Cattaneo, Bruce R. M. Weaver, Arslan Sajid Raja, Yujia Yang, Tobias Kippenberg, Fabrizio Carbone, **Thomas LaGrange**
- 2:30 PM **164** A Low-Noise, Two-Channel STEM EBIC Metrology System; **William Hubbard**, Matthew Mecklenburg, B. C. Regan

- 2:45 PM **165** High-Speed, High-Precision, and High-Throughput Strain Mapping with Cepstral Transformed 4D-STEM Data; **Dasol Yoon**, Harikrishnan K. P., Yu-Tsun Shao, David Muller

A08.2 From Operando Microcell Experiments to Bulk Devices

SESSION CHAIRS:

Dr. Arnaud Demortiere

PLATFORM SESSION

Thursday 1:30 PM • Room: A107-108

- 1:30 PM **173** In-situ (S)TEM Study of Synthesis and Degradation Process of Titanium-Based MXene Lithium-ion Anodes; Mounib Bahri, Juhan Lee, Dahnan Spurling, Oskar Ronan, Christian Kübel, Valeria Nicolosi, Volker Presser, **B. Layla Mehdi**
- 1:45 PM **174** Relevance of In-Situ Electrochemical STEM Observations to Li-Metal Batteries for Evaluating Performance; (invited) **Katherine Jungjohann**, Laura Merrill, Renae Gannon, Daniel Long, Steven Randolph, Katharine Harrison
- 2:30 PM **176** Stability of Fe Electrode in Alkaline Electrolyte; **Shu Fen Tan**, Joseph Manser, Maria Ronchi, Sylvia Smullin, Yet-Ming Chiang, Frances Ross
- 2:45 PM **177** Battery in situ Electrical Testing in FIB-SEM; **Libor Novak**, Petr Glajc, Ondřej Klvač

A10.5 Analytical Surface Chemistry, Part I; Dealing with Challenging Samples

PLATFORM SESSION

Thursday 1:30 PM • Room: B115

- 1:30 PM **211** Ambient Mass Spectrometry Imaging of Lipid Molecules from Alive Cells and Tissues; Heejin Lim, Jae Young kim, (invited) **DaeWon Moon**
- 2:00 PM **212** Development and Validation of In-Situ Specimen Orientation Method for Quantitative SEM/EDS Analysis; **Clay Klein**, Faith Corman, Joshua Homan, Brady Jones, Abbeigh Schroeder, Heavenly Duley, Chunfei Li
- 2:15 PM **213** Correlated Materials Characterization via Multimodal Chemical Imaging and Data Analytics; (invited) **Olga Ovchinnikova**
- 2:45 PM Using High-Speed, Molecularly-Resolved AFM and Fast Force Mapping to Investigate Adsorption, Self-Assembly and Solution Structure at Surfaces; **James De Yoreo**

B

Biological Sciences Symposia - Thursday Afternoon

B03.6 Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Thursday 1:30 PM • Room: D136

- 1:30 PM **272** *Visualizing Single Molecule Identity and Sample Integrity In Situ; (invited) Bronwyn Lucas, Nikolaus Grigorieff*
- 2:00 PM **273** *Data Collection Speedups in Leginon; Kashyap Maruthi, Huihui Kuang, Anchi Cheng, William Rice, Lambertus Alink, Edward Eng, Eugene Chua, Sargis Dallakyan, Clint Potter, Bridget Carragher*
- 2:15 PM **274** *Smart Leginon: Fully Automated Cryo-EM Grid Screening for CryoEM using Leginon and Ptolemy; Huihui Kuang, Paul Kim, Anchi Cheng, Kashyap Maruthi, Eugene Chua, Joshua Mendez, Hui Wei, Edward Eng, Viacheslav Serbynovskyi, Clint Potter, Bridget Carragher, Alex Noble, Tristan Bepler*
- 2:30 PM **275** *SmartScope: Framework for Unsupervised Cryo-EM Imaging; Jonathan Bouvette, Qinwen Huang, Amanda Riccio, William Copeland, Alberto Bartesaghi, Mario Borgia*
- 2:45 PM **276** *A Cryogenic Fluorescence Microscope Retrofittable in Coincidence with a FIB/SEM; Daan Boltje, Jacob Hoogenboom, Arjen Jakobi, Grant Jensen, Caspar Jonker, Bram Koster, Mart Last, Jürgen Plitzko, Stefan Raunser, Sebastian Tacke, Roger Wepf, Sander den Hoedt, Ernest van der Wee*

B04.2 Correlative and Multimodal Microscopy and Analysis

PLATFORM SESSION

Thursday 1:30 PM • Room: D133-134

- 1:30 PM **288** *Indirect Correlative Light and Electron Microscopy (iCLEM) Coupled with Computational Modeling Reveals the Nanoscale Basis of Functional Heterogeneities within the Heart; Heather Struckman, Nicolae Moise, Andrew Soltisz, Andrew Buxton, Izabella Dunlap, Zhenhui Chen, Seth Weinberg, Rengasayee Veeraraghavan*
- 1:45 PM **289** *Multimodal and Correlative Characterization of Hybrid Structures: Application to Materials for Environmental Remediation; Stephanie Ribet, Benjamin Shindel, Caroline Harms, Vikas Nandwana, Roberto dos Reis, Vinayak Dravid*

