

## M&M 2016 PLENARY LECTURES AND AWARDS

### SESSION CHAIRS:

Mike Marko, MSA President  
 Thomas F. Kelly, MAS President  
 Jaret J. Frafjord, IMS President  
 Joseph R. Michael, M&M 2016 Program Chair

### Monday 8:30 AM • Union Station Ballroom

- 8:30 AM **OPENING WELCOME:**  
 Mike Marko, MSA President  
 Thomas F. Kelly, MAS President  
 Jaret J. Frafjord, IMS President
- 9:00 AM **M&M PLENARY LECTURE**  
*Beyond the Limits of Microscopy: Revealing the Unseeable Through Hollywood Visual Effects*  
 Drew Berry; The Walter + Eliza Hall Institute of Medical Research, Australia
- 10:00 AM **MAS Awards Presentation**
- 10:15 AM **IMS Awards Presentation**
- 10:30 AM **Coffee Break, Ballroom Foyer**
- 10:50 AM **MSA Awards Presentation**
- 11:00 AM **M&M Meeting Awards Presentation**
- 11:15 AM **M&M Plenary Lecture**  
*Materials for the 21st Century*  
 Mark Miodownik; University College London, United Kingdom

## A ADVANCES IN INSTRUMENTATION SYMPOSIA—MONDAY AFTERNOON

### A04.1 Advances in FIB Instrumentation and Applications in Materials and Biological Sciences

#### SESSION CHAIR:

Lucille Giannuzzi, EXpressLO LLC

#### PLATFORM SESSION

#### Monday 1:30 PM • Room: C216

- 1:30 PM **3** *Simple Specimen Preparation Method for In Situ Heating Experiments*; Q Wang, J Wang, MJ Kim; The University of Texas, Dallas
- 1:45 PM **4** *Manipulation of Ceramic Fibers to EXpressLO™ Grids for FIB/TEM Analysis*; LA Giannuzzi; EXpressLO LLC; SL Harrison, KL Williams, RK Goduguchinta, EG Vaaler, JL Schneider, J Pegna; Free Form Fibers LLC
- 2:00 PM **5** (INVITED) *Focused Ion Beam on Radioactive Specimens: Operational Challenges and Approach*; A Parsi, PD Freyer; Westinghouse Electric Company LLC
- 2:30 PM **6** *Quantification of STEM-EDS with Ion Implantation*; Y Liu, R Garcia, FA Stevie; North Carolina State University
- 2:45 PM **7** *Nanoscale Analysis of Humidity Dependent Tonal Appearance of Platinum/Palladium Prints*; K Scott; National Institute of Standards and Technology; ML Clarke; Smithsonian Institution; A Myers; National Institute of Standards and Technology

### A06.1 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

#### SESSION CHAIRS:

Chaoying Ni, University of Delaware  
 Peter van Aken, Max Planck Institute for Solid State Research  
 Masashi Watanabe, Lehigh University

#### PLATFORM SESSION

#### Monday 1:30 PM • Room: C224-25

- 1:30 PM **8** (INVITED) *Fast Aberration Measurement in Multi-Dimensional STEM*; AR Lupini, M Chi, SV Kallinin, AY Borisevich, JC Idrobo, S Jesse; Oak Ridge National Laboratory
- 2:00 PM **9** *Application of High Speed Cameras for 4D Data Collection in S/TEM*; A Pakzad; C Czarnik; Gatan Inc.; R Geiss, E Jackson; Colorado State University; D Mastronarde; University of Colorado, Boulder
- 2:15 PM **10** *Electric and Magnetic Field Mapping with the pnCCD (S)TEM Camera*; M Huth, S Ihle, R Ritz, M Simson, H Soltau; PNDetector GmbH, Germany; V Migunov, M Duchamp, R Dunin-Borkowski; Ernst Ruska-Centre, Forschungszentrum Jülich, Germany; et al.
- 2:30 PM **11** **M&M 2016 STUDENT AWARDEE** *Reverse Engineering Cadmium Yellow Paint from Munch's "The Scream" with Correlative 3D Spectroscopic and 4D Crystallographic STEM*; B Levin, KX Nguyen, ME Holtz; Cornell University; MB Wiggins; University of Delaware; MG Thomas; Cornell University; ES Tveit; Munch Museum, Norway; JL Mass; Rijksmuseum, Netherlands, DA Muller; Cornell University, et al.
- 2:45 PM **12** *Simultaneous DualEELS and EDS Analysis Across the Ohmic Contact Region in FinFET Electronic Devices – Exploring the Effects of Electron Beam Damage*; P Longo; Gatan Inc.; H Zhang; Precision TEM, Inc.; RD Twesten; Gatan Inc

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—MONDAY AFTERNOON *continued*

### A11.1 Advances in Scanning Electron/Ion Instrumentation and Detectors

#### SESSION CHAIR:

Brad Thiel, SUNY Polytechnic Institute

#### PLATFORM SESSION

Monday 1:30 PM • Room: C121-22

- 1:30 PM **13** (INVITED) *Multi-Beam Scanning Electron Microscope Design*; P Kruit, Y Ren; Delft University of Technology, Netherlands
- 2:00 PM **14** *Selective Detection of Backscattered Electrons in the Compound Lens Equipped UHR SEM*; P Wandrol, R Vašina; FEI Company, Czech Republic; AM Sandu, EJ Vesseur; FEI Company, Netherlands; L Tüma; FEI Company, Czech Republic
- 2:15 PM **15** *Design of an Ultra-High-Resolution SEM for Enhanced Analysis*; J Jiruše, M Havelka, J Polster; TESCAN Brno, s.r.o., Czech Republic
- 2:30 PM **16** (INVITED) *Miniature Electron Beam Columns: From the Lab to the Field*; LP Muray, S Davilla, JP Spallas; Keysight Technologies

### A15.1 Quantitative Measurement of Intensities and Distances in Electron Microscopy

#### SESSION CHAIR:

Jinwoo Hwang, Ohio State University

#### PLATFORM SESSION

Monday 1:30 PM • Room: C212

- 1:30 PM **17** (INVITED) *Quantification and Sensible Correction for Energy-Loss and Thickness-Dependent Contrast Complications in Atomic-scale Electron Energy-Loss Spectroscopy*; HL Xin; Brookhaven National Laboratory; H Tan; National Institute of Standards and Technology; C Dwyer; Arizona State University; Y Zhu; Monash University
- 2:00 PM **18** *Misalignment Induced Artifacts in Quantitative Annular Bright-Field Imaging*; P Gao; The University of Tokyo, China; A Kumamoto, R Ishikawa, N Lugg, N Shibata, Y Ikuhara; The University of Tokyo, Japan
- 2:15 PM **19** *Sample Tilt Effects on Atom Column Position Determination in ABF-STEM Imaging*; D Zhou; Max Planck Institute for Solid State Research, Germany; K Müller-Caspary; Universität Bremen, Germany; W Sigle; Max Planck Institute for Solid State Research, Germany; FF Krause, A Rosenauer; Universität Bremen, Germany; PA van Aken; Max Planck Institute for Solid State Research, Germany
- 2:30 PM **20** *Quantitative, Real-Space Statistical Analysis of Imperfect Lattices*; BH Savitzky, R Hovden, K Whitham, T Hanrath, LF Kourkoutis; Cornell University

- 2:45 PM **21** *Experimental Contrast of Atomically-Resolved Cc/Cs-Corrected 20-80kV SALVE Images of 2D-Objects Matches Calculations*; Z Li, J Biskupek, H Rose; Ulm University, Germany; M Linck, P Hartel, H Müller, M Haider; Corrected Electron Optical Systems GmbH, Germany, U Kaiser; Ulm University, Germany, et al.

B

## BIOLOGICAL SCIENCES SYMPOSIA—MONDAY AFTERNOON

### B01.1 Nanostructured Scaffolds for Regenerative Medicine

#### SESSION CHAIRS:

Marco C. Bottino, Indiana University

Caroline A Miller, Indiana University

#### PLATFORM SESSION

Monday 1:30 PM • Room: C111

- 1:30 PM **22** (INVITED) *Microporous Electrospun Scaffolds for Skin Repair and Regeneration*; PP Bonvallet, SL Bellis; University of Alabama, Birmingham
- 2:00 PM **23** (INVITED) *Nanofibers for Regenerative Dentistry: From Scaffolds to Drug Delivery Systems*; MC Bottino; Indiana University
- 2:30 PM **24** *3D Cell Culture and Microscopy in a Capsule with Scaffolds, Tumors & Stem Cells*; SL Goodman; Microscopy Innovations, LLC; T Lyden; University of Wisconsin-River Falls; W-J Li, T Yen; University of Wisconsin-Madison
- 2:45 PM **25** **M&M 2016 STUDENT AWARDEE** *The Prospective Application of Graphene Loaded Poly(4-Vinylpyridine) Fibrous Scaffolds on the Dental Pulp Stem Cells Proliferation and Differentiation*; L Zhang, C-C Chang, M Simon, M Rafailovich; Stony Brook University

### B07.1 3D Structures of Macromolecular Assemblies, Cellular Organelles and Whole Cells

#### SESSION CHAIRS:

Teresa Ruiz, University of Vermont

Kristin Parent, Michigan State University

#### PLATFORM SESSION

Monday 1:30 PM • Room: C115

- 1:30 PM **26** (INVITED) *Complete Cells and a Complete Scientist: A Tribute to Dr. Gina Sosinsky*; ME Martone; University of California, San Diego
- 2:00 PM **27** **MSA POST-DOCTORAL AWARDEE** *Strategies for CLEM Imaging*; CM Hampton, RS Dillard, TM Desai, M Marin, G Melikian, ER Wright; Emory University
- 2:15 PM **28** *Analysis of Mitochondrial Networks by Serial Block Face SEM*; RD Leapman, JD Hoyne, BC Kuo, GN Calco, G Zhang, MA Aronova; National Institutes of Health

2:30 PM **29** (INVITED) *The Structure of the Relaxed Thick Filaments from Lethocerus Flight Muscle*; Z Hu, DW Taylor; Florida State University; MK Reedy, RJ Edwards; Duke University Medical Center; KA Taylor; Florida State University

P

## PHYSICAL SCIENCES SYMPOSIA— MONDAY AFTERNOON

### P02.1 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

Karen L. More, Oak Ridge National Laboratory

#### PLATFORM SESSION

Monday 1:30 PM • Room: E160AB

1:30 PM **30** (INVITED) *Measuring Population Distributions and Catalytic Hierarchy of the Active Species in Gold on Metal Oxide Catalysts for Low Temperature CO Oxidation*; CJ Kiely; Lehigh University; Q He; Oak Ridge National Laboratory; S Freakley, JK Edwards, GJ Hutchings; Cardiff University, United Kingdom

2:00 PM **31** *Microstructural Transformations of  $La_{0.6}Sr_{0.4}MnO_3$  to Nano-Layered Mn Oxide During Electrochemical Water Oxidation*; B Deljoo, A Shirazi Amin; University of Connecticut; SE Balaghi, Y Mousazadeh; Islamic Azad University, Iran; T Jafari; University of Connecticut; MM Najafpour; Institute for Advanced Studies in Basic Sciences, Iran; SL Suib, M Aindow; University of Connecticut

2:15 PM **32** *Evolution of  $Au_{25}(SR)_{18}$  Nanoclusters on Ceria Surfaces During In Situ Electron Beam Irradiation*; W Gao; University of California, Irvine; Z Wu; Oak Ridge National Laboratory; G Graham; University of Michigan; X Pan, K More; University of California, Irvine; M Chi; Oak Ridge National Laboratory

2:30 PM **33** (INVITED) *On the Study of PEM Fuel Cells by Transmission Electron Microscopy*; S Rasouli, D Groom, K Yu, A Godoy, A Bovik; University of Texas, Austin; D Myers; Argonne National Laboratory; N Nakashima; Kyushu University, Japan, PJ Ferreira; University of Texas, Austin

### P06.1 Magnetic Materials, Phenomena and Imaging at the Nanoscale

#### SESSION CHAIR:

Amanda Petford-Long, Argonne National Laboratory

#### PLATFORM SESSION

Monday 1:30 PM • Room: C213

1:30 PM **34** (INVITED) *Recent Advances and Future Opportunities with Magnetic Soft X-Ray Microscopy*; P Fischer; Lawrence Berkeley National Laboratory

2:00 PM **35** **M&M 2016 STUDENT AWARDEE** *Quantifying Magnetism on the nm Scale: EMCD on Individual FePt Nanoparticles*; SG Schneider, D Pohl; Leibniz-Institut für

Festkörper- und Werkstoffforschung, Dresden, Germany; S Löffler; Technische Universität Wien, Austria; D Kasinathan; Max Planck Institute for Chemical Physics of Solids, Germany; J Rusz; Uppsala University, Sweden; P Schattschneider; Technische Universität Wien, Austria; L Schultz, B Rellinghaus; Leibniz-Institut für Festkörper- und Werkstoffforschung, Dresden, Germany

2:15 PM **36** *Mapping Magnetic Ordering with Aberrated Electron Probes in STEM*; JC Idrobo; Oak Ridge National Laboratory; J Rusz, J Spiegelberg; Uppsala University, Sweden; MA McGuire, CT Symons, RR Vatsavai, C Cantoni, AR Lupini; Oak Ridge National Laboratory

2:30 PM **37** *Periodic Magnetization Pattern for Controlled Domain Wall Motion in Nanowires*; S Lopatin, YP Ivanov, J Kosel; King Abdullah University of Science & Technology, Saudi Arabia; A Chuvilin; CIC nanoGUNE, Spain

### P09.1 From Angstrom to AU: Studies of Planet-Forming Materials

#### SESSION CHAIR:

Eve L. Berger, NASA Johnson Space Center

#### PLATFORM SESSION

Monday 1:30 PM • Room: C113

1:30 PM **38** *Morphology of Cometary Dust at the Nanometre Scale Detected with MIDAS*; R Schmied, T Mannel, K Torkar, H Jeszenszky; Space Research Institute, Austria; J Romstedt; European Space Research and Technology Centre, Netherlands; MS Bentley; Space Research Institute, Austria

1:45 PM **39** *Atomic Resolution Analysis of Perovskite from the Early Solar System*; TJ Zega, V Magna, K Domanik, K Muralidharan; University of Arizona

2:00 PM **40** *Insights into Chondrule Formation Processes from EMP and LA-ICP-MS Analyses of Chondrule in a Chondrule from Allende*; J Das; Syracuse University; D Trail; University of Rochester; S Baldwin; Syracuse University

2:15 PM **41** (INVITED) *Cathodoluminescence Mapping of Chondrules and Their Constituents: Identification of Zoning Patterns in Olivine and Chondrules and Implications for Their Formation History and Parent Bodies Processes*; J Gross; Rutgers University; TL Dunn; Colby College

### Z02.1 Sorby Award Lecture

#### SESSION CHAIR:

Jaret J Frafjord, IMS President

#### PLATFORM SESSION

Monday 1:30 PM • Room: C123-124

1:30 PM **42** (INVITED) *From Correlative Microscopy to 3D Understanding of Material Microstructures*; F Muecklich; Universität des Saarlandes, Germany; D Britz; Materials Engineering Center Saarland, Saarbruecken, Germany; M Engstler; Universität des Saarlandes, Germany

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—MONDAY AFTERNOON

### A06.P1 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

#### POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

#### POSTER # 1

3:00 PM **43** *Initial Results from a CdTe High-Energy X-Ray Detector on a TEM*; HO Colijn, DW McComb; The Ohio State University

#### POSTER # 2

3:00 PM **44** *Atomic Resolution EELS Study of Polarization of BaTiO<sub>3</sub> in the Interface with Metallic Manganite*; X Hu, P Phillips, R Klie; University of Illinois, Chicago

#### POSTER # 3

3:00 PM **45** *Effective Method for Decreasing Detection Limit of Dopant Concentration in Semiconductor Using Dual SDD Analysis System*; K-I Fukunaga, N Endo; JEOL, Ltd, Japan; M Suzuki; Thermo Fischer Scientific Japan; Y Kondo; JEOL, Ltd, Japan

#### POSTER # 4

3:00 PM **46** *Ultrasensitive X-Ray Detection System of Two Very Large Sized SDDs for Aberration Corrected 300 kV Microscope*; I Ohnishi, K Miyatake, Y Jimbo, Y Iwasawa, M Morita, T Sasaki, H Sawada, E Okunishi; JEOL, Ltd, Japan

#### POSTER # 5

3:00 PM **47** *Study of Strain and Intermixing at the BaSnO<sub>3</sub>/SrTiO<sub>3</sub> and BaSnO<sub>3</sub>/LaAlO<sub>3</sub> Interfaces Using STEM and EELS*; K Ganguly, A Prakash, C Leighton, B Jalan, KA Mkhoyan, JS Jeong, H Yun; University of Minnesota

#### POSTER # 6

3:00 PM **48** *A Ge/SiNx Standard for Evaluating the Performance of X-Ray Detectors in the SEM, S/TEM and AEM*; NJ Zaluzec; Argonne National Laboratory; J-P DesOrmeaux, J Roussie; TEMWindows/SiMPore Inc

#### POSTER # 7

3:00 PM **49** *Aberration-Corrected Scanning Transmission Electron Microscopy and Spectroscopy of Nonprecious Metal Nanoparticles in Titania Aerogels*; TH Brintlinger, PA DeSario, JJ Pietron, DR Rolison, RM Stroud; U.S. Naval Research Laboratory

#### POSTER # 8

3:00 PM **50** *The Combination of STEM Tomography and STEM/EDS Analysis of NiSi formation Related Defects in Semiconductor Wafer-Foundries*; B Fu, M Gribelyuk, L Dumas, C Fang, N Lamanque, L Hodgkins, E Chen; GlobalFoundries, Inc

#### POSTER # 9

3:00 PM **51** *Beyond Electrochemical Analysis: 2D to 4D Correlation of Structure and Chemistry in Li-Ion Batteries*; S Freitag; Carl Zeiss Microscopy GmbH, Germany

#### POSTER # 10

3:00 PM **52** *A Challenge to Multivariate Statistical Analysis: Spent Nuclear Fuel*; CM Parish, TJ Gerczak, PD Edmondson, KA Terrani; Oak Ridge National Laboratory

#### POSTER # 11

3:00 PM **53** *Characterization of Palladium and Gold Nanoparticles on Granular Activated Carbon as an Efficient Catalyst for Hydrodechlorination of Trichloroethylene*; K Meduri, A Barnum; Portland State University; G O'Brien Johnson, PG Tratnyek; Oregon Health & Science University; J Jiao; Portland State University

#### POSTER # 12

3:00 PM **54** *Minimize Electron Beam Damage During Characterization of Carbon-Depletion in Ultra Low-K Dielectric Materials by STEM EELS Elemental Mapping*; WW Zhao, M Gribelyuk; GlobalFoundries, Inc

#### POSTER # 13

3:00 PM **55** *Performance of a Direct Electron Detector for the Application of Electron Energy-Loss Spectroscopy*; JL Hart, AC Lang; Drexel University; C Trevor, R Twesten; Gatan Inc.; ML Taheri; Drexel University

#### POSTER # 14

3:00 PM **56** *Simple and Compact Electrostatic Cs-Corrector Using Annular and Circular Electrodes*; T Kawasaki; Japan Fine Ceramics Center; T Ishida; Nagoya University, Japan; T Kodama; Meijo University, Japan; M Tomita; Vacuum Device Ltd, Japan; T Matsutani; Kinki University, Japan; T Ikuta; Osaka Electro-Communication University, Japan

### A11.P1 Advances in Scanning Electron/Ion Instrumentation and Detectors

#### POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

#### POSTER # 15

3:00 PM **57** *Image Simulation and Analysis to Predict the Sensitivity Performance of a Multi-Electron Beam Wafer Defect Inspection Tool*; M Mukhtar, K Quoi; SUNY Polytechnic Institute; B Bunday, M Malloy; SEMATECH; B Thiel; SUNY Polytechnic Institute

#### POSTER # 16

3:00 PM **58** *Design of a HAADF Detector for Z Contrast in SEM*; G L'Esperance, J-P Bailon, O Sioui-Latulippe; Ecole Polytechnique, Montreal, Canada; J Hunt, S Gubbens; Gatan Inc.