- 2:00 PM **290** *Sub-micron Scale Chemical and Mineralogical Analyses on Microbially Induced Calcium Carbonate Precipitates; Neerja Zambare, Alice Dohnalkova, Tamas Varga, Anil Battu, Libor Kovarik*

- 2:15 PM **291** *Elemental Co-Localization of Nutrients, C, Al, and Fe in Soil Minerals with Electron Microscopy and Scatterplot-Matrix Analysis; Odeta Qafoku, Mark Wirth, William Chrisler, Galya Orr, Rebecca Lybrand, Ashlee Dere, Diogo Spinola, David D'Amore*

- 2:30 PM **292** *A Workflow for Improving Nanoscale X-ray Fluorescence Tomographic Analysis; Yanqi Luo, Tatjana Paunesku, Olga Antipova, Yuzi Liu, Nestor Zaluzec, Zichao Wendy Di, Gayle Woloschak, Si Chen*

B06.2 Imaging, Microscopy, and Micro/Nano-Analysis of Pharmaceutical, Biopharmaceutical, and Medical Health Products—Research, Development, Analysis, Regulation, and Commercialization

PLATFORM SESSION

Thursday 1:30 PM • Room: D137

- 1:30 PM **317** *Molecular Imaging of Biological Samples in Pharmaceutical Development Using Mass Spectrometry Imaging and Machine Learning; (invited) Hang Hu, Hilary Brown, Daniela Mesa Sanchez, Julia Laskin*
- 2:15 PM **319** *Dye Free Determination of NASH in Human Liver Samples using NAD(P)H Autofluorescence and Machine Learning Analysis; Jonathan Boyd, Jada Domigue, Elizabeth Elizabeth, Taylor Taylor Cohen*
- 2:30 PM **320** *3D Multiplex Visualization of Biologics and Morphological Marker Distribution in Intact Tumors and Brain Using Tissue Clearing and Lightsheet Microscopy; Niyanta Kumar*
- 2:45 PM **321** *Elemental Analysis of Cosmetic Contact Lenses Reveals High Concentrations of Heavy Metals in Pigments Deposited on Cornea-Facing Surfaces; Louise Hughes, Errin Johnson*

Scientific Program

C

Cross-Cutting Symposia - Thursday Afternoon

C01.3

Microscopy Infrastructures: Architectures, Avenues and Access

SESSION CHAIR:

Sarah Akers

PLATFORM SESSION

Thursday 1:30 PM • Room: B116

- 1:30 PM **376** *Development of a FAIR Data Management Infrastructure; (invited) Sherjeel Shabih, Markus Kühbach, Markus Scheidgen, Lauri Himanen, Sandor Brockhauser, Benedikt Haas, Christoph Koch*
- 2:00 PM **377** *Retrofitting a Photoelectron Source: Improving Resolution & Functionality; Frances Quigley, Clive Downing, Cormac McGuinness, Lewys Jones*
- 2:15 PM **378** *Approaching Real-Time Low-Dose STEM: Image Recovery from Subsampled Measurements via Online Bayesian Dictionary Learning; Jack Wells, Daniel Nicholls, Alex Robinson, Amirafshar Moshtaghpour, Yalin Zheng, Jony Castegna, Nigel Browning*
- 2:30 PM **379** *A Materials Scientist's CANVAS: A System for Controlled Alteration of Nanomaterials in Vacuum Down to the Atomic Scale; (invited) Clemens Mangler, Jannik Meyer, Jani Kotakoski, Andreas Mittelberger, Kimmo Mustonen, Toma Susi*

Thursday, August 4

Physical Sciences Symposia - Thursday Afternoon

P06.3 Electron Spectroscopies for Nano-optics in Semiconductors

SESSION CHAIR:

Ofer Kfir

PLATFORM SESSION

Thursday 1:30 PM - Room: A106

- 1:30 PM **539** *Low Dimensional III-V and II-VI Semiconductors; (invited) Didem Dede, Nicholas Morgan, Nadine Gaecshter, Timur Nurmamytov, Marta de Luca, Silvia Rubini, Anna Fontcuberta i Morral*
- 2:00 PM **540** *Using Cathodoluminescence from Continuous and Pulsed-Mode SEM to Elucidate the Nanostructure of Hybrid Halide Perovskite Materials; Jordi Ferrer Orri, Felix Kosasih, Yuqi Sun, Gunnar Kusch, Giorgio Divitini, Rachel Oliver, Caterina Ducati, Samuel Stranks*
- 2:15 PM **541** *Correlative Electron Energy-Loss Spectroscopy Bandgap Mapping and DFT Modeling in AlGaIn Diodes; Julia Deitz, Joshua Sugar, Boris Kiefer, Nicholas Baldonado, Andrew Allerman, Mary Crawford*
- 2:30 PM **542** *Photon-Correlation Cathodoluminescence Spectroscopy in a SEM: A Tool to Analyze the Performance Of Optoelectronics Devices; Sylvain Finot, Corentin Le Maout, Etienne Gheeraert, David Vaufre, (invited) Gwénoél Jacopin*

P10.9 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Thursday 1:30 PM - Room: D135

- 1:30 PM **680** *Mapping Local Structure, Electronic and Excitonic Properties at the 2D/3D Interface; (invited) Kate Reidy, Andrea Konecna, Eugene Park, Benedikt Haas, Joachim Dahl Thomsen, Julian Klein, Christoph Koch, Frances Ross, Juan Carlos Idrobo*
- 2:00 PM **681** *Tracking Degradation in Individual Catalyst Nanoparticles Under Fuel Cell-Relevant Cycling Conditions by Identical-Location STEM; Haoran Yu, Michael Zachman, David Cullen, Chenzhao Li, Jian Xie, Leiming Hu, Kenneth Neyerlin, Nancy Kariuki, Deborah Myers, Rangachary Mukundan*
- 2:15 PM **682** *Determination of the Thermal Expansion Coefficient and the Local Temperature Measurements of BaTiO₃ Nanoparticles with Nanometer Resolution; Bibash Sapkota, Emilio Ferral, Serdar Ogut, Robert Klie*

- 2:30 PM **683** *Measuring 3D Chemistry with Fused Multi-Modal Electron Tomography; Jonathan Schwartz, Jacob Pietryga, Jonathan Rowell, Jeffrey A. Fessler, Steve Rozeveld, Yi Jiang, Zichao Wendy Di, Richard Robinson, Robert Hovden*

- 2:45 PM **684** *Correlated AFM/STEM Study on the Mechanical Stiffness Of Defect-Engineered Graphene; Wael Joudi*

P11.3 Planetary-Materials Characterization in the Era of Mission Returned Sample Analysis

PLATFORM SESSION

Thursday 1:30 PM - Room: DB114

- 1:30 PM **701** *Microstructural Characterization of Lunar Dust from the Apollo 11 Mission by Correlative Microscopy; (invited) Tai-Jan Huang, Michelle Thompson, Nikhilesh Chawla*
- 2:00 PM **702** *Influence of Frozen Curation on Volatile Retention in Pristine Apollo 17 Samples: Initial Results Using Aberration-Corrected STEM-EELS and EDS; Brittany Cymes, Katherine Burgess, Rhonda Stroud*
- 2:15 PM **703** *Evaluation of Space Weathering and Surface Exposure Timescales for Lunar Soils in Apollo 17 Core Sample 73002 through Electron Microscopy; James McFadden, Michelle Thompson, Lindsay Keller, Roy Christoffersen, Richard Morris, Charles Shearer*
- 2:30 PM **704** *Electron Microscopy and Analysis of Martian Meteorite ALH84001 with Mochii ISS-NL on the International Space Station; Christopher Own, Kathie Thomas-Keprta, Simon Clemett, Zia Rahman, James Martinez, Lawrence Own, Zach Morales, Randal Koene, Don Pettit*

Scientific Program

A

Analytical Sciences Symposia - Thursday Late Afternoon

A08.3

From Operando Microcell Experiments to Bulk Devices

SESSION CHAIRS:

Dr. Victor Boureau, CIME EPFL

PLATFORM SESSION

Thursday 3:30 PM • Room: A107-108

- 3:30 PM **178** *Structure and Field Evolution of Magnetic Skyrmions in Co/Pt-Based Multilayers by In-Situ Electron Holography*; **Ingrid Marie Andersen**, Hui Ru Tan, Xiaoye Chen, Hang Khume Tan, Chee Beng Nelson Lim, Lee Koon, Sherry Yap, Anjan Soumyanarayanan, Pin Ho, Chris Boothroyd
- 3:45 PM **179** *In-situ TEM and Spectroscopy Studies of Nanoscale Perpendicular Magnetic Tunnel Junction*; **Hwanhui Yun**, K. Andre Mkhoyan, Deyuan Lyu, Yang Lv, Brandon Zink, Jian-Ping Wang, Khanal Pravin, Bowei Zhou, Weigang Wang
- 4:00 PM **180** *In-situ Study of Skyrmions at High Resolution using Differential Phase Contrast Microscopy*; **Hui Ru Tan**, Ingrid Marie Andersen, Ming Lin, Xiaoye Chen, Hang Khume Tan, Anjan Soumyanarayanan, Chris Boothroyd
- 4:15 PM **181** *In-situ Transmission Electron Microscopy Study of the Impact of External Electric Field in 2D Perovskites*; **Romika Sharma**, Linh Lan Nguyen, Qiannan Zhang, Tze Chien Sum, Martial Duchamp
- 4:30 PM **182** *Development of Operando X-ray Ptychography at the Advanced Light Source*; **David Shapiro**, Richard Celestre, Young-Sang Yu