#### POSTER # 17

3:00 PM **59** *A Combination BSE and CL Detector Using Silicon Photomultipliers*; NC Barbi, OE Healy, RB Mott; Pulsetor LLC



**POSTER # 18**

3:00 PM **60** *In-Depth Sample Analysis with a Signal-Selective SEM Detection System*; M Havelka, J Jiruše, P Mareš, J Kološová; TESCAN Brno, s.r.o, Czech Republic

**POSTER # 19**

3:00 PM **61** *Image Sharpness Measurement in Scanning Electron Microscopy Based on Derivative Methods in ISO/TS 24597 Document*; BC Park; Korea Research Institute of Standards and Science, Republic of Korea; S Kim; Chonbuk National University, Republic of Korea; I-S Oh, JS Kim; Chonbuk National University, Republic of Korea

**POSTER # 20**

3:00 PM **62** *A Static Low Energy Ion Source for Local Surface Modification*; PH Trompenaars; FEI Company, Netherlands

**POSTER # 21**

3:00 PM **63** *"Smart Microscopy": Feature Based Adaptive Sampling for Focused Ion Beam Scanning Electron Microscopy*; T Dahmen; Deutsche Forschungszentrum für Künstliche Intelligenz GmbH, Germany; N de Jonge; Leibniz Institute of New Materials, Germany; P Trampert; Deutsche Forschungszentrum für Künstliche Intelligenz GmbH, Germany; M Engstler, C Pauly, F Mücklich; Saarland University, Germany; P Slusallek; Deutsche Forschungszentrum für Künstliche Intelligenz GmbH, Germany

**POSTER # 22**

3:00 PM **64** *A New Application of EBSD Technique – Determination of Unknown Bravais Lattice*; L Li, M Han; East China Jiaotong University, China; G Nolze; BAM Federal Institute for Materials Research and Testing, Germany

**POSTER # 23**

3:00 PM **65** *Practical Considerations for High-Resolution Transmission Kikuchi Diffraction Mapping and Analysis in Titanium Alloys*; J Orsborn, G Lee, SA Romo; The Ohio State University; TF Broderick; General Electric; AJ Ramirez, DW McComb, HL Fraser; The Ohio State University

**POSTER # 24**

3:00 PM **66** *EDS Windows and Plasma Cleaning: Characterization and Damage Mechanisms*; J Rafaelsen; EDAX, Inc

**POSTER # 25**

3:00 PM **67** *The Study of "Window-less" EDS Detector with Low Voltage FE-SEM*; Y Yamamoto, H Takahashi; JEOL, Ltd, Japan; H Morita, Oxford Instruments, Japan; H Yamada, National Institute of Technology, Japan; M Takakura, N Kikuchi, T Nokuo; JEOL, Ltd, Japan; N Erdman; JEOL USA, Inc.

**A15.P1 Quantitative Measurement of Intensities and Distances in Electron Microscopy**

**POSTER SESSION**

**Monday 3:00 PM • Room: Exhibit Hall**

**POSTER # 26**

3:00 PM **68** *An Extended Ageing Study of a Uranium Dioxide Layer on Uranium Metal Using the EDS/XPP Method*; CP Poulter; AWE plc, United Kingdom

**POSTER # 27**

3:00 PM **69** *Electron Beam Induced Mass Loss Dependence on Stained Thin Epon Resin Sections*; R Skoupy; Institute of Scientific Instruments ASCR, Czech Republic; J Nebesarova; Biology Center ASCR, Czech Republic; V Krzyzaneck; Institute of Scientific Instruments ASCR, Czech Republic

**POSTER # 28**

3:00 PM **70** *Image Processing of Energy Filtered Transmission Electron Microscopy Maps in Order to Extract Nanoscale Magnetic Properties of CoCr-Based Magnetic Thin Films*; JF Al-Sharab, M Benalla; Northwestern State University

**POSTER # 29**

3:00 PM **71** *Oxygen Octahedral Picker: A Digital Micrograph Script Tool for Extracting Quantitative Information from HAADF and ABF Images*; Y Wang, U Salzberger, W Sigle, YE Suyolcu, PA van Aken; Max Planck Institute for Solid State Research, Germany

**POSTER # 30**

3:00 PM **72** *Extraction of Quantitative Information from Non-Optimum-Focus Aberration-Corrected HRTEM Images by Image Processing*; C Wen; Southwest University of Science and Technology, China; DJ Smith; Arizona State University

**POSTER # 31**

3:00 PM **73 M&M 2016 STUDENT AWARDEE** *Effect of Probe Channeling on Differential Phase Contrast at the Atomic Scale*; S Im, JM Johnson, J Hwang; The Ohio State University

**POSTER # 32**

3:00 PM **74** *Evaluation of Electron Microscopy Techniques for the Purpose of Classification of Nanomaterials*; J Mielke; BAM Federal Institute for Materials Research and Testing, Germany; F Babick; Technische Universität Dresden, Germany; T Uusimäki; EAWAG Aquatic Research, Switzerland; P Müller; BASF SE, Germany; E Verleysen; CODA-CERVA, Belgium; V-D Hodoroba; BAM Federal Institute for Materials Research and Testing, Germany

**POSTER # 33**

3:00 PM **75** *High-Throughput, Semi-Automated Quantitative STEM Atom Counting in Supported Metal Nanoparticles Using a Conventional TEM/STEM*; SD House; University of Pittsburgh; Y Chen, R Jin; Carnegie Mellon University; JC Yang; University of Pittsburgh

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—

MONDAY AFTERNOON *continued*

## POSTER # 34

3:00 PM **76** *Development of Real-Time Probe Current Calibration for Performing Quantitative STEM with a Cold Field-Emission Gun*; SD House; University of Pittsburgh; CT Schamp, R Henry; Hitachi High Technologies America, Inc.; D Su, EA Stach; Brookhaven National Laboratory; JC Yang; University of Pittsburgh

## POSTER # 35

3:00 PM **77** *Exploring Boltzmann-Factor Distributions of Precipitation-Nuclei in the TEM*; JC Roberts, P Fraundorf; University of Missouri; J Kasthuri; SunEdison Solar Inc.; D Osborn; University of Missouri

## POSTER # 36

3:00 PM **78** *Determining Interplanar Distances from STEM-EDX Hyperspectral Maps*; J Ditto, G Mitchson, DR Merrill; University of Oregon; DL Medlin; Sandia National Laboratories; ND Browning; Pacific Northwest National Laboratory; DC Johnson; University of Oregon

## POSTER # 37

3:00 PM **79** *Determination of Image Distortion Through Fitting of a Reference Lattice*; G Buscher; The University of Tennessee, Knoxville; MF Chisholm; Oak Ridge National Laboratory

## POSTER # 38

3:00 PM **80** *Challenges of Oversimplifying Z-Contrast in Atomic Resolution ADF-STEM*; RJ Wu, ML Odlyzko, KA Mkhoyan; University of Minnesota

## POSTER # 39

3:00 PM **81** *Local Crystallography for Quantitative Analysis of Atomically Resolved Images*; A Belianinov, Q He, M Kravchenko; Oak Ridge National Laboratory; S Jesse; The Center for Nanophase Materials Sciences; A Borisevich, SV Kalinin; Oak Ridge National Laboratory

B

## BIOLOGICAL SCIENCES POSTER SESSIONS—MONDAY AFTERNOON

### B07.P1 3D Structures of Macromolecular Assemblies, Cellular Organelles and Whole Cells

## POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

## POSTER # 40

3:00 PM **82** *Role of DDR2 ECD Oligomerization in Binding to Collagen*; D Yeung, C Wang, J Wellmerling, G Agarwal; The Ohio State University

## POSTER # 41

3:00 PM **83** *Three-Dimensional Structure of Neuropeptide Y Pre-Pro-Peptide to Reveal its Interaction with Lipid Membrane*; L Xing, VM Hsiao, ZZ Kuang, Y Ngo, S Kim, LF Drummy; U.S. Air Force Research Laboratory, WPAFB

## POSTER # 42

3:00 PM **84** *3D Reconstruction of the NADH:Ubiqinone Oxidoreductase (Complex I) from *Yarrowia lipolytica* Lacking Subunit NUMM*; CT Nolan; University of Vermont; K Kmita, V Zickermann; Goethe University of Frankfurt, Germany; T Ruiz, M Radermacher; University of Vermont

## POSTER # 43

3:00 PM **85** *Structural Significance of EmaA Glycosylation in *A. actinomycetemcomitans**; A Watson, G Tang-Siegel, CJ Brooks, M Radermacher, KP Mintz, T Ruiz; University of Vermont

## POSTER # 44

3:00 PM **86** *Structural Rearrangements in R432A Variant of AAV2 Affect Genome Packaging*; LM Drouin, B Lins; University of Florida; M Janssen; University of California, San Diego; A Bennett, PR Chipman, N Muzyczka; University of Florida; TS Baker; University of California, San Diego, M Agbandje-McKenna; University of Florida, et al.

## POSTER # 45

3:00 PM **87** *Cryo-Electron Tomography Provides Insight Into the Native Architecture of the Measles Virus Assembly Site*; JD Strauss; Emory University School of Medicine; Z Ke; Georgia Institute of Technology; RK Plempner; Georgia State University; ER Wright; Emory University School of Medicine

## POSTER # 46

3:00 PM **88** *Choice of Specimen Thickness in Axial Bright-Field STEM Tomography of Cells*; Q He, RD Leapman; National Institutes of Health

## POSTER # 47

3:00 PM **89** *A Correlative Immunoconfocal and Electron Microscopic Study of Gap Junctions in Interlocking Domains of the Lens*; SK Biswas, L Brako, W-K Lo; Morehouse School of Medicine

## POSTER # 48

3:00 PM **90** *Freeze Drying Method with Gaseous Nitrogen to Preserve Fine Ultrastructure of Biological Organizations for Scanning Electron Microscopy, Helium Ion beam Microscopy and Fluorescence Microscopy*; K Uryu, NH Soplop, D Acehan; The Rockefeller University

## POSTER # 49

3:00 PM **91** *Generation of 3D Surface Models from Scanning Electron Microscope Images*; TE Amish, BT Hansen, ER Fischer; Rocky Mountain Labs/NIAID/NIH

## POSTER # 50

3:00 PM **92** *Morphological and Production Changes in Stressed Red Yeasts Monitored Using SEM and Raman Spectroscopy*; K Hrubanova, O Samek; Institute of Scientific Instruments ASCR, Czech Republic; A Haronikova; Brno University

of Technology, Czech Republic; S Bernatova, P Zemanek; Institute of Scientific Instruments ASCR, Czech Republic; I Marova; Brno University of Technology, Czech Republic; V Krzyzanek; Institute of Scientific Instruments ASCR, Czech Republic

**POSTER # 51**

3:00 PM **93** *Ultrastable Gold Substrates Improve the Resolution of 3D Reconstructed Density Maps from Electron Micrographs and Tomograms*; CJ Russo, IS Fernandez, TA Bharat, LA Passmore; MRC Laboratory of Molecular Biology, United Kingdom

**POSTER # 52**

3:00 PM **94** **MSA PTSA AWARDEE** *Automated Infrastructure for High-Throughput Acquisition of Serial Section TEM Image Volumes*; CG Robinson; Howard Hughes Medical Institute, Janelia; J Price; Hudson Price Designs, LLC; D Milkie, O Torrens; Coleman Technologies, Inc.; E Perlman, Z Zheng, RD Fetter, DD Bock; Howard Hughes Medical Institute, Janelia

**POSTER # 53**

3:00 PM **95** *A Third Hand for Array Tomography*; E Hanssen; The University of Melbourne, Australia

P

**PHYSICAL SCIENCES POSTER SESSIONS—MONDAY AFTERNOON**

**P02.P1 Electron Microscopy of Materials for Electrochemical Power Systems**

**POSTER SESSION**

**Monday 3:00 PM • Room: Exhibit Hall**

**POSTER # 54**

3:00 PM **96** *Microstructural Investigation on Degradation Mechanism of Layered  $\text{LiNi}_{0.6}\text{Co}_{0.2}\text{Mn}_{0.2}\text{O}_2$  Cathode Materials by Analytical TEM/STEM*; NY Kim, Z Lee; Ulsan National Institute of Science and Technology, Republic of Korea

**POSTER # 55**

3:00 PM **97** *Quantitative HAADF Study of Twin Boundaries in  $\text{Cu}_3\text{Pt}$  Nanoparticles*; G Drazic, M Bele, A Lautar, A Pavlisic, P Jovanovic, M Gaberscek; National Institute of Chemistry, Ljubljana, Slovenia

**POSTER # 56**

3:00 PM **98** **MSA POST-DOCTORAL AWARDEE** *Direct Visualization of the Grain Boundary Solute Segregation in Oxide Material at Atomic Resolution Using STEM-EDS*; B Feng; The University of Tokyo, Japan; T Yokoi; Osaka University, Japan; A Kumamoto; The University of Tokyo, Japan; M Yoshiya; Osaka University, Japan; Y Ikuhara, N Shibata; The University of Tokyo, Japan

**POSTER # 57**

3:00 PM **99** *Electron Microscopy and Electrochromic Studies of  $\text{V}_2\text{O}_5$  Thin Films Deposited by RF Magnetron Sputtering*; DR Acosta, A Perez, CR Magaña, F Hernandez; Universidad Nacional Autonoma de Mexico

**POSTER # 58**

3:00 PM **100** *Characterization of Gadolinium Doped Cerium (IV) Oxides Deposited by Reactive Spray Deposition Technology for Intermediate Temperature Fuel Cell Applications*; A Poozhikunnath, M Aindow, R Maric; University of Connecticut

**POSTER # 59**

3:00 PM **101** *Combined Electron Channeling Contrast Imaging (ECCI) and Transmission Electron Microscopy (TEM) Studies of Coherent Domain Boundaries in Strained  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  (LSM) Epitaxial Thin Films*; M Yan; National Energy Technology Laboratory; YN Picard, PA Salvador; Carnegie Mellon University

**POSTER # 60**

3:00 PM **102** *Analytical Electron Microscopy Study of SiSn/ (Reduced Graphene Oxide) Nanocomposite Powder Applicable to Li-Ion Battery Anodes*; M Kawasaki; JEOL USA, Inc.; V Laokawee, T Sarakonsri; Chiang Mai University, Thailand; T Hashizume; University of Toyama, Japan; M Shiojiri; Kyoto Institute of Technology, Japan

**POSTER # 61**

3:00 PM **103** *New Electrode Material Based on  $\text{Mn}_3\text{O}_4$  Nanoparticles Embedded in Organometallic-Derived Carbon (ODC)*; D Arenas-Esteban, D Ávila-Brandé, LC Otero-Díaz, E Urones-Garrote; Universidad Complutense de Madrid, Spain

**POSTER # 62**

3:00 PM **104** *Examining Li Diffusion in All-Solid-State Batteries Through Optically and Electron Transparent Electrodes*; A Yulaev; National Institute of Standards and Technology; MS Leite; University of Maryland; AA Talin; Sandia National Laboratories; A Kolmakov; National Institute of Standards and Technology

**POSTER # 63**

3:00 PM **105** *Mapping Trends In Electronic Structure Variation With Aging In  $\text{LiFePO}_4$  Cathodes: A Lorentz Oscillator Model Approach*; SA Channagiri, M Canova, DW McComb; The Ohio State University

**POSTER # 64**

3:00 PM **106** *Composition of Epitaxial  $\text{ZrO}_2\text{:Y}_2\text{O}_3/\text{SrTiO}_3$  Heterostructures*; FJ Scheltens, DE Huber, RE Williams, DW McComb; The Ohio State University

**POSTER # 65**

3:00 PM **107** *On the Degradation of PtNi Nanocatalysts for PEM Fuel Cells: An Identical Location Aberration-Corrected STEM Study*; S Rasouli; University of Texas, Austin; T Fujigaya; Kyushu University, Japan; D Myers; Argonne National Laboratory; N Nakashima; Kyushu University; P Ferreira; University of Texas, Austin

**POSTER # 66**

3:00 PM **108** *Revealing 3D Information of Porous Catalytic Structures Prepared by Template Methods*; X Zhang, MT Paul, BK Pilapil, B Brenden, BD Gates; Simon Fraser University, Canada

# Scientific Program

P

## PHYSICAL SCIENCES POSTER SESSIONS—MONDAY AFTERNOON *continued*

### P06.P1 Magnetic Materials, Phenomena and Imaging at the Nanoscale

#### POSTER SESSION

Monday 3:00 PM • Room: Exhibit Hall

#### POSTER # 67

3:00 PM **109** *A TEM Structural Study of the Origin of Perpendicular Magnetic Anisotropy in Ultra-Thin CoFeB Film*; Z Li, S Li, Y Zheng, J Fang, L Chen, L Hong, H Wang; Western Digital Corporation

#### POSTER # 68

3:00 PM **110** *Nonstoichiometric Twin Defects in Fe<sub>3</sub>O<sub>4</sub>(111) Thin Films: Atomic and Electronic Structure*; VK Lazarov; University of York, United Kingdom; D Kepaptsoglou; SuperSTEM Laboratory, United Kingdom; K McKenna, Z Nedelkoski, B Kuerbanjiang; University of York, United Kingdom; Q Ramasse; SuperSTEM Laboratory, United Kingdom; T Susaki, K Matsuzaki; Tokyo Institute of Technology, Japan, et al.

#### POSTER # 69

3:00 PM **111** *TEM Study of the Cobalt-Rich Hf-Co Intermetallic Compounds*; X-Z Li, Y-L Jin, M-Y Wang, JE Shield, R Skomski, DJ Sellmyer; University of Nebraska-Lincoln

#### POSTER # 70

3:00 PM **112** *Development of Pulse Magnetization System on Aberration Corrected 1.2-MV Cold Field-Emission Transmission Electron Microscope*; T Tanigaki, T Akashi, A Sugawara; Hitachi, Ltd, Japan; K Niitsu, X Yu; RIKEN, Japan; Y Tomioka; National Institute of Advanced Industrial Science and Technology, Japan; D Shindo, Y Tokura; RIKEN, Japan, et al.

#### POSTER # 71

3:00 PM **113** *Unitary Detector DPC Imaging with Multiscale Capabilities for Analysis of Local Magnetic Field of Nanomaterials*; I Ivanov, S Lopatin, J Kosel; King Abdullah University of Science & Technology, Saudi Arabia; A Chuvilin; CIC nanoGUNE, Spain

#### POSTER # 72

3:00 PM **114** *Extended Foucault Method for External Magnetic Fields with Conventional TEM*; H Nakajima, A Kotani; Osaka Prefecture University, Japan; K Harada; RIKEN, Japan; Y Ishii, S Mori; Osaka Prefecture University, Japan

#### POSTER # 73

3:00 PM **115** *Proposal for Magnetic Dichroism with a Standard STEM Probe Beam*; TR Harvey; University of Oregon; V Grillo; Consiglio Nazionale delle Ricerche, Italy; BJ McMorran; University of Oregon

#### POSTER # 74

3:00 PM **116** *Observation of an Electron Vortex Beam Created from a Self-Charging Rod*; AM Blackburn; Hitachi Cambridge Laboratory, United Kingdom

#### POSTER # 75

3:00 PM **117** *Characterization of the CoFe<sub>2</sub>O<sub>4</sub>@Mn Fe<sub>2</sub>O<sub>4</sub> Magnetic Particles Using Differential Phase Contrast in STEM*; D-Y Kim, J-I Son, B-K Park, S-H Lee; FEI Company, Republic of Korea; I-B Shim, S-J Kim, H-K Choi; Kookmin University, Republic of Korea

#### POSTER # 76

3:00 PM **118** *Atomic Resolution and In Situ STEM-EELS of Superparamagnetic Iron Oxide Nanoparticles*; R Hufschmid; University of Washington; RM Ferguson; LodeSpin Labs; E Teeman, KM Krishnan; University of Washington; ND Browning; Pacific Northwest National Laboratory

#### POSTER # 77

3:00 PM **119** *Tailoring Magnetic Nanostructures with Neon in the Ion Microscope*; G Hlawacek, R Bali; Helmholtz-Zentrum Dresden-Rossendorf, Germany; F Röder; Technische Universität Dresden, Germany; A Semisalova, K Wagner, H Schultheiss, S Facsko, J Fassbender; Helmholtz-Zentrum Dresden-Rossendorf, Germany, et al.

#### POSTER # 78

3:00 PM **120** *4D-STEM for Quantitative Imaging of Magnetic Materials with Enhanced Contrast and Resolution*; KX Nguyen, P Purohit, E Turgut, MW Tate, LF Kourkoutis, GD Fuchs, SM Gruner, DA Muller; Cornell University, et al.

#### POSTER # 79

3:00 PM **121** *Magnetic Domain Imaging of Ni-Mn-Ga Heusler Alloys Using Lorentz TEM*; I Kashyap, M De Graef; Carnegie Mellon University

#### POSTER # 80

3:00 PM **122** *Electron Energy-loss Magnetic Circular Dichroism of L10 FePt Nanograins*; J Zhu, R Zhang, Y Zhang, B Ozdol, S Myers, A Greene; Western Digital Corporation



## **P09.P1 From Angstrom to AU: Studies of Planet-Forming Materials**

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### **POSTER SESSION**

**Monday 3:00 PM • Room: Exhibit Hall**

#### **POSTER # 81**

3:00 PM **123** *Stoichiometry Fitter, a GUI for Fitting Solid Solutions and Analyzing Mineral Phases*; Z Gainsforth; University of California, Berkeley

#### **POSTER # 82**

3:00 PM **124** *Quantitative EPMA of Nitrogen in Silicate Glasses*; A von der Handt, C Dalou; University of Minnesota

#### **POSTER # 83**

3:00 PM **125** *Electron Microscopy of Spirulina (Arthrospira spp) Nanoparticles Obtained by Means of Mechanical Milling*; HA Calderon; Instituto Politecnico Nacional, Mexico; K Bustillo; Lawrence Berkeley National Laboratory; EE Neri-Torres, JJ Chanona Perez; Instituto Politecnico Nacional, Santo Tomás, Mexico; N Torres Figueredo; Instituto Politecnico Nacional, Mexico; GA Chamorro Ceballos, GH Calderon-Dominguez; Instituto Politecnico Nacional, Santo Tomás, Mexico

#### **POSTER # 84**

3:00 PM **126** *Inclusions and the Color of Obsidian*; SK Menon, A Camargo, CC Luhrs; Naval Postgraduate School; RP Mariella; Lawrence Livermore National Laboratory

#### **POSTER # 85**

3:00 PM **127** *Analogs for Unlayered-Graphene Droplet-Formation in Stellar Atmospheres*; P Fraundorf; University of Missouri Saint Louis; M Lipp; Universität Stuttgart, Germany; T Savage; University of Missouri Saint Louis

# Scientific Program

Tuesday, July 26

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—TUESDAY MORNING

### A04.2 Advances in FIB Instrumentation and Applications in Materials and Biological Sciences

#### SESSION CHAIR:

Srinivas Subramaniam, Intel Corporation

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C216

8:30 AM **128** (INVITED) *FIB Milling of Polymer Ceramic Nanocomposites: Far-Reaching Thermal Artefacts and Application to Analysis of Corrosion Barrier Coatings*; K Rykaczewski, D Mieritz, M Liu; Arizona State University; EB Iezzi; U.S. Naval Research Laboratory; LP Wang, KN Solanki, DK- Seo, RY Wang; Arizona State University; et al.

9:00 AM **129** *Exploring Differences in Amorphous Layer Formation During FIB Sample Preparation Between Metals and Non Metals*; M Presley, J Jensen, D Huber, HL Fraser; The Ohio State University

9:15 AM **130** *Evaluation of Neon Focused Ion Beam Milling for TEM Sample Preparation*; TC Pekin, FI Allen, AM Minor; University of California, Berkeley

9:30 AM **131** (INVITED) *Femtosecond Laser Damage in Metals and Semiconductors During TriBeam Tomography*; MP Echlin, MS Titus, WC Lenthe; University California, Santa Barbara; M Straw; FEI Company; P Gumbsch; Karlsruhe Institute of Technology, Germany; TM Pollock; University of California, Santa Barbara

### A05.1 Applications of Correlative Microscopy to Physical and Biological Sciences

#### SESSION CHAIRS:

Renu Sharma, National Institute of Standards and Technology

Si Chen, Argonne National Laboratory

Xiao-ying Yu, Pacific Northwest National Laboratory

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C210

8:30 AM **132** (INVITED) *Large-scale EM & Correlative Microscopy (Nanotomography & CLEM)*; BN Giepmans, P de Boer, KA Sjollem, J Kuipers, AG Wolters; University Medical Center Groningen, Netherlands

9:00 AM **133** *Application of Ionic Liquid on Biological Samples in Correlative Optical Microscopy and Scanning Electron Microscopy*; X Chen; University of Toronto, Canada; J Howe; Hitachi High-Technologies Canada, Inc., F Luo; University of Toronto, Canada; P Woo; Hitachi High-Technologies Canada, Inc., D Perovic, E Edwards; University of Toronto, Canada

9:15 AM **134** **M&M 2016 STUDENT AWARDEE** *Analysis of Phage-Pilus Interactions in *Caulobacter crescentus**; RS Dillard, RE Storms, L De Masi, C Hampton; Emory University; G Panis, PH Viollier; University of Geneva, Switzerland; ER Wright; Emory University

9:30 AM **135** *Correlative Microscopy Application in Spinal Cord Injury Research*; B Deng, CM Freria; The Ohio State University; T Burnett; The University of Manchester, United Kingdom; IN Boona; The Ohio State University; PJ Withers; The University of Manchester, United Kingdom; PG Popovich, DW McComb; The Ohio State University

9:45 AM **136** *Fluorescence Recovery of GFP Emission in Samples Embedded for TEM Upon Exposure to an Alkaline Solution*; DR Keene; Shriners Hospital for Children; CS López; Oregon Health Sciences University; S Kwon; Oregon Health Sciences University; S Gonzales; Shriners Hospital for Children; J Gray; Oregon Health Science University

### A06.2 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

#### SESSION CHAIRS:

Chaoying Ni, University of Delaware

Peter van Aken, Max Planck Institute for Solid State Research

Masashi Watanabe, Lehigh University

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C224-25

8:30 AM **137** *Detection of Oxygen Sub-Lattice Ordering in A-Site Deficient Perovskites Through Monochromated Core-Loss EELS Mapping*; D Kepaptsoglou; SuperSTEM Laboratory, United Kingdom; F Azough; University of Manchester, United Kingdom; D Hernandez Maldonado; SuperSTEM Laboratory, United Kingdom; R Freer; University of Manchester, United Kingdom; Q Ramasse; SuperSTEM Laboratory, United Kingdom

8:45 AM **138** *Pseudo Atomic Column EELS & EDS Mapping of Silicon Reconstructed with K and L Electrons Using STEM-Moiré Method*; Y Kondo, E Okunishi; JEOL, Ltd., Japan

9:00 AM **139** *Unveiling Complex Plasmonic Resonances in Archimedean Nanospirals Through Cathodoluminescence in a Scanning Transmission Electron Microscope*; J Hachtel, R Davidson; Vanderbilt University; M Chisholm, B Lawrie; Oak Ridge National Laboratory; R Haglund, S Pantelides; Vanderbilt University

9:15 AM **140** *Visualizing Interface Effects in Two-Dimensionally Doped  $\text{La}_2\text{CuO}_4$  and  $\text{La}_2\text{CuO}_4/\text{La}_{2-x}\text{Sr}_x\text{NiO}_4$  Superlattices*; Y Wang, W Sigle, U Salzberger, F Baiutti, G Gregori, C Georg, G Logvenov, J Maier; Max Planck Institute for Solid State Research, Germany; et al.

9:30 AM **141** *Connecting Phase Stability to the Grain Growth Behavior of Ni-W Alloys*; CJ Marvel, D Yin, MP Harmer; Lehigh University

9:45 AM **142** *Novel Characterization of Deformation Mechanisms in a Ni-Base Superalloy Using HAADF Imaging and Atomic Ordering Analysis*; D McAllister, D Lv; The Ohio State University; H Deutchman, B Peterson; Honeywell Aerospace; Y Wang, M Mills; The Ohio State University

## A09.1 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

### SESSION CHAIR:

Jim Ciston, Lawrence Berkeley National Laboratory

### PLATFORM SESSION

Tuesday 8:30 AM • Room: C220

- 8:30 AM **143** (INVITED) *Phase Contrast Imaging of Weakly-Scattering Samples with Matched Illumination and Detector Interferometry – Scanning Transmission Electron Microscopy (MIDI-STEM)*; C Ophus, J Ciston, H Yang; Lawrence Berkeley National Laboratory; J Pierce, TT Harvey, J Chess, BJ McMorrin; University of Oregon, C Czarnik; Gatan Inc., et al.
- 9:00 AM **144** *Enhanced Phase Contrast Transfer Using Ptychography Combined with a Pre-Specimen Phase Plate in a Scanning Transmission Electron Microscope*; H Yang, P Ercius, C Ophus; Lawrence Berkeley National Laboratory; PD Nellist; University of Oxford, United Kingdom
- 9:15 AM **145** *Towards 3D Electron Ptychographic Reconstruction*; S Gao; Nanjing University, China; F Zhang; Harwell Oxford Campus, United Kingdom; AI Kirkland; University of Oxford, United Kingdom; X Pan, P Wang; Nanjing University, China
- 9:30 AM **146** (INVITED) *The Use of Electron Ptychography to Implement Efficient Phase Imaging in STEM*; PD Nellist; University of Oxford, United Kingdom; H Yang; Lawrence Berkeley National Laboratory; L Jones, GT Martinez, RN Rutte, BG Davis; University of Oxford, United Kingdom; TJ Pennycook; University of Vienna, Austria, M Simson; PNDetector GmbH, Germany; et al.

## A11.2 Advances in Scanning Electron/Ion Instrumentation and Detectors

### SESSION CHAIR:

Matthew Phillips, University of Technology Sydney

### PLATFORM SESSION

Tuesday 8:30 AM • Room: C121-22

- 8:30 AM **147** (INVITED) *Imaging a 1mm<sup>3</sup> Volume of Rat Cortex Using a MultiBeam SEM*; RL Schalek, JW Lichtman, D Cox, H Pfister; Harvard University; N Kasthuri; Argonne National Laboratory; D Lee, A Peleg, T Jones; Harvard University; et al.
- 9:00 AM **148** *Multi-beam Electron Microscopy: Principles and Applications*; AL Eberle, D Zeidler; Carl Zeiss Microscopy GmbH, Germany
- 9:15 AM **149** *Patterned Wafer Inspection with Multi-beam SEM Technology*; B Thiel, M Mukhtar, K Quoi; SUNY Polytechnic Institute; B Bunday, M Malloy; SEMATECH

- 9:30 AM **150** *Towards Enhancing the Throughput and Eliminating the 4 Dimensions of Stitching Errors in Large Area, High-Resolution SEM for Integrated Circuit Reverse Engineering and Connectomics*; JE Sanabia; Raith America, Inc., CE Korman, A Popratiloff; The George Washington University; V Boegli, M Rasche, R Jede; Raith GmbH, Germany

- 9:45 AM **151** *IPrep – Automated Serial-Section Broad-Ion-Beam Tomography*; TC Hosman, S Coyle, A Abbott, M Olvera, M Hassel-Shearer, JA Hunt; Gatan, Inc.

## A15.2 Quantitative Measurement of Intensities and Distances in Electron Microscopy

### SESSION CHAIR:

James LeBeau, North Carolina State University

### PLATFORM SESSION

Tuesday 8:30 AM • Room: C212

- 8:30 AM **152** (INVITED) *Quantification of ADF STEM Image Data for Nanoparticle Structure and Strain Measurements*; PD Nellist, L Jones, A Varambhia; University of Oxford, United Kingdom; A De Backer, S Van Aert; University of Antwerp, Belgium; D Ozkaya; Johnson Matthey Technology Centre, United Kingdom
- 9:00 AM **153** *Imaging Local Polarization and Domain Boundaries with Picometer-Precision Scanning Transmission Electron Microscopy*; ME Holtz, JA Mundy, CS Chang; Cornell University; JA Moyer; University of Illinois Urbana-Champaign; R Hovden, ES Padgett, DG Schlom, DA Muller; Cornell University; et al.
- 9:15 AM **154** *Distortion Correction in Scanning Transmission Electron Microscopy with Controllable Scanning Pathways*; X Sang, AR Lupini, RR Unocic, T Meyer, TZ Ward, HN Lee, E Endeve, RK Archibald; Oak Ridge National Laboratory; et al.
- 9:30 AM **155** *Three-Dimensional Imaging of Single La Vacancies in LaMnO<sub>3</sub>*; J Feng, A Kvit, C Zhang, D Morgan, P Voyles; University of Wisconsin-Madison
- 9:45 AM **156** **MSA POST-DOCTORAL AWARDEE** *Tracking BO<sub>6</sub> Coupling in Perovskite Superlattices to Engineer Magnetic Interface Behavior*; Q He; Oak Ridge National Laboratory; S Ghosh; Vanderbilt University; EJ Moon, S May; Drexel University; S Pantelides; Vanderbilt University; A Borisevich, AR Lupini; Oak Ridge National Laboratory

# Scientific Program

B

## BIOLOGICAL SCIENCES SYMPOSIA— TUESDAY MORNING

### B02.1 New Technologies for Digital Pathology

#### SESSION CHAIRS:

Rohit Bhargava, University of Illinois

David Mayerich, University of Houston

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C110

- 8:30 AM **157** (INVITED) *Slide-Free Microscopy via UV Surface Excitation*; R Levenson, F Fereidouni, Z Harmany; University of California, Davis Medical Center; S Demos; Lawrence Livermore National Laboratory
- 9:00 AM **158** (INVITED) *Histopathological Image Analysis: Path to Acceptance Through Evaluation*; MN Gurcan; The Ohio State University
- 9:30 AM **159** (INVITED) *Computerized Histologic Image Based Risk Predictor (CHIRP): Identifying Disease Aggressiveness Using Sub-Visual Image Cues from Image Data*; A Madabhushi; Case Western Reserve University

### B06.1 Pharmaceuticals and Medical Science

#### SESSION CHAIR:

John-Bruce Green, Baxter Healthcare

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C111

- 8:30 AM **160** (INVITED) *Compendial Guidance for Particles*; DS Aldrich; Ultramikro, LLC
- 9:00 AM **161** (INVITED) *Detection of Crystalline Components in Amorphous Solid Dispersions by Correlative Imaging Techniques*; JP Neilly, J Roth; AbbVie, Inc.
- 9:30 AM **162** (INVITED) *Applications of the FDA's Counterfeit Detection Device (CD3+) to the Examination of Suspect Counterfeit Pharmaceutical Tablets and Packaging*; SF Platek, N Ranieri, JS Batson; U.S. Food and Drug Administration

### B07.2 3D Structures of Macromolecular Assemblies, Cellular Organelles and Whole Cells

#### SESSION CHAIRS:

Kristin Parent, Michigan State University

Teresa Ruiz, University of Vermont

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C115

- 8:30 AM **163** (INVITED) *Receptor Recognition by Porcine Circovirus 2*; R Khayat; City College of New York

9:00 AM **164** *A Polymerase-Activating Host Factor, YajQ, Bound to the Bacteriophage  $\phi 6$  Capsid*; B Heymann; National Institute of General Medical Sciences, NIH; D Nemecek; Sanofi-Pasteur, France; R Huang; Howard Hughes Medical Institute; N Cheng; National Institutes of Health; J Qiao, L Mindich; University of Medicine and Dentistry of New Jersey; ACSteven; National Institutes of Health

9:15 AM **165** *Cryo-Electron Microscopy of Influenza Vaccine Nanoparticles Indicates Full Occupancy of Displayed Epitopes Is Facilitated by Particle Design*; JR Gallagher, AK Harris; National Institutes of Health

9:30 AM **166** *Microscopic Evidence for a Stargate Structure in the Giant Virus, Samba virus*; JR Schrad; Michigan State University; JS Abrahão; Universidade Federal de Minas Gerais, Brazil; JR Cortines; Universidade Federal do Rio de Janeiro, Brazil; KN Parent; Michigan State University

9:45 AM **167** *Native-State Structural Analysis of Respiratory Syncytial Virus*; Z Ke; Georgia Institute of Technology; RS Dillard, CM Hampton, RE Storms, JD Strauss, ER Wright; Emory University

### B08.1 Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals

#### SESSION CHAIRS:

Jon Charlesworth, Mayo Clinic

Greg Ning, Pennsylvania State University

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C114

- 8:30 AM **168** *Quantitative Characterization of Theranostic Nanoparticles by Electron Microscopy*; MA Aronova; National Institutes of Health; AA Sousa; Federal University of São Paulo, Brazil; RD Leapman; National Institutes of Health
- 8:45 AM **169** *Ferritin Mineral Core Composition in Health and Disease*; A Blissett, B Ollander, B Deng, T Nocera, E Calomeni, D McComb, D McTigue, G Agarwal; The Ohio State University; et al.
- 9:00 AM **170** (INVITED) *Use of Transmission Electron Microscopy in the Diagnosis of Canine Kidney Disease*; RE Cianciolo; The Ohio State University
- 9:30 AM **171** *Composition Analysis with EDS; Possibilities for Life Science*; M Falke, A Kaepfel, R Terborg; Bruker, Germany