A10.6

Analytical Surface Chemistry, Part II; Quantification and Composition Challenges

PLATFORM SESSION

Thursday 3:30 PM • Room: B115

- 3:30 PM **214** *SIMS Uranium Isotope Analysis of NIST Standard Glasses to Determine Detection Limits*; **Kimberly Wurth**, Travis Tenner, Benjamin Naes, Cyler Conrad
- 3:45 PM **215** *Quantitative Piezoresponse Force Microscopy Informed by Cantilever Vibrations*; (invited) **Jason Killgore**
- 4:15 PM **216** *XPS Surface Analysis Augmented Using Correlative Spectroscopy and Microscopy*; **Tim Nunney**, Paul Mack, Helen Oppong-Mensah, Mark Baker, Jonathan England
- 4:45 PM **217** *Structural Analysis of Liquid-Exfoliated Graphene as Building-Blocks for Anti-Corrosion Thin Films*; Wen Qian, Roman Schmidt, Joseph Turner, **Kaleb Hood**, Jun Jiao

Thursday, August 4

B

Biological Sciences Symposia - Thursday Late Afternoon

B03.7 Technical Advances in Cryo-EM

SESSION CHAIRS:

Chris Russo, Anchi Cheng and me, Mike Marko

PLATFORM SESSION

Thursday 3:30 PM • Room: D136

- 3:30 PM **277** *Using Inelastically Scattered Electrons to Enhance Imaging of Biological Macromolecules from any Layer of a Thick Specimen; (invited) Joshua Dickerson*, Peng-Han Lu, Dilyan Hristov, Rafal Dunin-Borkowski, Christopher Russo
- 4:00 PM **278** *Investigating Direct Focused Probe Ptychography for Single Particle Analysis; Christoph Hofer*, Chuang Gao, Emiliya Pogosyan, Kimmo Mustonen, Elisabeth Müller, Takashi Ishikawa, Timothy Pennycook
- 4:15 PM **279** *Distinguishing between Quaternary Symmetries and Pseudo-symmetries in a Prokaryotic Potassium Channel in both the Open and Closed Conformation; Peter Moeck*
- 4:30 PM **280** *Particles Per Hour as a Metric for Single-particle Cryo-EM Data Collection Speed When Comparing Super-Resolution and Hardware-Binned Data; Jonathan Fay*, Peck Jared, Joshua Strauss
- 4:45 PM **281** *On the Road to Correlative Cryo-Lift-Out, Fully Automated Waffles and Beyond – Make the Most out of your Tissue Sample; Jürgen Plitzko*, Sven Klumpe, Oda Schiøtz, Anna Bieber, Cristina Capitanio, Jakub Kuba, Alexander Rigort

B04.3 Correlative and Multimodal Microscopy and Analysis

PLATFORM SESSION

Thursday 3:30 PM • Room: D133-134

- 3:30 PM **293** *Synchrotron Radiation and Laser Light Microscopy Partnership for the Study of Biological Systems: The Case of Soft X-Ray Tomography and Structured Illumination Microscopy at Cryogenic Temperatures; (invited) Maria Harkiolaki*, Nina Vyas, Clarie Pizzey, Thomas Fish, Archana Jadhav, Chidinma Okolo
- 4:00 PM **294** *Developing a Practical Framework for Spatially Correlated Electron and X-ray High Resolution Chemical Imaging; Alice Dohnalkova*, Anil Battu, Libor Kovarik, Tamas Varga

- 4:15 PM **295** *Laboratory Cryo Soft X-ray Tomography reveals Cellular Ultrastructure at the Nanoscale; Kenneth Fahy*, Paul Sheridan, William Fyans, Fergal O'Reilly, Tony McEnroe
- 4:30 PM **296** *Connected Microscopy to Characterise the Dermal Dentine of Raja Clavata; Thornback Ray, Jebin Jestine*, Richard Johnston, Cameron Pleydell-Pearce, Benjamin Tordoff, Elizabeth Sackett, Rachel Board, Nicola Thomas, Kevin Joshy
- 4:45 PM **297** *Correlative Structure-Property Characterisation of the Leafcutter Ant (Atta cephalotes) Mandible; Richard Johnston*, Mohammed Wakib Said, David Labonte, James Russell, Elizabeth Sackett, Rachel Board

Scientific Program

P

Physical Sciences Symposia - Thursday Late Afternoon

P06.4 Electron Spectroscopies for Nano-optics in New Materials

PLATFORM SESSION

Thursday 3:30 PM • Room: A106

- 3:30 PM **543** *Tuning the Optical Properties of 2D materials with Defects and Strain*; Chia-Hao Lee, Yichao Zhang, M. Abir Hossain, Yue Zhang, Arend van der Zande, (invited) **Pinshane Huang**
- 4:00 PM **544** *Probing Optical Phenomena of Si@MoS₂ Core-Shell Architectures at Nanoscale by Valence EELS*; **Yea-Shine Lee**, Tatsuki Hinamoto, Sina Abedini Dereshgi, Shiqiang Hao, Matthew Cheng, Hiroshi Sugimoto, Minoru Fujii, Christopher Wolverton, Koray Aydin, Roberto dos Reis, Vinayak Dravid
- 4:15 PM **545** *Exploring Mie Resonances, Anapole States, and Anapole-Exciton Polaritons in Nanopatterned TMD Materials Using STEM EELS*; **Andrew Yankovich**, Carlos Maciel Escudero, Battulga Munkhbat, Denis Baranov, Rainer Hillenbrand, Javier Aizpurua, Timur Shegai, Eva Olsson
- 4:30 PM **546** *STEM-EELS Mapping of Eigenmodes and Coupling Effects of Photonic Silicon Nanocavities*; **Duncan Alexander**, Valentin Flauraud, Frank Demming-Janssen
- 4:45 PM **547** *Infrared Plasmons in Single La-doped BaSnO₃ Nanocrystals Revealed by Monochromated STEM-EELS*; **Hongbin Yang**, Andrea Konecna, F. Javier Garcia de Abajo, Philip Batson