P

## PHYSICAL SCIENCES SYMPOSIA—

TUESDAY MORNING

### P01.1 Dr. Gareth Thomas Symposium: Materials Solutions Through Microscopy

#### SESSION CHAIRS:

Ron Gronsky, University of California, Berkeley

Dave Williams, The Ohio State University

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C214

- 8:30 AM **172** *Professor Gareth Thomas: Colleague, Friend, Mentor, Oenophile, and Rugby Player*; R Gronsky; University of California, Berkeley; DB Williams; The Ohio State University
- 9:00 AM **173** *Microstructure-Based Modeling of Metal Plasticity and Electron Microscopy Characterization of Automotive Structural Metals at Multi-Scales*; RK Mishra; General Motors Research & Development Center
- 9:15 AM **174** (INVITED) *Dislocations and Grain Boundaries in Ceramics and Metals*; CB Carter; University of Connecticut
- 9:30 AM **175** (INVITED) *Instrumentation/Technique Developments in Gareth Thomas's Research Group*; OL Krivanek; Nion Company
- 9:45 AM **176** (INVITED) *High-Resolution Electron Microscopy of Grain Boundary Motion During Island Grain Shrinkage*; U Dahmen; Lawrence Berkeley National Laboratory; T Radetic; University of Belgrade, Serbia; M Bowers, C Ophus, A Gautam; Lawrence Berkeley National Laboratory; F Lancon; Institut Nanosciences et Cryogénie-CEA, France

### P02.2 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

Mark Aindow, University of Connecticut

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: E160AB

- 8:30 AM **177** (INVITED) *Contribution of Transmission Electron Microscopy to Proton Exchange Membrane Fuel Cell Electrodes Development and Degradation Understanding*; L Guetaz, M Lopez-Haro, P Bayle-Guillemaud, A Morin, S Escribano; Institut Nanosciences et Cryogénie-CEA, France
- 9:00 AM **178** *Quantitative Information from Cryo-Electron Tomography of Energy Materials*; E Padgett, N Andrejevic; Cornell University; Z Liu; General Motors; K Moriyama; Honda R&D Company, Japan; R Kukreja; General Motors; Y Jiang, V Elser, DA Muller; Cornell University; et al.
- 9:15 AM **179** *Structural Characterization of Bimetallic Nanocrystal Electrocatalysts*; BT Sneed; Oak Ridge National Laboratory; C-H Kuo; Academia Sinica, Taiwan; DA Cullen; Oak Ridge National Laboratory

- 9:30 AM **180** (INVITED) *Fuel Cell Electrode Optimization Through Multi-Scale Analytical Microscopy*; DA Cullen, BT Sneed, KL More; Oak Ridge National Laboratory

### P06.2 Magnetic Materials, Phenomena and Imaging at the Nanoscale

#### SESSION CHAIR:

Marc De Graef, Carnegie Mellon University

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C213

- 8:30 AM **181** (INVITED) *Domain Behavior in Functional Materials Studied Using Lorentz Microscopy*; C Phatak, S Zhang, W Jiang, SG te Velthuis, A Hoffmann, JF Mitchell, H Zheng, MR Norman; Argonne National Laboratory; et al.
- 9:00 AM **182** *Formation of Magnetic Textures in the Ferromagnetic Phase of  $La_{0.825}Sr_{0.175}MnO_3$* ; A Kotani, H Nakajima; Osaka Prefecture University, Japan; K Harada; RIKEN, Japan; Y Ishii, S Mori; Osaka Prefecture University, Japan
- 9:15 AM **183** *Investigation of Layer Composition and Morphology in Perpendicular Magnetic Tunnel Junctions*; D Reifsnnyder Hickey; University of Minnesota; H Almasi, W Wang; University of Arizona; KA Mkhoyan; University of Minnesota
- 9:30 AM **184** (INVITED) *Iterative Reconstruction of the Magnetization and Charge Density Using Vector Field Electron Tomography*; KA Mohan; Purdue University; P K C; Carnegie Mellon University; C Phatak; Argonne National Laboratory; M De Graef; Carnegie Mellon University; CA Bouman; Purdue University

### P07.1 Failure Analysis Applications of Microanalysis, Microscopy, Metallography & Fractography

#### SESSION CHAIR:

Daniel P. Dennies, Consulting Metallurgical Engineer

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C215

- 8:30 AM **185** (INVITED) *Failure Analysis of a Ruptured Cast Aluminum Alloy Fire Hose Manifold*; SN Rosenbloom; WI Gore & Associates, Inc., D Crowe; Corrosion Probe, Inc., K Hessler; Corrosion Testing Laboratories, Inc.
- 9:00 AM **186** *Failure of Mountain-Anchors as Consequence of Hydrogen Embrittlement*; M Panzenboeck, C Freitag; Montanuniversitaet Leoben, Austria
- 9:15 AM **187** *Troubleshooting Fabricated Products via Microscopic Defect and Failure Analysis*; EI Garcia-Meitin, MM Kapur, RM Patel; The Dow Chemical Company
- 9:30 AM **188** (INVITED) *Residue Induced Product Failures - Microanalysis*; P Verghese, N Budiansky, P Ledwith, D Bauer; Exponent, Inc.

# Scientific Program

P

## PHYSICAL SCIENCES SYMPOSIA—

TUESDAY MORNING *continued*

### P09.2 From Angstrom to AU: Studies of Planet-Forming Materials

#### SESSION CHAIR:

Eve L. Berger, NASA Johnson Space Center

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C113

- 8:30 AM **189** *MultiLaue: A Technique to Extract d-Spacings from Laue XRD*; Z Gainsforth; University of California, Berkeley; MA Marcus, N Tamura; Lawrence Berkeley National Laboratory; AJ Westphal; University of California, Berkeley
- 8:45 AM **190** *Determination of the Modal Abundance of Nanoscale Amorphous Phases Using Selected Area Electron Diffraction Mapping*; BT De Gregorio, RM Stroud; U.S. Naval Research Laboratory; NM Abreu; Pennsylvania State University, Dubois; KT Howard; American Museum of Natural History
- 9:00 AM **191** (INVITED) *Investigation of Organic Matter at the Micron Scale in Carbonaceous Chondrites: a Spyglass to Study The Early Solar System*; L Remusat; Museum National D'Histoire Naturelle, France; C Le Guillou; Université de Lille, France; S Bernard, V Vinogradoff; Museum National D'Histoire Naturelle, France; A Brearley; University of New Mexico
- 9:30 AM **192** (INVITED) *Microanalysis of Fossil Micrometeorites and Meteorites to Study a Major Asteroid Collision ~470 Million Years Ago*; PR Heck; The Field Museum of Natural History; B Schmitz; Lund University, Sweden

TF

## TECHNOLOGISTS' FORUM—

TUESDAY MORNING

### X30.1 Real Analysis Data vs Artifact Recognition

#### SESSION CHAIRS:

Cathy Johnson, Mager Scientific  
Caroline Miller, Indiana University

#### PLATFORM SESSION

Tuesday 9:00 AM • Room: C125

- 9:00 AM **193** (INVITED) *Artifacts in Cryo-Preparation for Electron Microscopy*; KH Rensing; Fibics Inc., Canada
- 9:30 AM **194** (INVITED) *Artifacts in Neuroimaging - Pitfalls in Volume Electron Microscopy for CLEM and in Freeze-Fracture Replica Immunogold Labeling*; N Kamasawa; Max Planck Florida Institute for Neuroscience

T

## PHYSICAL SCIENCES TUTORIAL—

TUESDAY MORNING

### X43.1 Diffraction Mapping and 4D STEM

#### SESSION CHAIR:

Patrick Phillips, University of Illinois, Chicago

#### PLATFORM SESSION

Tuesday 8:30 AM • Room: C211

- 8:30 AM **195** *Automated Analysis of Large Datasets Acquired with STEM Diffraction Mapping*; C Gammer; University of Vienna, Austria

O

## MICROSCOPY OUTREACH —

TUESDAY MORNING

### X90.1 Microscopy in the Classroom: Strategies for Education and Outreach

#### SESSION CHAIRS:

Alyssa Waldron & David Becker  
Bergen County Technical Schools

#### PLATFORM SESSION

Tuesday 9:00 AM • Room: C123-24

- 9:00 AM **196** *The "WOW Factor": Using Scanning Electron Microscopy to Stimulate Interest in STEM Disciplines*; M Gury, NA Butkevich; Schoolcraft College
- 9:15 AM *Discussion*
- 9:30 AM **197** *Macro to Micro: Innovation Inspired by Nature*; S Okerstrom; Lichen Labs LLC; P Anderson; Ely Memorial High School
- 9:45 AM *Discussion*

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—TUESDAY MORNING

### A04.3 Advances in FIB Instrumentation and Applications in Materials and Biological Sciences

#### SESSION CHAIR:

Nabil Bassim, U.S. Naval Research Lab

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C216

- 10:30 AM **198** *FIB-Milled Nanopore Sensors for Tracking Virus Assembly*; Z Harms, LS Lee, A Zlotnick, SC Jacobson; Indiana University
- 10:45 AM **199** *Use of Single Crystal Masks for Improved Mill Characteristics in High Current Xenon Plasma FIB Instrumentation*; S Subramaniam, L Smath, A Brown, K Johnson; Intel Corporation
- 11:00 AM **200** *The Neon Focused Ion Beam – Stabilizing the Emission Process*; JA Notte, JW Huang, R Rickert; Carl Zeiss Microscopy
- 11:15 AM **201** (INVITED) *GFIS in Semiconductor Applications*; S Tan, R Hallstein, R Livengood; Intel Corporation
- 11:45 AM **202** *Polarization Control via He-Ion Beam Induced Nanofabrication in Layered Ferroelectric Semiconductors*; A Belianinov, V Iberi, A Tselev, MA Susner, MA McGuire; Oak Ridge National Laboratory; D Joy; University of Tennessee; S Jesse, AJ Rondinone; Oak Ridge National Laboratory; et al.

### A05.2 Applications of Correlative Microscopy to Physical and Biological Sciences

#### SESSION CHAIRS:

Si Chen, Argonne National Laboratory

Renu Sharma, National Institute of Standards and Technology

Nestor Zaluzec, Argonne National Laboratory

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C210

- 10:30 AM **203** (INVITED) *The Agony and the Ecstasy: Correlative Microscopy from Photons to Electrons and X-Rays Lessons from Recent Case Studies*; L-M Joubert; Stanford University
- 11:00 AM **204** (INVITED) *Correlative Chemical Element Imaging in Cells Using Fluorescence Microscopy and Synchrotron X-Ray Fluorescence*; R Ortega, S Roudeau, L Perrin, A Carmona; Centre National de la Recherche Scientifique, France
- 11:30 AM **205** (INVITED) *A New Microscopy Facility for Optical, Electron and X-Ray Imaging at Diamond*; P Quinn, J Parker, F Cacho-Nerin; Diamond Light Source Ltd., United Kingdom; J Kim, A Kirkland; University of Oxford, United Kingdom; D Ozakaya; Johnson Matthey, United Kingdom

### A06.3 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

#### SESSION CHAIRS:

Chaoying Ni, University of Delaware

Peter van Aken, Max Planck Institute for Solid State Research

Masashi Watanabe, Lehigh University

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C224-25

- 10:30 AM **206** (INVITED) *Spectral Electron Tomography as a Quantitative Technique to Investigate Functional Nanomaterials*; S Bals, D Zanaga, B Goris, M Pfannmoeller, S Turner; University of Antwerp, Belgium; B Freitag; FEI Company, Netherlands
- 11:00 AM **207** *Automated 3D EDS Acquisition for Spatially Resolved Elemental Characterization of Catalyzed MgH<sub>2</sub> Nanostructures*; B Van Devener; The University of Utah; KJ McIlwrath; JEOL USA, Inc., S Kim; AppFive LLC; Z Zak Fang, C Zhou; The University of Utah
- 11:15 AM **208** *Quantitative Measurements of the Penumbra of XEDS Systems in an AEM*; NJ Zaluzec, J Wen, J Wang, DJ Miller; Argonne National Laboratory
- 11:30 AM **209** *Characterization of VLSI Processing Defects Using STEM-EELS Tomography*; FH Baumann, J Miller, B Rhoads, A Friedman, B Fu; GlobalFoundries, Inc.
- 11:45 AM **210** **MSA POST-DOCTORAL AWARDEE** *Multidimensional Analysis of Nanoscale Phase Separation in Complex Materials Systems*; SR Spurgeon, Y Du, T Droubay, A Devaraj; Pacific Northwest National Laboratory; X Sang; North Carolina State University; P Longo; Gatan Inc., PG Kotula; Sandia National Laboratories, SA Chambers; Pacific Northwest National Laboratory; et al.

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—TUESDAY MORNING *continued*

### A09.2 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

#### SESSION CHAIR:

Doug Medlin, Sandia National Laboratories

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C220

- 10:30 AM **211** (INVITED) *Mapping of Nanoscale Structural Fluctuations in Ferroelectric BaTiO<sub>3</sub> Using STEM-CBED*; K Tsuda; Tohoku University, Japan
- 11:00 AM **212** *Revealing Point Defects in a Large-Scale Scanning Diffraction Dataset*; R Dos Reis, C Ophus, J Ciston, P Ercius, U Dahmen; Lawrence Berkeley National Laboratory
- 11:15 AM **213** *Reconstruction of Polarization Vortices by Diffraction Mapping of Ferroelectric PbTiO<sub>3</sub>/SrTiO<sub>3</sub> Superlattice Using a High Dynamic Range Pixelated Detector*; KX Nguyen, P Purohit; Cornell University; AK Yadav; University of California, Berkeley; MW Tate, CS Chang; Cornell University; R Ramesh; University of California, Berkeley; SM Gruner, DA Muller; Cornell University
- 11:30 AM **214** **MSA POST-DOCTORAL AWARDEE** *Facilitating Quantitative Analysis of Atomic Scale 4D STEM Datasets*; Z Chen, M Weyland, C Zheng, MS Fuhrer; Monash University, Australia; AJ D'Alfonso, LJ Allen; The University of Melbourne, Australia; SD Findlay; Monash University, Australia
- 11:45 AM **215** *Towards Mapping Perovskite Oxide 3D Structure Using Two-Dimensional Pixelated STEM Detector*; M Nord, A Ross; University of Glasgow, United Kingdom; I Hallsteinsen, T Tybell; Norwegian University of Science and Technology; I MacLaren; University of Glasgow, United Kingdom

### A11.3 Advances in Scanning Electron/Ion Instrumentation and Detectors

#### SESSION CHAIR:

Brad Thiel, SUNY Polytechnic Institute

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C121-22

- 10:30 AM **216** (INVITED) *Silicon Photomultipliers: Properties, Latest Developments at FBK and Applications*; C Piemonte; Fondazione Bruno Kessler, Italy
- 11:00 AM **217** *Figure of Merit of Silicon Photomultiplier/Scintillator Electron Detector*; MB Tzolov; Lock Haven University of Pennsylvania; NC Barbi; Pulsetor LLC; CT Bowser; Lock Haven University of Pennsylvania; OE Healy; Pulsetor LLC
- 11:15 AM **218** *Real-World Electron Detector Performance in Scanning Electron Microscopes*; OE Healy, RB Mott; Pulsetor LLC

- 11:30 AM **219** *How New Electron Detector Concepts Can Help to Increase Throughput and Sensitivity of Single- and Multi-Beam Scanning Electron Microscopes*; A Liebel; PNDetector GmbH, Germany; G Lutz; PNSensor GmbH, Germany; U Weber, M Schmid, A Niculae, H Soltau; PNDetector GmbH, Germany

### A13.1 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

#### SESSION CHAIRS:

Huolin Xin, Brookhaven National Laboratory

Kai He, Northwestern University

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C221

- 10:30 AM **220** *Beyond Movie Mode: Bridging the Gap of Time Resolution*; BW Reed, ST Park, DJ Masiel; Integrated Dynamic Electron Solutions, Inc.
- 10:45 AM **221** (INVITED) *Pump-Probe and Time-Resolved Electron Microscopy and Big Data Analysis of Electron-Lattice Dynamics in Strongly Correlated Electron Systems*; Y Zhu, J Li, L Wu, P Zhu, T Konstantinova, J Tao, J Hill; Brookhaven National Laboratory, X Wang; SLAC National Accelerator Laboratory
- 11:15 AM **222** (INVITED) *Local Strain Measurements During In Situ TEM Deformation with Nanobeam Electron Diffraction*; A Minor; University of California, Berkeley; C Gammer; University of Vienna, Austria; Y Deng; Nanjing University, China; C Ophus, P Ercius, J Ciston; Lawrence Berkeley National Laboratory
- 11:45 AM **223** *Probing Stress-Induced Grain Boundary Migration and Hypofriction at High Resolution*; ML Bowers, C Ophus; Lawrence Berkeley National Laboratory; AM Minor; University of California, Berkeley; U Dahmen; Lawrence Berkeley National Laboratory

### A15.3 Quantitative Measurement of Intensities and Distances in Electron Microscopy

#### SESSION CHAIR:

James LeBeau, North Carolina State University

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C212

- 10:30 AM **224** (INVITED) *Direct Electromagnetic Structure Observation by Aberration-Corrected Differential Phase Contrast Scanning Transmission Electron Microscopy*; N Shibata; The University of Tokyo, Japan; SD Findlay; Monash University, Australia; T Matsumoto, T Seki, G Sánchez-Santolino; The University of Tokyo, Japan; Y Kohno; JEOL, Ltd., Japan; H Sawada; JEOL, Ltd., United Kingdom; Y Ikuhara; The University of Tokyo, Japan; et al.
- 11:00 AM **225** *Atomic Level Structure-Property Relationship in a Spin-Orbit Mott Insulator: Scanning Transmission Electron and Scanning Tunneling Microscopy Studies*; M Ziatdinov, A Maksov, W Zhou, A Baddorf, S Kalinin; Oak Ridge National Laboratory



- 11:15 AM **226** *Atomic Resolution Distortion Analysis of Yttrium-Doped Barium Zirconate*; J Ding; Georgia Institute of Technology; X Sang, J Balachandran; Oak Ridge National Laboratory; N Bassiri-Gharb; Georgia Institute of Technology; P Ganesh, RR Unocic; Oak Ridge National Laboratory
- 11:30 AM **227** *Exploring Thermal Properties of MoS<sub>2</sub> Using In Situ Quantitative STEM*; JM Johnson; The Ohio State University; CH Lee; The Ohio State University; S Rajan, W McCulloch, Y Wu, J Hwang; The Ohio State University
- 11:45 AM **228** *Aberration Corrected STEM Imaging of Domain Walls in Congruent LiNbO<sub>3</sub>*; D Mukherjee, GA Stone, K Wang, V Gopalan, N Alem; The Pennsylvania State University

## B

### BIOLOGICAL SCIENCES SYMPOSIA— TUESDAY MORNING

#### **B05.1 Pathology: When Normal Goes Wrong**

##### SESSION CHAIRS:

Jay Jerome, Vanderbilt University  
Bill Gunning, University of Toledo

##### PLATFORM SESSION

Tuesday 10:30 AM • Room: C110

- 10:30 AM **229** *When the Immunoreactions Don't Help*; WT Gunning; University of Toledo
- 10:45 AM **230** *The Use of a Degradable Biomaterial to Regulate Fibrosis at the Implant-Host Interface*; KA Harmon, BA Lane, JF Eberth; University of South Carolina; MJ Yost; Medical University of South Carolina; HI Friedman, RL Goodwin; University of South Carolina
- 11:00 AM **231** *STEM Imaging and Analysis of Ferritin Nanoparticles in Organs: Spatial and Temporal Association of Ferritin with Invader Nanoparticles and Oxidation States Revealed*; AK Dozier; National Institute for Occupational Safety and Health; UM Graham; University of Kentucky; C Wang, JE Fernback, ME Birch; National Institute for Occupational Safety and Health; G Oberdoester; University of Rochester; BH Davis; University of Kentucky
- 11:15 AM **232** (INVITED) **M&M 2016 STUDENT AWARDEE** *Visualizing the Entry of Clostridium difficile Toxin A into Human Colonic Epithelial Cells*; R Chandrasekaran, DB Lacy; Vanderbilt University

#### **B06.2 Pharmaceuticals and Medical Science**

##### SESSION CHAIR:

John-Bruce Green, Baxter Healthcare

##### PLATFORM SESSION

Tuesday 10:30 AM • Room: C111

- 10:30 AM **233** (INVITED) *Mapping Chemistry, Composition, and Dynamics with Coherent Raman Imaging*; MT Cicerone, CH Camp, R Sharon-Frilling, YJ Lee; National Institute of Standards and Technology
- 11:00 AM **234** (INVITED) *Time of Flight Secondary Ion Mass spectrometry: Chemical Imaging*; S Attavar, DA Cole, A Ginwalla, JH Gibson; Evans Analytical Group
- 11:30 AM **235** (INVITED) *Applications of Optical Coherence Tomography for Nondestructive Evaluation of Materials*; J Slepicka; Baxter Healthcare

#### **B07.3 3D Structures of Macromolecular Assemblies, Cellular Organelles and Whole Cells**

##### SESSION CHAIRS:

Cheri Hampton, Emory University  
Kristin Parent, Michigan State University

##### PLATFORM SESSION

Tuesday 10:30 AM • Room: C115

- 10:30 AM **236** (INVITED) *Structure of the Full-Length TRPV<sub>2</sub> Channel by Cryo-EM*; VY Moiseenkova-Bell, KW Huynh, MR Cohen; Case Western Reserve University; J Jiang; University of California, Los Angeles; A Samanta, DT Lodowski; Case Western Reserve University; ZH Zhou; University of California, Los Angeles
- 11:00 AM **237** *Structural Oncology – Determining 3D Structures of Breast Cancer Assemblies*; BL Gilmore, CE Winton, V Karageorge, Z Sheng, DF Kelly; Virginia Polytechnic Institute and State University
- 11:15 AM **238** **M&M 2016 STUDENT AWARDEE** *Probing the Nanoscale Features of Rhodobacter Sphaeroides: Insight Gained from Cryo- Focused Ion Beam and Cryo-Electron Tomography*; JM Noble; Cornell University; J Lubieniecki, H Engelhardt, J Pnitzko, W Baumeister; Max Planck Institute of Biochemistry, Germany; L Kourkoutis; Cornell University
- 11:30 AM **239** (INVITED) *Sub-Tomogram Averaging in RELION*; TA Bharat, SH Scheres; MRC Laboratory of Molecular Biology, United Kingdom

# Scientific Program

Tuesday, July 26

B

## BIOLOGICAL SCIENCES SYMPOSIA—

TUESDAY MORNING *continued*

### B08.2 Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals

#### SESSION CHAIRS:

Jon Charlesworth, Mayo Clinic

Betty Thompkins, University of Pennsylvania

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C114

- 10:30 AM **240** *Using Scanning Transmission Electron Microscopy (STEM) for Accurate Virus Dosing Quantification*; CD Blancett, DP Fetterer, KA Koistinen, EM Morazzani, MK Monniger, AE Piper, PJ Glass, MG Sun; U.S. Army Medical Research Institute; et al;
- 10:45 AM **241** *Improved Virus Specimen Preparation for Transmission Electron Microscopy Using mPrep/g Capsules: Applications in BSL3-4 Laboratories*; MK Monniger, CA Nguessan, CD Blancett; U.S. Army Medical Research Institute of Infectious Diseases; SL Goodman; Microscopy Innovations, LLC; MG Sun; U.S. Army Medical Research Institute of Infectious Diseases
- 11:00 AM **242** (INVITED) *Vacuolar Myopathies: Ultrastructural Studies Benefit Diagnosis*; R Goffredi; Children's Hospital Colorado
- 11:30 AM **243** *Thrombosis, Inflammation, and Hematopoiesis Visualized by Multi-Scale In Vivo 1p, 2p, and On-Chip Imaging Systems*; S Nishimura; Jichi Medical University, Japan
- 11:45 AM **244** *SEM Visualization of Biological Samples Using Hitachi Ionic Liquid HILEM® IL 1000: A Comparative Study*; L-M Joubert; Stanford University; KL McDonald; University of California, Berkeley

P

## PHYSICAL SCIENCES SYMPOSIA—

TUESDAY MORNING

### P01.2 Dr. Gareth Thomas Symposium: Materials Solutions through Microscopy

#### SESSION CHAIRS:

R Gronsky, University of California Berkeley

D Williams, The Ohio State University

#### PLATFORM SESSION

Tuesday 10:30 AM • Room: C214

- 10:30 AM **245** (INVITED) *The Microstructure of Dislocated Martensite: Size, Microscopy and Microanalysis*; JW Morris; University of California, Berkeley
- 10:45 AM **246** (INVITED) *Nanomagnetic Materials in Medicine: Recent Developments in Imaging, Diagnostics and Therapy*; KM Krishnan; University of Washington
- 11:00 AM **247** (INVITED) *A Grain Boundary "TTT" – "Tribute to Thomas"*; MP Harmer, CJ Marvel; Lehigh University; PR Cantwell; Rose-Hulman Institute of Technology
- 11:15 AM **248** (INVITED) *Observation of a Metastable Cu Phase Formed at a Crystalline Si/Liquid Al-Alloy Interface in an Al-Cu-Mg-Si Alloy*; JM Howe; University of Virginia; MM Schneider; University of Central Florida
- 11:30 AM **249** (INVITED) *Impact of Analytical Electron Microscopy in Advancing Materials Technology in the Refining and Petrochemical Industry*; R Ayer; SK Innovation, Republic of Korea
- 11:45 AM **250** (INVITED) *Contributions to High-Resolution Electron Microscopy by Gareth Thomas' NCEM*; MA O'Keefe; OKCS

### P02.3 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

Dean J. Miller, Argonne National Laboratory

#### PLATFORM SESSION

Tuesday 10:10 AM • Room: E160AB

- 10:10 AM **251** (INVITED) *Progress in Soft X-Ray Microscopy Characterization of PEM Fuel Cell Catalyst Layers*; AP Hitchcock, J Wu, V Lee, N Appathurai; McMaster University, Canada; T Tyliszczak, HW Shiu, D Shapiro; Lawrence Berkeley National Laboratory, V Berejnov; Automotive Fuel Cell Cooperation Corporation, Canada; et al.
- 10:40 AM **252** *Bridging the Pressure Gap in Electron Beam Induced Current Microscopy: Imaging Charge Transport in Metal Oxide Nanowires Under Atmospheric Pressures*; A Stevanovic, J Velmurugan; University of Maryland; F Yi, D Lavan, A Kolmakov; National Institute of Standards and Technology
- 10:55 AM **253** *Electron Dose Management for High Angle Annular Dark Field Scanning Transmission Electron Microscope Tomography of Beam Sensitive Materials*; F Voisard, H Demers; McGill University, Canada; M Trudeau; Research Institute D'hydro-Québec, Canada; GP Demopoulos, R Gauvin; McGill University, Canada; K Zaghib; Research Institute D'hydro-Québec, Canada

- 11:10 AM **254** *Comparison of Energy Filtered TEM Spectra Image and Automatic Computer Orientation Mapping in LiFePO<sub>4</sub>/FePO<sub>4</sub> Phase Mapping*; X Mu, A Kobler; Karlsruhe Institute of Technology, Germany; VSK Chakravadhanula; Helmholtz-Institute Ulm for Electrochemical Energy Storage, Germany; P Norby; Technical University of Denmark; C Kübel; Karlsruhe Institute of Technology, Germany
- 11:25 AM **255** *Time-Resolved Atomic-Scale Chemical Imaging of the Phase Transformation in Li-Rich Layered Cathode Materials Induced by Electron-Beam Irradiations*; P Lu; Sandia National Laboratories; P Yan, C Wang; Pacific Northwest National Laboratory

## P06.3 Magnetic Materials, Phenomena and Imaging at the Nanoscale

### SESSION CHAIR:

Charudatta Phatak, Argonne National Laboratory

### PLATFORM SESSION

Tuesday 10:30 AM • Room: C213

- 10:30 AM **256** (INVITED) *Ferromagnetic Resonance Force Microscopy: Spectroscopy on the Nano-Scale*; SP White, PC Hammel; The Ohio State University
- 11:00 AM **257** (INVITED) *Three-Dimensional Induction Mapping of Magnetic Nanoscale Materials by Electron Holographic Tomography*; D Wolf, A Lubk, H Lichte; Technical University Dresden, Germany
- 11:30 AM **258** *Visualization of Magnetization in CoFe Nanofibers by Lorentz TEM and Electron Holography*; S Zhang, Z Zhou, G Grocke, A Petford-Long, Y Liu, X Chen, C Phatak; Argonne National Laboratory
- 11:45 AM **259** *Controlled Magnetization by Electron Holography of Polycrystalline Cobalt Nanowires*; JE Sanchez, J Cantu-Valle, E Ortega; University of Texas, San Antonio; I Betancourt; Universidad Nacional Autónoma de México; MM Maqableh, BJ Stadler; University of Minnesota; M Jose Yacamán; University of Texas, San Antonio, A Ponce; University of Texas, San Antonio

## P07.2 Failure Analysis Applications of Microanalysis, Microscopy, Metallography & Fractography

### SESSION CHAIRS:

Daniel P. Dennies, Consulting Metallurgical Engineer

Noah Budiansky, Exponent

William Kane, Exponent

### PLATFORM SESSION

Tuesday 10:30 AM • Room: C215

- 10:30 AM **260** (INVITED) *Prediction of Fatigue-Initiating Twin Boundaries in Polycrystalline Nickel Superalloys Informed by TriBeam Tomography*; WC Lenthe, J-C Stinville, MP Echlin, TM Pollock; University of California, Santa Barbara
- 11:00 AM **261** *TEM Characterization of HSLA Steels and Welds*; B Shalchi Amirkhiz, D-Y Park, C Bibby, P Liu; Natural Resources Canada

- 11:15 AM **262** *Combining Orientation Mapping and In Situ TEM to Investigate High-Cycle Fatigue and Failure*; DC Bufford; Sandia National Laboratories; D Stauffer; Hysitron, Inc., WM Mook; Sandia National Laboratories; SAS Asif; Hysitron, Inc., BL Boyce, K Hattar; Sandia National Laboratories
- 11:30 AM **263** *High-Resolution Cathodoluminescence Investigation of Degradation Processes in InGaN Green Laser Diodes*; D Gachet; Attolight AG, Switzerland; C De Santi, M Meneghini; University of Padova, Italy; G Mura, M Vanzi; University of Cagliari, Italy; G Meneghesso, E Zanoni; University of Padova, Italy
- 11:45 AM **264** *In Situ SEM Study of Mechanical Properties of Aluminide Bond Coating at Elevated Temperature*; S Bhowmick, S Asif; Hysitron, Inc.

## P09.3 From Angstrom to AU: Studies of Planet-Forming Materials

### SESSION CHAIR:

Eve L. Berger, NASA Johnson Space Center

### PLATFORM SESSION

Tuesday 10:30 AM • Room: C113

- 10:30 AM **265** (INVITED) *Deformation Analysis of Forsterite Olivine Using Electron Channeling Contrast Imaging and Electron Backscatter Diffraction*; S Kaboli; University of Nevada, Las Vegas; R Guavin; McGill University, Canada; P Burnley; University of Nevada, Las Vegas
- 11:00 AM **266** *Can Zircons be Suitable Paleomagnetic Recorders? – A Correlative Study of Bishop Tuff Zircon Grains Using High-Resolution Lab X-Ray Microscopes and a Quantum Diamond Microscope*; RR Fu; Columbia University; BP Weiss, EA Lima, J Ferraz; Massachusetts Institute of Technology; J Gelb; Carl Zeiss X-Ray Microscopy, Inc., D Glenn, P Kehayias; Harvard University, JF Einsle; University of Cambridge, United Kingdom; et al.
- 11:15 AM **267** *TEM Analyses of Itokawa Regolith Grains and Lunar Soil Grains to Directly Determine Space Weathering Rates on Airless Bodies*; EL Berger, LP Keller, R Christoffersen; NASA Johnson Space Center
- 11:30 AM **268** **MSA POST-DOCTORAL AWARDEE** *Nanophase Fe-Oxide, Fe-Sulfide, and Ilmenite in High-Ti Lunar Soil Using Aberration-Corrected STEM-EELS and EDS*; K Burgess; ASEE Naval Research Laboratory; R Stroud; U.S. Naval Research Laboratory
- 11:45 AM **269** *In Situ Heating of Lunar Soil in the Transmission Electron Microscope: Simulating Micrometeorite Impacts*; MS Thompson, TJ Zega; University of Arizona; JY Howe; Hitachi High-Technologies Canada Inc.

# Scientific Program

P

**PHYSICAL SCIENCES SYMPOSIA—**  
TUESDAY MORNING *continued*

## P11.1 Metallography and Microstructural Characterization of Metals

### SESSION CHAIRS:

George Vander Voort, Vander Voort Consulting LLC  
Coralee McNee, United Technologies

### PLATFORM SESSION

Tuesday 10:30 AM • Room: C112

- 10:30 AM **270** (INVITED) *Atomic Level Characterization of Novel Hardening Mechanisms in High-Mn-Steels*; J Mayer; RWTH Aachen University, Germany; M Beigmohamadi, M Lipinska-Chwalek; Forschungszentrum Jülich, Germany; JE Wittig; Vanderbilt University
- 11:00 AM **271** *The Power of Correlative Microscopy – Understanding Deformation Compatibility with HR-EBSD and HR-DIC*; J Jiang, T Zhang, F Dunne, B Britton; Imperial College London, United Kingdom
- 11:15 AM **272** *STEM Optical Sectioning for Imaging Screw Dislocations Core Structures in BCC Metals*; D Hernandez-Maldonado; SuperSTEM Laboratory, United Kingdom; H Yang; Lawrence Berkeley National Laboratory; L Jones; University of Oxford, United Kingdom; R Gröger; Institute of Physics of Materials ASCR, Czech Republic; PB Hirsch; University of Oxford, United Kingdom; QM Ramasse; SuperSTEM Laboratory, United Kingdom; PD Nellist; University of Oxford, United Kingdom
- 11:30 AM **273** *Investigating Dislocation-Twin Boundary Interactions in Nickel Using Diffraction Contrast Scanning Transmission Electron Microscopy*; DL Medlin; Sandia National Laboratories; ML Bowers, C Ophus; Lawrence Berkeley National Laboratory; SK Lawrence, B Somerday, RA Karnesky; Sandia National Laboratories
- 11:45 AM **274** *Through-Focal HAADF-STEM Analysis of Dislocation Cores in a High-Entropy Alloy*; TM Smith, BD Esser, MS Hooshmand; The Ohio State University; EP George; Ruhr University Bochum; F Otto; Ruhr University Bochum, Germany; M Ghazisaeidi, DW McComb, MJ Mills; The Ohio State University

TF

**TECHNOLOGISTS' FORUM—**  
TUESDAY MORNING

## X32.1 Roundtable Discussion on Artifacts

### PANELISTS:

E. Ann Ellis, Consultant In Biological Electron Microscopy  
Lee Cohen-Gould, Weill Cornell Medical College

### PLATFORM SESSION

Tuesday 10:30 AM • Room: C125

- 10:30 AM **275** *Recognizing and Preventing Artifacts in Microscopy: A Roundtable Discussion*; EA Ellis; Consultant In Biological Electron Microscopy; L Cohen-Gould; Weill Cornell Medical College

## MSA DISTINGUISHED SCIENTIST AWARDEE LECTURES

12:15 - 1:15 PM • Room C121-122

*Lunch served to first 100 participants*

### DISTINGUISHED SCIENTIST—PHYSICAL

George D.W. Smith  
Oxford University, UK

*Some Atoms I Have Known: The Origins, Development, and Current Status of Atom Probe Tomography*

### DISTINGUISHED SCIENTIST—BIOLOGICAL

Ken Downing  
Lawrence Berkeley National Laboratory, Berkeley

*From Tubulin to Microtentacles: Structures for Potential Cancer Therapy Targets*



A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—TUESDAY AFTERNOON

### A03.1 X-Ray Imaging and Analysis

#### SESSION CHAIR:

Jeff Davis, PNDetector

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C115

1:30 PM **276** (INVITED) *Novel Methods for Hard X-Ray Holographic Lensless Imaging*; MT Saliba; University of Zurich, Switzerland; J Bosgra; Paul Scherrer Institute, Switzerland; AD Parsons, UH Wagner, C Rau; Diamond Light Source Ltd., United Kingdom; P Thibault; University of Southampton, United Kingdom

2:00 PM **277** *High-Throughput Quantitative Phase Mapping Using Synchrotron X-Ray Diffraction*; J-H Her, Y Gao, E Jezek, J Rijssenbeek; GE Global Research Center; H Zhong, J Parise; Stony Brook University

2:15 PM **278** **M&M 2016 STUDENT AWARDEE** *Coherent Ptychographic Imaging Microscope With 17.5nm Spatial Resolution Employing 13.5nm High Harmonic Light*; M Tanksalvala, DF Gardner, GF Mancini, ER Shanblatt; University of Colorado, Boulder; X Zhang; Kapteyn-Murnane Laboratories; BR Galloway, CR Porter, R Karl; University of Colorado, Boulder; et al

2:30 PM **279** (INVITED) *Simultaneously Synchrotron X-Ray Fluorescence and Ptychographic Imaging of Frozen Biological Single Cells*; S Chen; Argonne National Laboratory; J Deng; Northwestern University; Y Nashed; Argonne National Laboratory; Q Jin; Northwestern University; D Vine; Lawrence Berkeley National Laboratory; T Peterka; Argonne National Laboratory; K Brister; Northwestern University, C Jacobsen; Argonne National Laboratory; et al.