P10.10 Advanced Imaging and Spectroscopy for Nanoscale Materials

PLATFORM SESSION

Thursday 3:30 PM • Room: D135

- 3:30 PM **685** *Large-Aperture STEM Hexapole Cs-Corrector*; **Stephan Uhlemann**, Thomas Riedel, Peter Hartel, Svenja Perl, Martin Linck, Volker Gerheim, Heiko Müller
- 3:45 PM **686** *Exploiting the Full Potential of the Advanced Two-hexapole Corrector for STEM*; **Ryusuke Sagawa**, Akira Yasuhara, Hiroki Hashiguchi, Tomoyuki Naganuma, Shinichi Tanba, Takaki Ishikawa, Thomas Riedel, Peter Hartel, Martin Linck, Stephan Uhlemann, Heiko Müller, Hidetaka Sawada
- 4:00 PM **687** *The User Adjustable Pole-piece: Expanding TEM Functionality Without Compromise*; Patrick McBean, Pat Murphy, Ryusuke Sagawa, **Lewys Jones**

4:15 PM **688** *Multi-Sun EELS: Ultra-High Energy Resolution combined with High Spatial Resolution and High Beam Current*; Niklas Dellby, Ondrej Krivanek, Neil Bacon, George Corbin, Russel Hayner, Petr Hrnčík, Nils Johnson, Benjamin Plotkin-Swing, Dylan Taylor, **Tracy Lovejoy**

4:30 PM **689** *Development of a High Electron Energy-loss Spectrometry System for Advanced Scanning Transmission Electron Microscopy*; **Masashi Watanabe**, Giulio Guzzinati, Volker Gerheim, Martin Linck, Heiko Müller, Max Haider, Thomas Isabell, Hidetaka Sawada

4:45 PM **690** *Event-based Hyperspectral EELS: Towards Nanosecond Temporal Resolution*; **Yves Auad**, Michael Walls, Jean-Denis Blazit, Odile Stéphan, Luiz Tizei, Mathieu Kociak, Francisco De la Peña, Marcel Tencé