### A04.4 Advances in FIB Instrumentation and Applications in Materials and Biological Sciences

#### SESSION CHAIR:

Srinivas Subramaniam, Intel Corporation

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C216

1:30 PM **280** *SIMS on the Helium Ion Microscope: A Powerful Tool for High-Resolution High-Sensitivity Nano-Analytics*; T Wirtz, D Dowsett, J-N Audinot, S Eswara; Luxembourg Institute of Science and Technology

1:45 PM **281** *Flexible Grid Holder Enabling FIB-SEM Sample Prep and Analysis*; C Hartfield; Oxford Instruments Nanoanalysis; F Bauer; Oxford Instruments, Germany

2:00 PM **282** *Localization of Subsurface Structures for Site-Specific Cryo-FIB Lift-Out Preparation of Solid-Liquid Interfaces*; MJ Zachman, LF Kourkoutis; Cornell University

2:15 PM **283** *Monolithic Multi-Grating Diffraction in a Convergent Electron Beam*; A Agarwal, C-S Kim, R Hobbs; Massachusetts Institute of Technology; D Van Dyck; University of Antwerp, Belgium; KK Berggren; Massachusetts Institute of Technology

2:30 PM **284** (INVITED) *FIB Sample Preparation for X-Ray Microscopy and ROI Target Cross-sectioning*; E Zschech, J Gluch, R Rosenkranz, Y Standke; Fraunhofer Institute for Ceramic Technologies and Systems, Germany; S Niese; AXO Dresden GmbH, Germany

### A05.3 Applications of Correlative Microscopy to Physical and Biological Sciences

#### SESSION CHAIRS:

Nestor Zaluzec, Argonne National Laboratory

Renu Sharma, National Institute of Standards and Technology

Si Chen, Argonne National Laboratory

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C210

1:30 PM **285** (INVITED) *Temperature Programmed Reduction of a PdCu Bimetallic Catalyst via Atmospheric Pressure In Situ STEM-EDS and In Situ X-Ray Adsorption Analysis*; MA Kulzick; BP Research Center; E Prestat; University of Manchester, United Kingdom; P Dietrich, E Doskocil; BP Research Center; SJ Haigh, MG Burke; University of Manchester, United Kingdom; NJ Zaluzec; Argonne National Laboratory

2:00 PM **286** *Multimodal Approach for Rationalization and Quantification of Structural Disorder in Transition Al<sub>2</sub>O<sub>3</sub>*; L Kovarik, M Bowden, A Andersen, N Washton, J Szanyi, J Hu, CH Peden; Pacific Northwest National Laboratory, J-H Kwak; Ulsan National Institute of Science and Technology, Republic of Korea; et al.

2:15 PM **287** *Combined Scanning Probe Microscopy and Confocal Raman Spectroscopy for Functional Imaging of the Layered Materials*; AV Ievlev, M Susner, M McGuire, P Maksymovych, S Kalinin; Oak Ridge National Laboratory

2:30 PM **288** *Correlative Imaging and Spectroscopy of Particles in Liquid*; X-Y Yu, B Arey, HJ Jung, L Kovarik, Z Zhu, J Yao; Pacific Northwest National Laboratory; T Troy, M Ahmed; Lawrence Berkeley National Laboratory et al.

2:45 PM **289** *Distinguishing Isotopes in the Electron Microscope: In Situ TEM-SIMS Correlative Analysis*; L Yedra, S Eswara, D Dowsett, T Wirtz; Luxembourg Institute of Science and Technology

# Scientific Program

Tuesday, July 26

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—TUESDAY AFTERNOON *continued*

### A06.4 Analytical Electron Microscopy for Advanced Characterization from Multi-dimensional Data Acquisition to Integrated Analysis

#### SESSION CHAIRS:

Chaoying Ni, University of Delaware

Peter van Aken, Max Planck Institute for Solid State Research

Masashi Watanabe, Lehigh University

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C224-25

- 1:30 PM **290** (INVITED) *Improved Data Analysis and Reconstruction Methods for EDX Tomography*; Z Saghi, J Einsle, R Blukis, A Strodahs, R Leary; University of Cambridge, United Kingdom; P Burdet; École Polytechnique Fédérale de Lausanne, Switzerland; R Harrison, P Midgley; University of Cambridge, United Kingdom
- 2:00 PM **291** *Quantifying the Advantages of Compressive Sensing and Sparse Reconstruction for Scanning Transmission Electron Microscopy*; BW Reed, ST Park, DJ Masiel; Integrated Dynamic Electron Solutions, Inc.
- 2:15 PM **292** *High Performance Computing Tools for Cross Correlation of Multi-Dimensional Data Sets Across Instrument Platforms*; A Belianinov; Oak Ridge National Laboratory; D Gobeljic, VV Shvartsman; University of Duisburg-Essen, Germany; E Endeve, EJ Lingerfelt, R Archibald, SV Kalinin, S Jesse; Oak Ridge National Laboratory
- 2:30 PM **293** *The Enabler Framework: an Object-Oriented Toolkit for Microscopy Data Analysis*; MK Kundmann; e-Metrikos
- 3:00 PM **294** *Using Multivariate Analysis of Scanning-Rochigram Data to Reveal Material Functionality*; S Jesse, M Chi, AY Borisevich, A Belianinov, SV Kalinin, E Endeve, RK Archibald, CT Symons; Oak Ridge National Laboratory; et al.

### A09.3 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

#### SESSION CHAIR:

Jim Ciston, Lawrence Berkeley National Laboratory

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C220

- 1:30 PM **295** (INVITED) *An Electron Microscope Pixel Array Detector as a Universal STEM Detector*; DA Muller, KX Nguyen, MW Tate, P Purohit, C Chang, M Cao, SM Gruner; Cornell University

2:00 PM **296** *STEM Phase Imaging by Annular Pixel Array Detector (A-PAD) Combined with Quasi-Bessel Beam*; T Kawasaki; Japan Fine Ceramics Center; T Ishida; Nagoya University, Japan; T Kodama; Meijo University, Japan; T Tanji; Nagoya University, Japan; T Ikuta; Osaka Electro-Communication University, Japan

2:15 PM **297** *Multivariate Statistical Analysis of Series of Diffraction Patterns*; PG Kotula, MH Van Benthem; Sandia National Laboratories; H Ryll; PNSensor GmbH, Germany; M Simpson, H Soltau; PNDetector GmbH, Germany

2:30 PM **298** (INVITED) *Measurement of Atomic Electric Fields by Scanning Transmission Electron Microscopy (STEM) Employing Ultrafast Detectors*; K Müller-Caspary, FF Krause; Universität Bremen, Germany; A Béché; Universiteit Antwerpen, Belgium; M Duchamp; Forschungszentrum Jülich, Germany; M Schowalter; Universität Bremen, Germany; M Huth; PNDetector GmbH, Germany; S Löffler; Technische Universität Wien, Austria, A Rosenauer; Universität Bremen, Germany; et al.

### A11.4 Advances in Scanning Electron/Ion Instrumentation and Detectors

#### SESSION CHAIR:

Matthew Phillips, University of Technology Sydney

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C121-22

- 1:30 PM **299** (INVITED) *Nanoscale Imaging of Structural and Optical Properties Using Helium Temperature Scanning Transmission Electron Microscopy Cathodoluminescence of Nitride Based Nanostructures*; F Bertram, M Müller, G Schmidt, P Veit, J Christen; Institute of Experimental Physics, Germany; S Albert, E Calleja; Universidad Politécnica de Madrid, Spain
- 2:00 PM **300** *Nanoscale Cathodoluminescence of an InGaN Single Quantum Well Intersected by Individual Dislocations*; P Veit, S Metzner, C Berger, F Bertram, A Dadgar, A Strittmatter, J Christen; Otto-Von-Guericke University Magdeburg, Germany
- 2:15 PM **301** *STEM/SEM, Chemical Analysis, Atomic Resolution and Surface Imaging At  $\leq 30$ keV with No Aberration Correction for Nanomaterials on Graphene Support*; T Sunaoshi, K Kaji, Y Orai; Hitachi High-Technologies Corporation, Japan; T Schamp, E Voelkl; Hitachi High Technologies America, Inc.
- 2:30 PM **302** *Is it Possible to Image the Auger Electron Signal in a Conventional SEM Using a Segmented Annular BSED and Stage Bias?*; BJ Griffin, AA Suvorova; The University of Western Australia; JR Michael; Sandia National Laboratories; DC Joy; Oak Ridge National Laboratory
- 2:45 PM **303** *Comparison of Secondary, Backscattered and Low Loss Electron Imaging for Dimensional Measurements in the Scanning Electron Microscope - Part 2*; MT Postek, AE Vladar, J Villarrubia; National Institute of Standards and Technology; A Muto; Hitachi High Technologies America, Inc.

## A13.2 *In Situ* Electron Microscopy and Big Data Analytics in 2D and 3D

### SESSION CHAIR:

Renu Sharma, National Institute of Standards and Technology

### PLATFORM SESSION

Tuesday 1:30 PM • Room: C221

- 1:30 PM **304** (INVITED) *Structural Dynamics of Supported Metal Nanoparticles*; JC Yang; University of Pittsburgh
- 2:00 PM **305** (INVITED) *Recent Advancement of Environmental TEM for Material Process Characterization*; S Takeda, H Yoshida, T Uchiyama; Osaka University, Japan
- 2:30 PM **306** (INVITED) *Automated Image Processing Scheme to Measure Atomic-Scale Structural Fluctuations*; R Sharma, ZA Hussaini, P Lin; National Institute of Standards and Technology; W Zhu; State University of New York, Binghamton; B Natarajan; National Institute of Standards and Technology

## A15.4 Quantitative Measurement of Intensities and Distances in Electron Microscopy

### SESSION CHAIR:

Jinwoo Hwang, The Ohio State University

### PLATFORM SESSION

Tuesday 1:30 PM • Room: C212

- 1:30 PM **307** (INVITED) *Three-Dimensional Determination of the Coordinates of Individual Atoms in Materials*; J Miao; University of California, Los Angeles
- 2:00 PM **308** *Reconstruction of the Nanoscale Three-Dimensional Mass-Density Autocorrelation Function of Individual Cells*; Y Li, D Zhang, I Capoglu, D Damania, K Hujsak, L Cherkezyan, E Roth, R Bleher; Northwestern University; et al.
- 2:15 PM **309** (INVITED) *Retrieving Atomic Structure from Dynamical Rocking Curve Measurements in Both Real and Reciprocal Space*; CT Koch, WR Van den Broek, F Wang, RS Pennington; Humboldt University, Berlin, Germany
- 2:45 PM **310** *Quantitative Comparison of Phase Contrast Imaging in Conventional TEM Focal Series and STEM Ptychography*; E Liberti; University of Oxford, United Kingdom; H Yang; Lawrence Berkeley National Laboratory; G Martinez, P Nellist, A Kirkland; University of Oxford, United Kingdom

B

## BIOLOGICAL SCIENCES SYMPOSIA—

TUESDAY AFTERNOON

## B05.2 Pathology: When Normal Goes Wrong

### SESSION CHAIRS:

Bill Gunning, University of Toledo

Jay Jerome, Vanderbilt University

### PLATFORM SESSION

Tuesday 1:30 PM • Room: C110

- 1:30 PM **311** (INVITED) *In Late-Staged Atherosclerotic Foam Cells, Autophagy Exacerbates Lysosome Dysfunction and Cellular Homeostasis*; WG Jerome, C Netherland-Van Dyke, CE Romer; Vanderbilt University
- 2:00 PM **312** (INVITED) *Second Harmonic Generation and Multiphoton Excited Fluorescence Microscopy as a Phenotypic Tool in an Animal Model*; AL Nestor-Kalinowski; University of Toledo
- 2:30 PM **313** (INVITED) *Pathological Consequences of Altered Hemodynamics During Heart Valve Development*; JD Potts; University of South Carolina; V Menon, J Eberth, L Junor

## B06.3 Pharmaceuticals and Medical Science

### SESSION CHAIR:

Bridget Carragher, Nanoimaging Services

### PLATFORM SESSION

Tuesday 1:30 PM • Room: C111

- 1:30 PM **314** (INVITED) *EM by EM: High-Efficiency Epitope Mapping Using High-Throughput Electron Microscopy*; A Estevez; Genentech Inc., C Garvey, C Ciferri; Genentech Inc.
- 2:00 PM **315** (INVITED) *Structural Characterization of Monoclonal Antibody Therapeutics by Transmission Electron Microscopy and 2D Classification Analysis*; A Schneemann, JJ Sung, JA Speir, SK Mulligan, K On, J Quispe, B Carragher, CS Potter; Nanoimaging Services, Inc.
- 2:30 PM **316** *Characterization of the Shielding Properties of Serum Albumin on a Plant Viral Nanoparticle*; NM Gulati, AS Pitek, NF Steinmetz, PL Stewart; Case Western Reserve University
- 2:45 PM **317** *Fine Tuned Seed Mediated Synthesis and Photothermal Response of Gold Nanorods*; B Gates, I Guo, T Chung; Simon Fraser University, Canada

# Scientific Program

P

## PHYSICAL SCIENCES SYMPOSIA—

TUESDAY AFTERNOON

### P01.3 Dr. Gareth Thomas Symposium: Materials Solutions through Microscopy

#### SESSION CHAIRS:

Ronald Gronsky, University of California, Berkeley

David Williams, The Ohio State University

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C214

- 1:30 PM **318** (INVITED) *Antiphase Ordered Domains and Optical Diffraction for Copper-Gold and Samarium-Doped Ceria: Reflections on Gareth Thomas*; R Sinclair, SC Lee, AL Koh; Stanford University
- 1:45 PM **319** *In Situ Study of the Order-Disorder Transformation in Lithium Ferrite*; OO Van der Biest; Katholieke Universiteit Leuven, Belgium
- 2:00 PM **320** (INVITED) *Molecular Biomimetics vs Materials Science*; M Sarikaya; University of Washington
- 2:15 PM **321** *Pulsed Plasma Surface Modifications (PPSM) from an Industrial Perspective: Pico-Technology, Nano-Structures and Novel Structures with Unique Properties*; RH Hoel; MOTech Plasma a.s., Norway
- 2:30 PM **322** (INVITED) *Polar Vortices in Oxide Superlattices*; R Ramesh; University of California, Berkeley
- 2:45 PM **323** *Using Energy-Filtered TEM to Solve Practical Materials Problems with Inspirations from Gareth Thomas*; JD Sugar, F El Gabaly; Sandia National Laboratories; W Chueh; Stanford University; PG Kotula, N Bartelt; Sandia National Laboratories; JT McKeown; Lawrence Livermore National Laboratory; AM Glaeser, R Gronsky; University of California, Berkeley; et al.

### P02.4 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

David A. Cullen, Oak Ridge National Laboratory

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: E160AB

- 1:30 PM **324** (INVITED) *Microstructural Evolution in Transition-Metal-Oxide Cathode Materials for Lithium-Ion Batteries*; DJ Miller; Argonne National Laboratory
- 2:00 PM **325** *On Growth and Chemistry of Electrodeposited Mg Layers with Electrolytes Having Varying Cl Content for Battery Application*; M Bachhav; University of Michigan
- 2:15 PM **326** *Revealing Microstructural Defects in Commercial Li-Ion Batteries Under Electrochemical Fatigue Cycling*; J Gelb; Carl Zeiss X-Ray Microscopy, Inc., D Finegan, D Brett, P Shearing; University College London, United Kingdom
- 2:30 PM **327** *STEM/EELS Analysis of  $\text{Li}(\text{Ni}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05})\text{O}_2$  Held at High Voltages*; P Mukherjee; Rutgers University; D Su; Brookhaven National Laboratory; N Pereira, G Amatuucci, F Cosandey; Rutgers University

- 2:45 PM **328** *A “Hidden” Mesoscopic Feature Revealed by Electron Microscopy could Facilitate Ion Transport in Solid Electrolytes*; C Ma, K More, N Dudney, Y Cheng, M Chi; Oak Ridge National Laboratory

### P09.4 From Angstrom to AU: Studies of Planet-Forming Materials

#### SESSION CHAIR:

Eve L. Berger, NASA Johnson Space Center

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C113

- 1:30 PM **329** (INVITED) *Volatile Addition to the Inner Solar System Between 4.566 and 4.564 Ga: Evidence from Angrite Meteorites*; AR Sarafian, SG Nielsen, HR Marschall, GA Gaetani; Woods Hole Oceanographic Institution; EH Hauri; Carnegie Institution of Washington; K Righter; NASA Johnson Space Center; E Sarafian; Woods Hole Oceanographic Institution
- 2:00 PM **330** (INVITED) *Investigating the History of Magmatic Volatiles in the Moon Using NanoSIMS*; JJ Barnes, M Anand, IA Franchi; The Open University, United Kingdom
- 2:30 PM **331** (INVITED) *Identifying the Carrier of Martian Water in the Nakhla Meteorite*; MR Lee, I MacLaren; University of Glasgow, United Kingdom

### P11.2 Metallography and Microstructural Characterization of Metals

#### SESSION CHAIRS:

George Vander Voort, Vander Voort Consulting LLC

Coralee McNee, United Technologies

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C112

- 1:30 PM **332** (INVITED) *Nonmetallic Inclusions in Steel – Origin, Estimation, Interpretation and Control*; AA Kazakov; Peter The Great Saint Petersburg Polytechnic University, Russian Federation
- 2:00 PM **333** (INVITED) *EBSD-Based Analysis of the Relation Between Oxide Scale Microstructure and Pickling Characteristics of a Commercial Hot Rolled Strip*; G Karacali; Erdemir-Eregli Iron and Steel Works, Inc., Turkey; K Davut; Atılım University, Turkey
- 2:30 PM **334** *The Application of Automated Microanalysis on SEM to the Characterization of Steel Samples*; J Goulden, H Jiang; Oxford Instruments Nanoanalysis, United Kingdom; K Thomsen, K Mehnert; ST Development ApS, Denmark
- 2:45 PM **335** *Results of Interlaboratory Test Programs to Assess the Precision of Inclusion Ratings by Methods A, C and D of ASTM E45*; GF Vander Voort; Vander Voort Consulting LLC



TF

## TECHNOLOGISTS' FORUM— TUESDAY AFTERNOON

### X31.1 Special Topic: A Practical Approach to Current Software Solutions and their Applications

#### SESSION CHAIRS:

Frank Macaluso, Einstein College of Medicine  
Caroline Miller, Indiana University

#### PLATFORM SESSION

Tuesday 1:30 PM • Room: C125

- 1:30 PM **336** (INVITED) *Performing Quantitative Imaging Acquisition, Analysis and Visualization Using the Best of Open Source and Commercial Software Solutions*; SM Shenoy; Albert Einstein College of Medicine
- 2:00 PM **337** (INVITED) *ImageJ: Image Analysis Interoperability for the Next Generation of Biological Image Data*; CT Rueden, MC Hiner, KW Eliceiri; University of Wisconsin-Madison
- 2:30 PM **338** (INVITED) *An Image Processing Workflow to Quantify Penetration of Blob-like Structures into an Arbitrary Region of Interest*; TW Lancon; FEI Company

T

## BIOLOGICAL SCIENCES TUTORIAL— TUESDAY AFTERNOON

### X42 Building and Validating Atomic Models for EM Density Maps

#### SESSION CHAIR:

Scott Stagg, Florida State University

- 1:30 PM **339** *Building and Validating Atomic Models for Cryo-EM Density Maps*; ML Baker, M Chen, T Durmaz, PR Baldwin; Baylor College of Medicine; T Ju; Washington University in St. Louis; SJ Ludtke; Baylor College of Medicine

A

## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—TUESDAY AFTERNOON

### A03.P1 X-Ray Imaging and Analysis

#### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 86

3:00 PM **340** *X-Ray Mapping and Particle Searching with a Benchtop SEM*; J Maas, K Kersten, J Smulders; Phenom-World BV, Netherlands; K Mason; Eastern Analytical Pty Ltd., Belgium

#### POSTER # 87

3:00 PM **341** *Automated Analysis of EDS Maps*; C Lang, M Hiscock; Oxford Instruments Nanoanalysis, United Kingdom

#### POSTER # 88

3:00 PM **342** *Characterisation of Recycled Aggregate Concrete Through X-Ray Mapping*; Q Huang, T Murphy, EL Tan, R Wuhrer; Western Sydney University, Australia

#### POSTER # 89

3:00 PM **343** *Analysis of Food Packaging Layered Polymers by SEM/EDS and Raman Spectroscopy*; J Konopka, M Wall; Thermo Fisher Scientific

#### POSTER # 90

3:00 PM **344** *Quantification of Elemental Distribution in Spherical Core-Shell Nanoparticles Measured by STEM-EDX*; JT Held, K Hunter, UR Kortshagen, KA Mkhoyan; University of Minnesota

#### POSTER # 91

3:00 PM **345** *Chemically Specific Buried Interface Imaging with a Coherent EUV Nanoscope*; CL Porter, ER Shanblatt, DF Gardner, GF Mancini, RM Karl, MD Tanksalvala, CS Bevis, HC Kapteyn; University of Colorado, Boulder; et al.

# Scientific Program

Tuesday, July 26

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## ADVANCES IN INSTRUMENTATION

### POSTER SESSIONS—

TUESDAY AFTERNOON *continued*

#### A04.P1 Advances in FIB Instrumentation and Applications in Materials and Biological Sciences

##### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

##### POSTER # 92

3:00 PM **346** *Micromachining of Si<sub>3</sub>N<sub>4</sub> by Ga<sup>+</sup>-Ion Implantation and Dry Etching*; M Baluktsian, K Keskinbora, UT Sanli, G Schütz; Max Planck Institute for Intelligent Systems, Germany

##### POSTER # 93

3:00 PM **347** *FIB Tomography of Bacterial Biofilms Grown on Gold and Polystyrene*; T Chou, M Libera, J Gu; Stevens Institute of Technology

##### POSTER # 94

3:00 PM **348** *New Attempts on Preparing Tungsten FIB Sample*; Z Pengcheng, S Zhiwei, C Pengtao, Z Xinai; Xi'an Jiaotong University, China

##### POSTER # 95

3:00 PM **349** *Novel TEM Specimen Preparation Using Multi-Source Focused Ion Beam for Real-Time Electrostatic Biasing Studies*; JA Peoples; Wright State University; B Howe; U.S. Air Force Research Laboratory, WPAFB; L Grazulis; University of Dayton; K Mahalingam; UES, Inc.

##### POSTER # 96

3:00 PM **350** *Xe<sup>+</sup> FIB Milling and Measurement of Amorphous Damage in Diamond*; B Van Leer, R Kelley, A Genc, A Savenko; FEI Company

##### POSTER # 97

3:00 PM **351** *Site Specific Preparation of Powders for High-Resolution Analytical Electron Microscopy Using a Ga<sup>+</sup> Focused Ion Beam*; S Vitale, JD Sugar; Sandia National Laboratories; PD Cappillino; University of Massachusetts, Dartmouth; LA Giannuzzi; EXpressLO LLC; DB Robinson; Sandia National Laboratories

##### POSTER # 98

3:00 PM **352** *Fabrication of Frozen-Hydrated Sections by Focused Ion Beam (FIB) Method*; J Zhang; Institute of Biophysics, CAS, China

##### POSTER # 99

3:00 PM **353** *MEMS-Based Heating Element for In Situ Dynamical Experiments on FIB/SEM Systems*; L Novak, T Vystavel, J Starek; FEI Company, Czech Republic; L Mele; FEI Company, Netherlands

##### POSTER # 100

3:00 PM **354** *An In Situ Method for Preserving Buried Voids and Cracks During TEM Sample Preparation Using FIB*; X Zhong; The University of Manchester, United Kingdom; P Withers, MG Burke; University of Manchester, United Kingdom

##### POSTER # 101

3:00 PM **355** *Novel Investigative Preparation of Human Hair*; IN Boona, RE Williams, D Huber; The Ohio State University; JM Marsh, M Mamak; Procter & Gamble Company; DW McComb; The Ohio State University

##### POSTER # 102

3:00 PM **356** *Automatic FIB-SEM Preparation of Straight Pillars for Micro-Compression Testing*; T Volkenandt; Carl Zeiss Microscopy GmbH, Germany; A Laquerre; Fibics Inc., Canada; M Postolski, F Pérez-Willard; Carl Zeiss Microscopy GmbH, Germany

##### POSTER # 103

3:00 PM **357** *The Application of Cryogenic Focused Ion Beam Scanning Electron Microscopy to Hydrogel Characterisation*; CD Parmenter, A Baki, KM Shakesheff; University of Nottingham, United Kingdom

##### POSTER # 104

3:00 PM **358** *Quantification of Milling Rate and Reduction in Amorphous Damage Using Low Energy, Small Spot, Argon Ion Milling for TEM Specimens Prepared by FIB*; M Abadier, M Boccabella, J Liu, P Fischione; E.A. Fischione Instruments

##### POSTER # 105

3:00 PM **359** *Curtaining-Free Top-Down TEM Lamella Preparation from a Cutting Edge Integrated Circuit*; A Denisyuk; TESCAN Orsay Holding a.s., Česká republika; T Hrnčíř, JV Oboňa, M Petrevec; TESCAN Brno, s.r.o., Česká republika; J Michalička; TESCAN Orsay Holding a.s., Česká republika

#### A05.P1 Applications of Correlative Microscopy to Physical and Biological Sciences

##### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

##### POSTER # 106

3:00 PM **360** *Multimodal Low-Dimensional Materials Characterization with Correlative Microscopy: Raman-PL-FLIM-AFM-SNOM-SEM*; U Schmidt; WITec GmbH, Germany; W Liu; WITec Instruments; D Steinmetz, T Dieing, O Hollricher; WITec GmbH, Germany

##### POSTER # 107

3:00 PM **361** *Correlative Characterization of Graphene with the Linkage of SEM and KFM*; Y Hashimoto; Hitachi High-Technologies Corporation, Japan; T Yamaoka; Hitachi High-Tech Science Corporation, Japan; S Takeuchi, T Sunaoshi, A Miyaki, M Sasajima; Hitachi High-Technologies Corporation, Japan; A Muto, J-J Yu; Hitachi High Technologies America, Inc.

##### POSTER # 108

3:00 PM **362** *Correlative Isotopic Analysis by Image Fusion of Electron Microscopy and Secondary Ion Mass Spectrometry Data*; JG Tarolli, BE Naes, D Willingham; Pacific Northwest National Laboratory

## POSTER # 109

3:00 PM **363** *Correlative Light and Electron Microscopy in Atmosphere*; M Nakabayashi, M Shoji, M Yoshihara; Hitachi High-Technologies Corporation, Japan; A Hisada; Hitachi, Ltd., Japan; Y Ominami; Hitachi High-Technologies Corporation, Japan

## POSTER # 110

3:00 PM **364** *Correlative Fluorescence and Scanning Electron Microscope Imaging of Cultured Neurons Pretreated with Ionic Liquid*; A Muto; Hitachi High Technologies America, Inc., M Shibata; Max Planck Florida Institute for Neuroscience; M Konomi; Hitachi High-Technologies Corporation, Japan; R Yasuda, N Kamasawa; Max Planck Florida Institute for Neuroscience

## POSTER # 111

3:00 PM **365** *The Effects of Chemical Fixation on the Cellular Nanostructure: A Correlative Study of Back-Scattered Interference Spectrometry Microscopy and TEM*; Y Li, L Almassalha, J Chandler, Y Cyrus, R Bleher, H Subramanian, I Szleifer, V Backman; Northwestern University; et al.

## POSTER # 112

3:00 PM **366** *Processing a Biological Tissue from Cryo-SEM to Replica*; N Vaskovicova, K Hrubanova, V Krzyzanek; Institute of Scientific Instruments ASCR, Czech Republic

## POSTER # 113

3:00 PM **367** *Linking Length Scales and Modalities with Integrated, Correlative Microscopy*; J Gelb, W Harris, L Lechner, A Merkle; Carl Zeiss X-Ray Microscopy, Inc.

## POSTER # 114

3:00 PM **368** *Learning from Scanning Transmission Electron Microscopy to Enhance Transmission X-Ray Microscopy: How We Can Merge STEM and TXM Datasets?*; X Yang, D Gürsoy, C Phatak, V De Andrade; Argonne National Laboratory; EB Gulsoy; Northwestern University; F De Carlo; Argonne National Laboratory

## POSTER # 115

3:00 PM **369** *Correlative NanoSIMS and Atom Probe Study of Nacre: Toward Understanding Polymorphism Effects in a Chinese Pearl*; HG Francois-Saint-Cyr; CAMECA Instruments, Inc., G Wille; BRGM, French Geological Survey; I Martin; CAMECA Instruments, Inc., A Cabin-Flaman; Université de Rouen, France; DJ Larson; CAMECA Instruments, Inc.

## POSTER # 116

3:00 PM **370** *Advancements in Interfaced SEM and Raman Spectromicroscopy ( $\mu$ RS)*; S Prikhodko; University of California, Los Angeles; A King; Renishaw Inc., I Kakoulli; University of California, Los Angeles

## POSTER # 117

3:00 PM **371** *Correlative Light and Electron Microscopy (CLEM) Utilizing Hitachi HILEM IL1000 Ionic Liquid*; JP Kilcrease, O Takagi; Hitachi High Technologies America, Inc., G Baughan; U.S. Department of Agriculture

## POSTER # 118

3:00 PM **372** *A New Solution of Non-Integrated Correlative Light and Electron Microscopy Based on High-Vacuum Optical Platform*; S Li, G Ji, X Huang, L Sun, J Zhang, W Xu, F Sun; Institute of Biophysics, CAS, China

## POSTER # 119

3:00 PM **373** *Morphology and Composition of Biomineralized Ceria and Ceria-Zirconia Nanocrystals*; L Lu, C Curran, C Kiely, B Berger, S McIntosh; Lehigh University

## A09.P1 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

## POSTER # 120

3:00 PM **374** **MSA POST-DOCTORAL AWARDEE** *Quantitative Atomic Resolution Differential Phase Contrast Imaging Using a Segmented Area All Field Detector*; G Sanchez-Santolino, T Seki, N Lugg, R Ishikawa; The University of Tokyo, Japan; DJ Taplin, SD Findlay; Monash University, Australia; Y Ikuhara, N Shibata; The University of Tokyo, Japan

## POSTER # 121

3:00 PM **375** **M&M 2016 STUDENT AWARDEE** *Development of STEM-Holography*; FS Yasin, TR Harvey, JJ Chess, JS Pierce, BJ McMorran; University of Oregon

## POSTER # 122

3:00 PM **376** *Phase Imaging in STEM Allowing for Post-Acquisition Aberration Correction and 3D Optical Sectioning Using Ptychography Wigner-Distribution Deconvolution*; H Yang; Lawrence Berkeley National Laboratory; L Jones, RN Rutte, BD Davis; University of Oxford, United Kingdom; TJ Pennycook; University of Vienna, Austria; M Simson, M Huth, H Soltau; PNDetector GmbH, Germany; et al.

## POSTER # 123

3:00 PM **377** *Low-Frequency Response of Ptychography in the TEM*; DJ Johnson, AM Maiden; The University of Sheffield, United Kingdom

## POSTER # 124

3:00 PM **378** *Pushing the Limits of Fast Acquisition in TEM Tomography and 4D-STEM*; M Simson; PNDetector GmbH, Germany; RE Dunin-Borkowski; Ernst Ruska-Centre, Forschungszentrum Jülich, Germany; R Hartmann; PNSensor GmbH, Germany; M Huth, S Ihle; PNDetector GmbH, Germany; L Jones; University of Oxford, United Kingdom; Y Kondo; JEOL, Ltd., Japan; V Migunov; Ernst Ruska-Centre, Forschungszentrum Jülich, Germany; et al.

## POSTER # 125

3:00 PM **379** *Mega-Electron-Volt Femtosecond Electron Micro-Diffraction*; X Shen, R Li, X Wang; SLAC National Accelerator Laboratory

# Scientific Program

Tuesday, July 26

A

## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—

TUESDAY AFTERNOON *continued*

### POSTER # 126

3:00 PM **380 M&M 2016 STUDENT AWARDEE** *Fundamental Symmetry of Barium Titanate Single Crystal Determined Using Energy-Filtered Scanning Convergent Beam Electron Diffraction*; Y-T Shao, J-M Zuo; University of Illinois Urbana-Champaign

### POSTER # 127

3:00 PM **381** *Nanoscale Strain and Composition Mapping in Ionic Thin Film Heterostructures for Resistive Switching Devices*; WJ Bowman; Arizona State University; S Schweiger; ETH Zürich, Switzerland; A Darbal; AppFive LLC; PA Crozier; Arizona State University; JL Rupp; ETH Zürich, Switzerland

### POSTER # 128

3:00 PM **382** *STEM Strain Measurement From a Stream of Diffraction Patterns Recorded on a Pixel-Free Delay-Line Detector*; K Müller-Caspary; Universität Bremen, Germany; A Oelsner; Surface Concept GmbH, Germany; P Potapov; GlobalFoundries, Dresden, Germany

### POSTER # 129

3:00 PM **383** *Nanoscale Strain Mapping During In Situ Deformation of Annealed Al-Mg Alloys*; TC Pekin; University of California, Berkeley; J Ciston; Lawrence Berkeley National Laboratory; C Gammer; University of Vienna, Austria; AM Minor; University of California, Berkeley

### POSTER # 130

3:00 PM **384** *De-Coupling Anelastic and Elastic Deformation in Metallic Glass Thin Films via Measurement of Micro Strain Tensors Using In Situ Electron Diffraction*; R Sarkar; Arizona State University; C Ebner, C Rentenberger; University of Vienna, Austria; J Rajagopalan; Arizona State University

### POSTER # 131

3:00 PM **385** *Texture and Phase Analysis in Nanocrystalline Ni Thin Films by Precession Electron Diffraction Microscopy*; S-T Hu, P Ferreira; University of Texas, Austin; K Hattar; Sandia National Laboratories

### POSTER # 132

3:00 PM **386** *Fast Scanning Electron Diffraction and Electron Holography as Methods to Acquire Structural Information on Au<sub>102</sub>(p-MBA)<sub>44</sub> Nanoclusters*; JE Ortega, U Santiago, A Bruna, D Alducin, G Plascencia-Villa, RL Whetten, A Ponce, M Jose-Yacamán; University of Texas, San Antonio

### POSTER # 133

3:00 PM **387** *Developing Rapid and Advanced Visualisation of Magnetic Structures Using 2D Pixelated STEM Detectors*; M Nord, M Krajnak; University of Glasgow, United Kingdom; R Bali, J Fassbender; Helmholtz-Zentrum Dresden-Rossendorf, Germany; S McVitie, GW Paterson, I MacLaren, D McGrouther; University of Glasgow, United Kingdom; et al.

B

## BIOLOGICAL SCIENCES POSTER SESSIONS—TUESDAY AFTERNOON

### B02.P1 New Technologies for Digital Pathology

#### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 134

3:00 PM **388** *Imaging and Feature Selection Using GA-FDA Algorithm for the Classification of Mid-Infrared Biomedical Images*; RD Mankar; University of Houston; V Verma, M Walsh; University of Illinois, Chicago; C Bueso-Ramos; University of Texas MD Anderson Cancer Center; D Mayerich; University of Houston

#### POSTER # 135

3:00 PM **389** *Fully-Automated Immunogold Labeling of Resin-Embedded Specimens and On-Grid Deposition of Gold Fiducial Particles*; E Frankel, B August, A Audhya; University of Wisconsin-Madison; T Strader; Microscopy Innovations, LLC

### B05.P1 Pathology: When Normal Goes Wrong

#### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 136

3:00 PM **390** *Comparison of Rat Lung Tissue Following Inhalation and Intratracheal Administration of Metal Oxide Nanoparticles*; K Yamamoto, T Yoshida, T Hayashida; National Institute of Advanced Industrial Science and Technology, Japan; H Izumi, Y Morimoto; University of Occupational and Environmental Health, Japan

#### POSTER # 137

3:00 PM **391** *Ultrastructural Evaluation of the Planter Nerve after Transection of the Ramus Communicans in the Horse*; F Al-Bagdadi; Louisiana State University; J Schumacher; University of Tennessee; R Henry; Lincoln Memorial University; J Carter, F Tóth; University of Tennessee

### B06.P1 Pharmaceuticals and Medical Science

#### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 138

3:00 PM **392** *Protocol for the Isolation and Rapid Characterization of Foreign Debris in Pharmaceutical Products Using Light and Electron Microscopy*; RS Brown; MVA Scientific Consultants

#### POSTER # 139

3:00 PM **393** *Characterizing Dense Suspensions Using Image Analysis: A Case Study from the Pharmaceutical Industry*; NN Khawaja; Merck Research Laboratories; DJ Goldfarb; Merck Manufacturing Division



## POSTER # 140

3:00 PM **394** *Using Microscopy to Qualitatively Assess Protein A Resin and Guide Cleaning In Place (CIP) Strategy*; LM Dimemmo, M Mayani, S Chollangi, E Schutsky, K Sing, Y Li, M Hubert; Bristol-Myers Squibb Company

## POSTER # 141

3:00 PM **395** *Particle Induced X-Ray Emission Imaging of Gadolinium Distribution into Xenograft U87 Human Glioblastoma after AGuIX Nanoparticles Injection*; A Carmona, S Roudeau, R Ortega, Y Prezado; Centre National de la Recherche Scientifique, France; F Pouzoulet; Institut Curie, France

## POSTER # 142

3:00 PM **396 M&M 2016 STUDENT AWARDEE** *Synthesis and Characterization of Paramagnetic Iron Nanoparticles with Minimal Gold Coating for Optimal Drug Delivery*; DJ Banner, E Firlar; The University of Illinois, Chicago; H Asayesh-Ardakani; Michigan Technological University; R Shahbazian-Yassar, T Shokuhfar; The University of Illinois, Chicago

## POSTER # 143

3:00 PM **397** *Altering Lentiviral Tropism: Design and Implications of a Targeted Drug-Delivery System*; R Gleyzer, C Queenan, A Waldron, R Pergolizzi; Bergen County Academies

## B08.P1 Utilizing Microscopy for Research and Diagnosis of Diseases in Humans, Plants and Animals

### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

## POSTER # 144

3:00 PM **398** *TEM Investigation of Nanocarriers Distribution in Mice Brain*; R Nikkhah-Moshaie; A Kaushik; RD Jayant; Florida International University; V Bhardwaj; Western Carolina University; M Nair; Florida International University

## POSTER # 145

3:00 PM **399** *Ultrastructural Characterization of Nucleolar Organization in Human Gingival Fibroblast Overexpressing CEMPI*; CE Villegas-Mercado, L Agredano-Moreno, LF Jiménez-García; Universidad Nacional Autónoma de México

## POSTER # 146

3:00 PM **400** *Image Analysis of Transient Expression in Bombarded Soybean (Glycine max) Immature Embryos*; T Cicak, K Effinger, S Chennareddy, D Pareddy; Dow Agrosciences

## POSTER # 147

3:00 PM **401** *Environmental Scanning Electron Microscopy as a Useful Tool for Taxonomical Documentation of Parasitical Helminths*; E Tihlaříková, V Neděla; Institute of Scientific Instruments ASCR, Czech Republic; Š Mašová; Masaryk University, Czech Republic

## POSTER # 148

3:00 PM **402** *Study of Plant Waxes Using Low Temperature Method for ESEM*; V Neděla, E Tihlaříková; Institute of Scientific Instruments ASCR, Czech Republic; P Schiebertová, I Zajíčková, K Schwarzerová; Charles University, Czech Republic

## POSTER # 149

3:00 PM **403** *Decreased Aflatoxin Biosynthesis Upon Uptake of 20nm-sized Citrate Coated Silver Nanoparticles by the Aflatoxin Producer Aspergillus parasiticus*; C Mitra, A Chanda, S Ghoshroy, J Lead; University of South Carolina

## POSTER # 150

3:00 PM **404** *Emergence of Previously Unknown Poxviruses*; CS Goldsmith, MG Metcalfe, Y Li, WB Davidson, K Wilkins, AA Roess, LU Osadebe, NM Vora; Centers for Disease Control and Prevention; et al.