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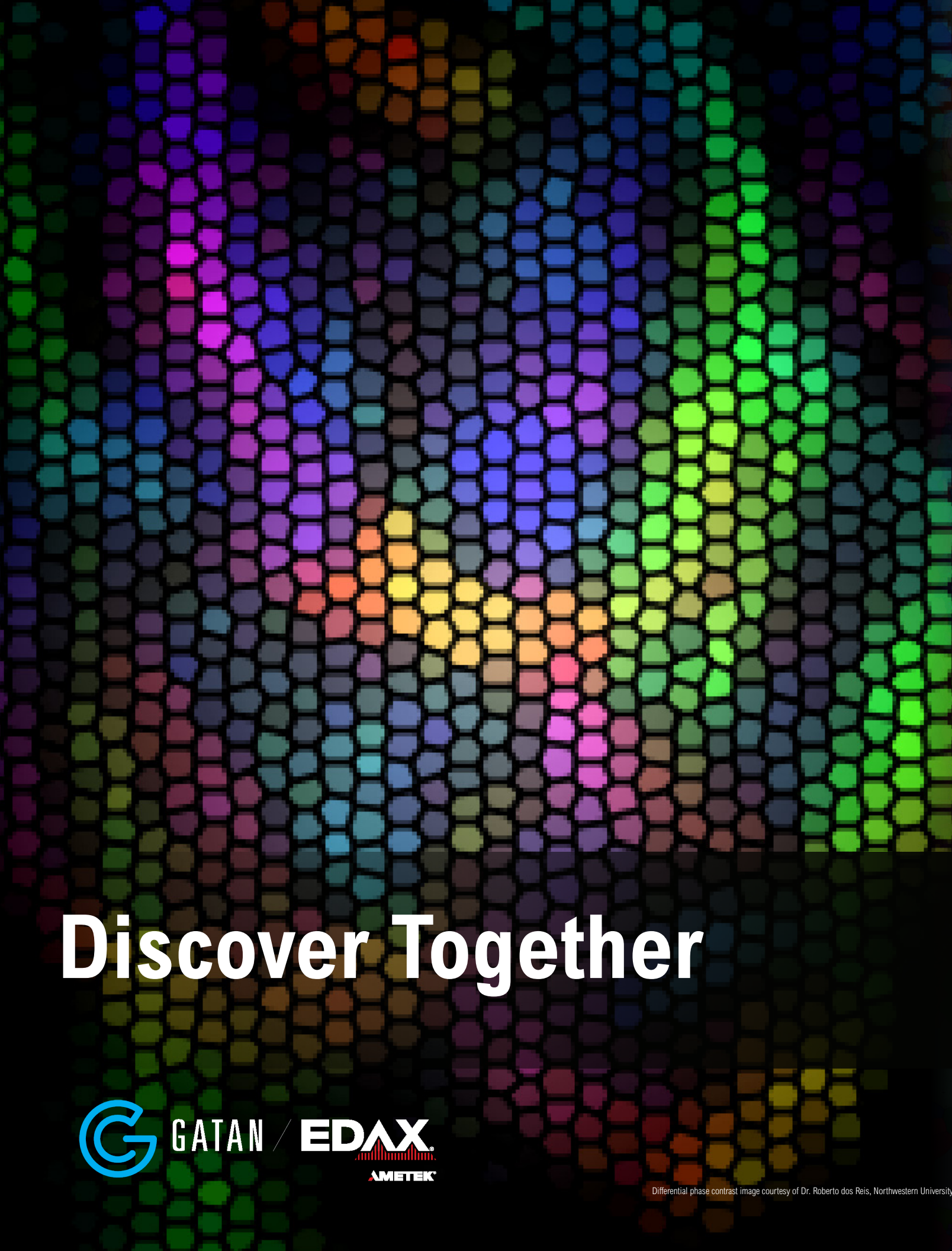
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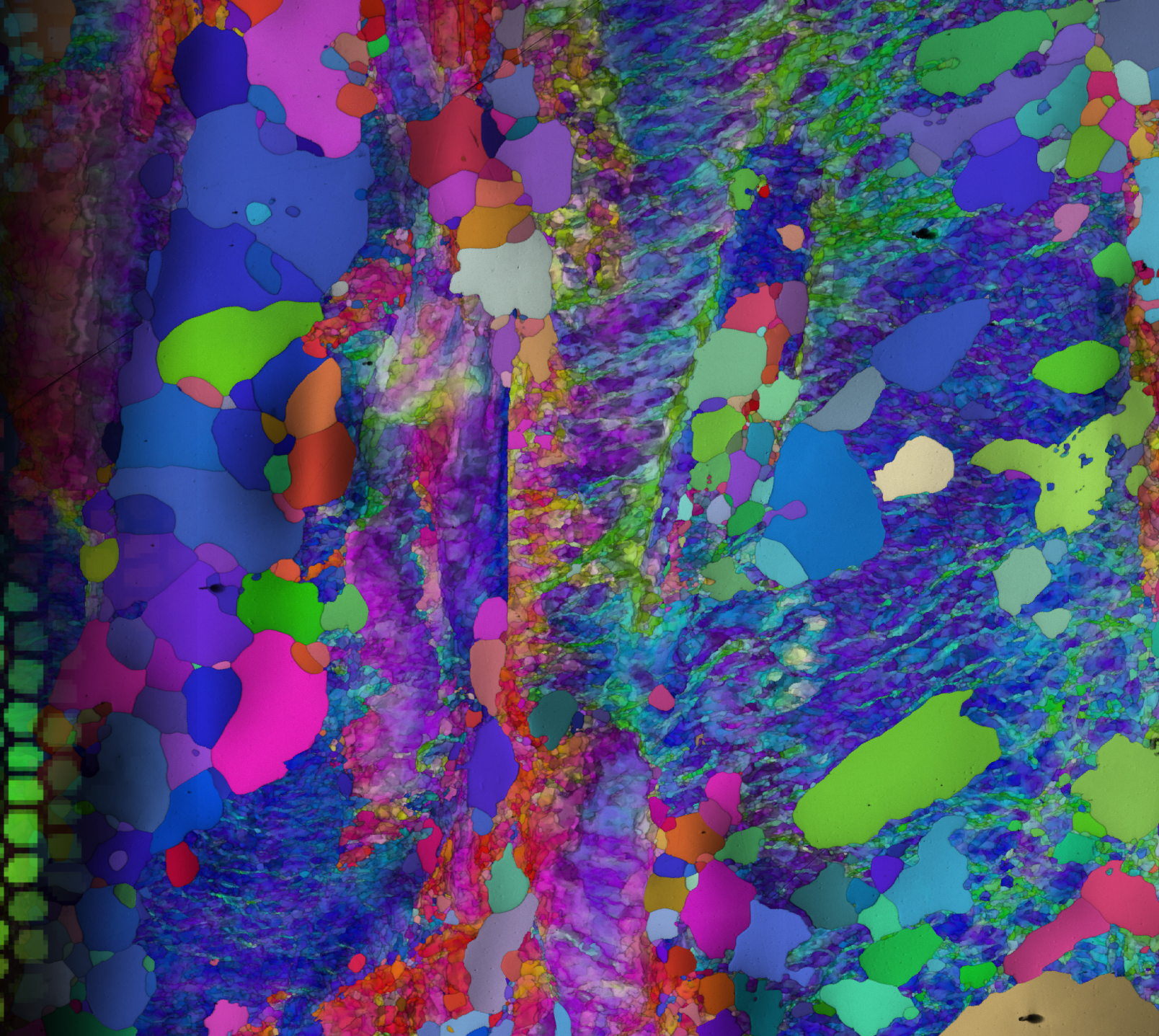
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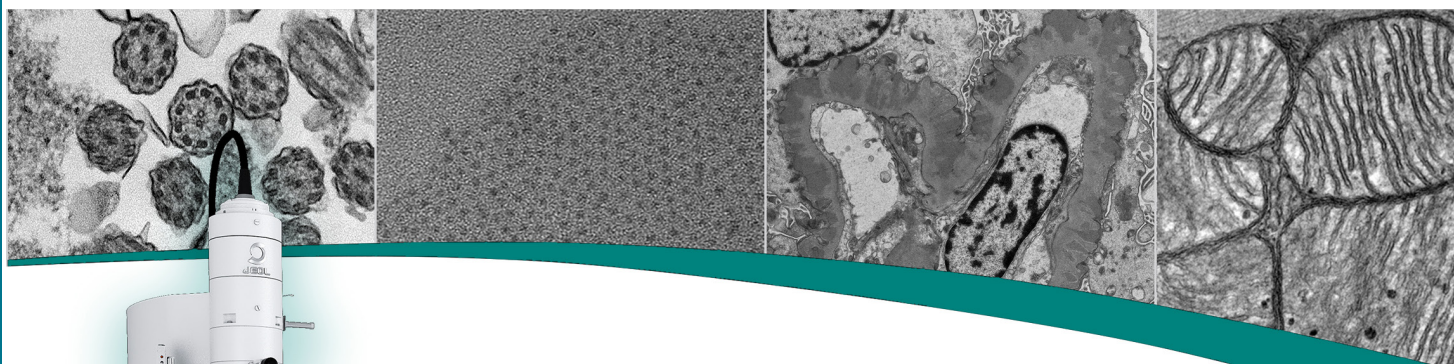
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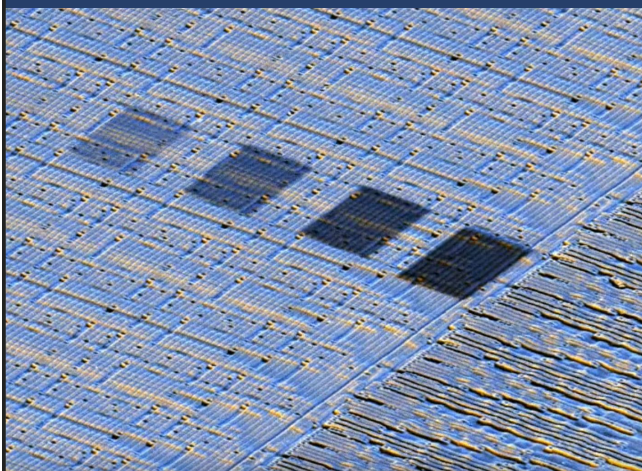
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1021	Object Research Systems
1033	Vibration Engineering Consultants
1034	Nanoscience Instruments
1039	Refeyn
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1045	Midwest Center for Cryo-Electron Tomography
1046	Pacific Northwest CryoEM Center
1125	Oxford Instruments
1134	Electron Microscopy Sciences / Quorum Technology / Diatome US
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1144	Physical Electronics
1145	condenZero
1205	Wiley
1211	GEEGAH Inc
1213	Duniway Stockroom Corp.
1216	Kleindiek Nanotechnik
1236	Thermo Fisher Scientific
1239	XEI Scientific, Inc.
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1980	Nanosurf
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Norcada, Inc.	1982
XEI Scientific, Inc.	1239

AFM / STM Accessories

NenoVision	1661
Oxford Instruments	1125
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3D- Micromac AG	1845
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Auger Microscopes

JEOL USA, Inc.	1758
Physical Electronics	1144

Backscatter Detectors

PNDetector GmbH	1842
Quantum Detectors	1765

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RMC Boeckeler	1847
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Camera / Digital Camera Systems - CDC, CMOS, Megapixel

Advanced Microscopy Techniques Corp.	1442
Angstrom Scientific Inc.	1779
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Direct Electron, LP	1656
Gatan/EDAX	2071
HORIBA Scientific	1746
PNDetector GmbH	1842
Quantum Detectors	1765
TVIPS GmbH	1771

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Ladd Research	1541
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Ted Pella Inc.	2172

Confocal Microscopes

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Carl Zeiss Microscopy, LLC	1018
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HORIBA Scientific	1746
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NanoMEGAS USA	1655

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CrystalMaker Software Ltd	1659
International Centre for Diffraction Data (ICDD)	1783
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Duniway Stockroom Corp.	1213
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Knife Resharpener / Resharpener Services

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NenoVision	1661

Nanopositioners & Stages

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XEI Scientific, Inc.	1239

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element Pi, LLC	1742
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Hummingbird Scientific	1243
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Digital Surf	1017

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zeroK NanoTech Corporation	2081

SEM / STEM Digital Imaging Systems

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Norcada, Inc.	1982
PNDetector GmbH	1842
XEI Scientific, Inc.	1239

SEM Stages, Mounts and Holders

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Hitachi High-Tech America, Inc.	1878
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Nanoscience Instruments	1034
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Renishaw, Inc.	1763

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element Pi, LLC	1742
EXpressLO LLC	1841
Fischione Instruments	1450
Microscopy Innovations, LLC	1761
Nanoscience Instruments	1034
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XEI Scientific, Inc.	1239

Specimen Storage

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Stage Automation

Voxa	1679
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Keyence Corporation of America	2179
Nanoscience Instruments	1034
NenoVision	1661
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Keyence Corporation of America	2179
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Hitachi High-Tech America, Inc.	1878
JEOL USA, Inc.	1758
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TEM Accessories

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EXpressLO LLC	1841
Gatan/EDAX	2071
Hummingbird Scientific	1243
ibss Group, Inc.	1748
Integrated Dynamics Engineering	1675

TEM Accessories cont'd.

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NanoMEGAS USA	1655
Nanoscience Instruments	1034
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PNDetector GmbH	1842
Ted Pella Inc.	2172
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XEI Scientific, Inc.	1239

TEM Specimen Holders

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EXpressLO LLC	1841
Fischione Instruments	1450
Hummingbird Scientific	1243
Nanoscience Instruments	1034
Norcada, Inc.	1982
Protochips, Inc.	1780
Tousimis	1545
Voxa	1679

Testing Equipment

Barnett Technical Services/Attolight	1543
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Transmission Electron Microscopes (TEM)

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DECTRIS Ltd	1636
Euclid TechLabs, LLC	2083
Hitachi High-Tech America, Inc.	1878
Hummingbird Scientific	1243
Integrated Dynamics Engineering	1675
JEOL USA, Inc.	1758
NanoMEGAS USA	1655
Pacific Northwest CryoEM Center	1046
Thermo Fisher Scientific	1236

Vacuum Equipment

Denton Vacuum, LLC	1664
Duniway Stockroom Corp.	1213
Electron Microscopy Sciences / Quorum Technology / Diatome US	1134
Physical Electronics	1144
Quorum Technologies	1134

Vacuum Evaporators

Denton Vacuum, LLC	1664
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Vibration Isolation Systems

Integrated Dynamics Engineering	1675
TMC / CAMECA	1872
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WDS Detectors & Systems

Bruker Corporation	1772
Gatan/EDAX	2071
Oxford Instruments	1125
PNDetector GmbH	1842
Thermo Fisher Scientific	1236

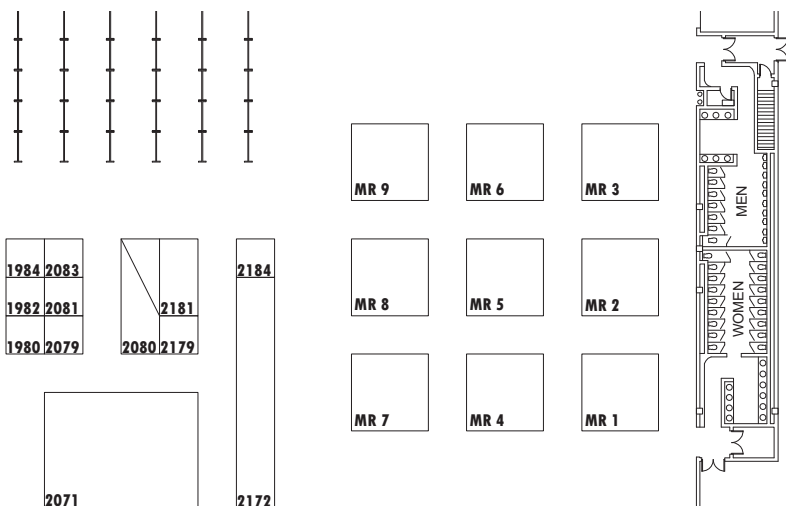
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Carl Zeiss Microscopy, LLC	1018
CrystalMaker Software Ltd	1659
DECTRIS Ltd	1636
HORIBA Scientific	1746
JEOL USA, Inc.	1758
Oxford Instruments	1125
Physical Electronics	1144
PNDetector GmbH	1842
Sigra, Inc.	1671
TESCAN	1544

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Level 2—Hall A, B and C



ENTRANCE

Exhibit Hall Schedule

Monday, August 1

12:00 - 1:30 PM	Lunch in Exhibit Hall
12:00 PM - 5:30 PM	Exhibit Hall Open
3:00 PM - 5:00 PM	Poster Presentations
5:45 PM	Vendor Tutorials

Tuesday, August 2

10:00 AM - 10:30 AM	Coffee Break in Exhibit Hall
10:00 AM - 5:30 PM	Exhibit Hall Open
12:00 PM - 1:30 PM	Lunch Break in Exhibit Hall
3:00 PM - 5:00 PM	Poster Presentations
5:45 PM	Vendor Tutorials

Wednesday, August 3

10:00 AM - 10:30 AM	Coffee Break in Exhibit Hall
10:00 AM - 5:30 PM	Exhibit Hall Open
12:00 PM - 1:30 PM	Lunch Break in Exhibit Hall
3:00 PM - 5:00 PM	Poster Presentations
5:45 PM	Vendor Tutorials

Thursday, August 4

10:00 AM - 12:00 PM	Coffee Break and Poster Session
10:00 AM - 12:00 PM	Poster Presentations
10:00 AM - 2:00 PM	Exhibit Hall Open
12:00 PM - 1:30 PM	Lunch Break in Exhibit Hall

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**See you
next year.**