## POSTER # 151

3:00 PM **405** *Drebrin Depletion Causes Abnormal Morphology in Mouse Skin*; G Ning, RK Reynolds; The Pennsylvania State University; A August; Cornell University

## POSTER # 152

3:00 PM **406** *Development of a New Autophagosome Sensor with an LC3-Interacting Region (LIR) Motif and a Hydrophobic Domain*; YH Huh; Korea Basic Science Institute, Republic of Korea; Y-K Lee; Hannam University, Republic of Korea; Y-W Jun, S-M Um; Kyungpook National University, Republic of Korea; B-K Kaang; Seoul National University, Republic of Korea; D-J Jang; Kyungpook National University, Republic of Korea; J-A Lee; Hannam University, Republic of Korea

## POSTER # 153

3:00 PM **407** *Memantine Treatment for Prevention of Neuronal Cell Death in Traumatic Brain Injury*; R Rosenthal, C Queenan, A Wadron; Bergen County Academies

## POSTER # 154

3:00 PM **408** *Nano-Structure Mediated Delivery of a Chemotherapeutic Agent for Improved Leukemia Treatment*; A Molotkova, C Queenan, A Waldron; Bergen County Academies

## POSTER # 155

3:00 PM **409** *Microscopy in the Study of the Eye Disease Glaucoma*; CR Hann, MP Fautsch; Mayo Clinic

## POSTER # 156

3:00 PM **410** *Ultrastructural Imaging of Collagen Fibrils in Mouse Model of Abdominal Aortic Aneurysm*; JR Tonniges, B Albert; The Ohio State University; E Calomeni; Wexner Medical Center; C Hans; Nationwide Children's Hospital; G Agarwal; The Ohio State University

## POSTER # 157

3:00 PM **411** *Post Embedding Immunogold Labeling for Transmission Electron Microscopy, to Confirm Light Chain Restriction in Renal Diseases*; E Roberts, LA Anderson, R Gupta; Johns Hopkins University

# Scientific Program

Tuesday, July 26

B

## BIOLOGICAL SCIENCES POSTER SESSIONS—

TUESDAY AFTERNOON *continued*

### POSTER # 158

3:00 PM **412** *Bacterial Growth on Contact Lenses: Links Between Lens Care and Bacterial Formation Patterns*; K Prive; Northern Kentucky University

### POSTER # 159

3:00 PM **413** *Leaf Anatomical Changes Induced by Paclobutrazol Tree Growth Regulator in Cherrybark Oak*; Y Qi; Southern University and A&M College

### POSTER # 160

3:00 PM **414** *Localization of UV Absorbing Compounds in Nuttall Oak (Quercus nuttallii) Leaves Using Naturstoffreagenz-A (NA) and the Leica DMI6000 B Inverted Robotic Microscope*; VA Ferchaud; Southern University Agricultural Research & Extension Center; Y Qi; Southern University and A&M College

### POSTER # 161

3:00 PM **415** *Effect of Arsenic on Chloroplast Ultrastructure in Azolla filliculoides Lam*; A Zavaleta-Mancera; Colegio de Postgraduados en Ciencias Agrícolas, Mexico; LG Ortega-Ramirez, LF Jimenez-Garcia; Universidad Nacional Autónoma de México; G Sánchez-Viveros; Universidad Veracruzana, Mexico; A Alarcon; Colegio de Postgraduados en Ciencias Agrícolas, Mexico

### POSTER # 162

3:00 PM **416** *Effects of Bacillus thuringiensis Cry Proteins On the Morphology of Western Corn Rootworm (Diabrotica virgifera virgifera) Midgut Cells*; AJ Bowling, HE Pence; Dow Agrosciences; AM Turchi; Indiana University; SY Tan, KE Narva; Dow Agrosciences

### POSTER # 163

3:00 PM **417** *Alleviating Damage from Epirubicin-Induced Cardiotoxicity with an Increased Dosage of Cardioprotective Magnesium*; G Shukla, C Queenan, A Waldron; Bergen County Academies

### POSTER # 164

3:00 PM **418** *Blocking Intra-Bacterial Communication to Improve Water Quality in Developing Countries*; R Gohil, A Waldron, D Leonardi; Bergen County Academies

### POSTER # 165

3:00 PM **419** *Determining the Effectiveness of a Salicylic Acid Regimen to Reduce Cytotoxic ROS Associated with Anthracycline Treatment*; A Lekan, C Queenan, A Waldron; Bergen County Academies

P

## PHYSICAL SCIENCES POSTER SESSIONS—TUESDAY AFTERNOON

### P01.P1 Dr. Gareth Thomas Symposium: Materials Solutions through Microscopy

#### POSTER SESSION

Tuesday 3:00 PM • Room: Exhibit Hall

### POSTER # 166

3:00 PM **420** *Electron Microscopy of Morphed Graphene Nanostructures Synthesized by Mechanical Milling*; HA Calderon; Instituto Politécnico Nacional, Mexico City, Mexico; F Alvarez Ramirez; Instituto Mexicano Del Petróleo; I Estrada Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; VG Handjiev, FC Robles-Hernandez; University of Houston

### POSTER # 167

3:00 PM **421** *Low Dose Electron Microscopy of Cobalt Oxide Heterostructures, the Genuine Atomic Structure and Dose Limit*; HA Calderon; Escuela Superior de Física y Matemáticas-IPN, Mexico; OE Cigarros-Mayorga; Instituto Politécnico Nacional, Mexico City, Mexico; CF Kisielowski; Lawrence Berkeley National Laboratory

### POSTER # 168

3:00 PM **422** *STEM Video of Electronically-Driven Metal-Insulator Transitions in Nanoscale NbO<sub>2</sub> Devices*; WA Hubbard; University of California, Los Angeles; T Joshi, P Borisov, D Lederman; West Virginia University; BC Regan; University of California, Los Angeles

### POSTER # 169

3:00 PM **423** *TEM Analysis of InGaAs/GaAs Quantum Well-Quantum Dot Structures for Optoelectronics Applications*; V Kanzyuba, S Rouvimov; University of Notre Dame; S Mintairov, NA Kalyuzhnyy, M Maximov, A Zhukov; Academic University, Russian Federation; A Nadochty; Ioffe Physical-Technical Institute of Russian Academy of Science

### POSTER # 170

3:00 PM **424** *Coarsening Evolution in a Nickel-Base Superalloy with a Bimodal Gamma Prime Precipitate Distribution*; S Meher, LK Aagesen, LJ Carroll, MC Carroll; Idaho National Laboratory; TM Pollock; University of California, Santa Barbara

### POSTER # 171

3:00 PM **425** *Quantitative Dark-Field Transmission Electron Microscopy of the Microstructure Evolution in a 2618A Aluminum Alloy During Ageing*; C Rockenhäuser, B Skrotzki; Bundesanstalt für Materialforschung und -prüfung, Germany

### POSTER # 172

3:00 PM **426** *Further Development of an Environmental HVTEM for Reaction Science by a New Non-Exposure Transfer Holder*; N Tanaka, S Arai; Nagoya University, Japan; S Ohta; JEOL, Ltd., Japan

**POSTER # 173**

3:00 PM **427** *The Role of Grain Boundary Dislocations in the Segregation-Induced Grain Boundary Embrittlement of Copper by Bismuth*; CA Wade; University of Manchester, United Kingdom; I MacLaren; University of Glasgow, United Kingdom; RP Vinci, M Watanabe; Lehigh University

**POSTER # 174**

3:00 PM **428** *Characterizing Atomic Ordering in Intermetallic Compounds Using X-Ray Energy Dispersive Spectroscopy in an Aberration-Corrected (S)TEM*; RE Williams; The Ohio State University; A Carlsson, A Genc; FEI Company; J Sosa, D McComb, H Fraser; The Ohio State University

**POSTER # 175**

3:00 PM **429** *Microstructure Evolution in Nanostructured High-Performance Thermoelectrics: The Case of P-Type  $Pb_{1-x}Na_xTe-SrTe$* ; X Zhang, G Tan, S Hao, CM Wolverton, MG Kanatzidis, VP Dravid; Northwestern University

**POSTER # 176**

3:00 PM **430** *Characterization of Nanoscale Instabilities in Titanium Alloys Using Aberration-Corrected Scanning Transmission Electron Microscope*; Y Zheng, RE Williams, HL Fraser; The Ohio State University

**POSTER # 177**

3:00 PM **431** *Electron Microscopy Study on Hydrothermally Synthesized  $(SnO_2)_x(ZnO)_{1-x}$  Powders*; S Turan, P Kaya; Anadolu University, Turkey

## **P07.P1 Failure Analysis Applications of Microanalysis, Microscopy, Metallography & Fractography**

**POSTER SESSION**

**Tuesday 3:00 PM • Room: Exhibit Hall**

**POSTER # 178**

3:00 PM **432** *Flex Bending Fatigue of Dental Archwires*; JL Gbur, KN Gupte, JJ Lewandowski; Case Western Reserve University

**POSTER # 179**

3:00 PM **433** *Site-Specific Manipulation of CNTs to EXPRESSLO™ Grids for TEM Analysis*; PA Anzalone; Nanocomp Technologies, Inc., LA Giannuzzi; EXPRESSLO LLC

**POSTER # 180**

3:00 PM **434** *Temperature Dependence of Fracture Initiation in Silicon from In Situ SEM*; E Hintsala; Hysitron, Inc., S Bhowmick; Hysitron Inc., R Ballarini; University of Houston; W Gerberich; University of Minnesota

## **P11.P1 Metallography and Microstructural Characterization of Metals**

**POSTER SESSION**

**Tuesday 3:00 PM • Room: Exhibit Hall**

**POSTER # 181**

3:00 PM **435** *Column-Like Structure Observed in Aluminum-Copper-Iron Alloy*; AJ Baker, C Li, A Sobolewski, M Bair, H Hampikian; Clarion University; L Wang; Changchun Institute of Applied Chemistry, CAS, China; M Hua; University of Pittsburgh, D Li; Youngstown State University; et al.

**POSTER # 182**

3:00 PM **436** *An Electron Microscopy Study on Morphology and Microstructure of a NiCoAlFeMoTiCr High-Entropy Alloy Synthesized by Arc-Melting*; FJ Baldenebro-López, CD Gómez-Esparza; Universidad Autónoma de Ciudad Juárez, Mexico; JA Baldenebro-López; Universidad Autónoma de Sinaloa, Mexico; I Estrada-Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; JT Elizalde-Galindo, CA Rodríguez-González; Universidad Autónoma de Ciudad Juárez, Mexico; R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico; H Camacho-Montes; Universidad Autónoma de Ciudad Juárez, Mexico

**POSTER # 183**

3:00 PM **437** *Effect on Microstructure and Microhardness of Equiatomic NiCoAlFeMoTi High Entropy Alloys Produced by Mechanical Alloying and Subsequent Arc-Melting*; FJ Baldenebro-López; Universidad Autónoma de Sinaloa, Mexico; CD Gómez-Esparza; Universidad Autónoma de Ciudad Juárez, Mexico; JA Baldenebro-López; Universidad Autónoma de Sinaloa, Mexico; I Estrada-Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; JT Elizalde-Galindo, H Camacho-Montes; Universidad Autónoma de Ciudad Juárez, Mexico; R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

**POSTER # 184**

3:00 PM **438** *Synthesis of AlCoNi-SiC Composite Prepared by Mechanical Alloying*; FJ Baldenebro-López; Universidad Autónoma de Sinaloa, Mexico; CD Gómez-Esparza; Centro de Investigación en Materiales Avanzados, S.C., Mexico; JA Baldenebro-López, JH Castorena-González, MD Pellegrini-Cervantes, RA Vargas-Ortiz; Universidad Autónoma de Sinaloa, Mexico; R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico; JL Almaral-Sánchez; Universidad Autónoma de Sinaloa, Mexico

**POSTER # 185**

3:00 PM **439** *Microstructural Characterization of Hardened AISI 4140 Using TiN/SiC Coating*; JL Bernal, AI Martínez, EE Vera; Universidad Politécnica de Pachuca, Mexico

# Scientific Program

Tuesday, July 26

P

## PHYSICAL SCIENCES POSTER SESSIONS—

TUESDAY AFTERNOON *continued*

### POSTER # 186

3:00 PM **440** *Solid State Reaction Detected Between Hexagonal Boron Nitride and Iron During Sintering*; KP Furlan, DR Consoni; Universidade Federal de Santa Catarina, Florianópolis, Brazil; B Leite; JEOL USA, Inc., AN Klein; Universidade Federal de Santa Catarina, Florianópolis, Brazil

### POSTER # 187

3:00 PM **441** *Effect Mg Addition on Microstructure and Hardness of Al2024 Alloy after Thermo-Mechanical Treatments*; CG Garay-Reyes, IK Gómez-Barraza, MA Ruiz-Esparza-Rodríguez, E Cuadros-Lugo, HM Medrano-Prieto, I Estrada-Guel, MC Maldonado-Orozco, R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 188

3:00 PM **442** *Microstructure and Mechanical Properties of Al2024 Alloy Modified with Mg and Zn Additions After Hot-Extrusion and Aging Processes*; CG Garay-Reyes, MA Ruiz-Esparza-Rodríguez, E Cuadros-Lugo, HM Medrano-Prieto, I Estrada-Guel, MC Maldonado-Orozco, R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 189

3:00 PM **443** *Relative Strain in Cu-Nb Composite Wound Wire*; RE Goddard, KH Han; National High Magnetic Field Laboratory-Florida State University; DN Nguyen; National High Magnetic Field Laboratory-Los Alamos Laboratory

### POSTER # 190

3:00 PM **444** *Comparison of Microstructure and Hardness of an Equiatomic NiCo Alloy Produced by Two Routes*; CD Gómez Esparza, FJ Baldenebro López; Universidad Autónoma de Ciudad Juárez, Mexico; I Estrada Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; JA Baldenebro López; Universidad Autónoma de Sinaloa, Mexico; JT Elizalde Galindo, CA Rodríguez González; Universidad Autónoma de Ciudad Juárez, Mexico; R Martínez Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 191

3:00 PM **445** *Microstructural Characterization of a Metal Matrix Composite CoCrFeMnMoNi-ZnO Nanoparticles*; CD Gómez Esparza, FJ Baldenebro López; Universidad Autónoma de Ciudad Juárez, Mexico; R Martínez Sánchez, I Estrada-Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; H Camacho Montes, C López Díaz-De-León, CA Rodríguez González; Universidad Autónoma de Ciudad Juárez, Mexico

### POSTER # 192

3:00 PM **446** *Microstructural Study of the Gradient Structured Austenitic Stainless Steel Treated by Shot Peening*; Y He; Changwon National University, China; K Shin; Changwon National University, Republic of Korea

### POSTER # 193

3:00 PM **447** *Unveiling Solid State Dissimilar Ni-Base Alloy 625 / Structural Steel Joints Using Transmission Kikuchi Diffraction*; GW Lee, J Orsborn, AJ Ramirez; The Ohio State University

### POSTER # 194

3:00 PM **448** *TEM Study of Microstructure of 316L Stainless Steel with Different Specimen Preparation Techniques*; S-C Liou, W-A Chiou; University of Maryland

### POSTER # 195

3:00 PM **449** *HRTEM of Amorphous and Crystalline Bi Nanoparticles Prepared by Pulsed Laser Deposition*; L Liu; Universidade Católica do Rio de Janeiro, Brazil; Y Xing, DF Franceschini; Universidade Federal Fluminense, Brazil; IG Solórzano; Universidade Católica do Rio de Janeiro, Brazil

### POSTER # 196

3:00 PM **450** *Effect of Ce Addition and Deformation on the Microstructure and Hardness of (Al-Si-Mg) A356 Type Alloys*; HM Medrano-Prieto, CG Garay-Reyes, MC Maldonado-Orozco, R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 197

3:00 PM **451** *Optimizing the 3D Microstructure Observation Conditions of Pearlite Steel Through SEM-FIB Technique*; H Nakamichi, T Nishiyama, M Nagoshi; JFE Steel Corporation, Japan

### POSTER # 198

3:00 PM **452** *AEM Study of Grain Boundary Precipitation Phenomena in Alloy 33 (Cr-Fe-Ni-N) Resulting from the Direct-Aging at 700 °C*; JC Spadotto; Pontifícia Universidade Católica do Rio de Janeiro, Brazil; M Watanabe; Lehigh University; IG Solórzano; Pontifícia Universidade Católica do Rio de Janeiro, Brazil

### POSTER # 199

3:00 PM **453** *HRTEM and HRSTEM Study of Nanostructured Materials Prepared by Pulsed Laser Deposition*; Y Xing; Universidade Federal Fluminense, Brazil; L Liu; Pontifícia Universidade Católica do Rio de Janeiro, Brazil; DF Franceschini, WC Nunes; Universidade Federal Fluminense, Brazil; DJ Smith; Arizona State University; IJ Kiely; Pontifícia Universidade Católica do Rio de Janeiro, Brazil; G Solórzano

### POSTER # 200

3:00 PM **454** *Morphologic Evidence of In Situ Gold Deposition in Lateritic Placer Deposits from Guyana Shield of Venezuela*; JA Silverstein, M Krekeler, J Rakovan; Miami University

### POSTER # 201

3:00 PM **455** *Characterization of Sphere-like Structure in Aluminum Based Alloy*; C Li; Clarion University; L Wang; Changchun Institute of Applied Chemistry, CAS, China; H Hampikian, M Bair; Clarion University; A Baker; Clarion University; A Sobolewski; Clarion University; M Hua; University of Pittsburgh, D Li; Youngstown State University; et al.



**POSTER # 202**

3:00 PM **456** *Analysis of Strain Localization at High Angle Grain Boundaries During Creep of a Polycrystalline Superalloy Using SEM-Based Digital Image Correlation*; CE Slone, MJ Mills; The Ohio State University

**POSTER # 203**

3:00 PM **457** *“Colossal” Interstitial Supersaturation in Delta Ferrite in 17-7 PH Stainless Steels after Low-Temperature Nitridation*; D Wang, H Kahn, F Ernst, A Heuer; Case Western Reserve University

TF

**TECHNOLOGISTS’ FORUM POSTER SESSION—TUESDAY AFTERNOON**

**X31.P1 SPECIAL TOPIC: A Practical Approach to Current Software Solutions and their Applications**

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**POSTER SESSION**

Tuesday 3:00 PM • Room: Exhibit Hall

**POSTER # 204**

3:00 PM **458** *Advanced Platform for 3D Visualization, Reconstruction, and Segmentation with Electron Tomography*; Y Jiang; Cornell University; MD Hanwell; Kitware, Inc., E Padgett; Cornell University; S Waldon; Kitware, Inc., DA Muller, R Hovden; Cornell University

**POSTER # 205**

3:00 PM **459** *A Digital Micrograph Script for Detection of Astigmatism in TEM Images*; R Yan, W Jiang; Purdue University

O

**MICROSCOPY OUTREACH POSTER SESSION—TUESDAY AFTERNOON**

**X91.P1 A Family Affair**

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**POSTER SESSION**

Tuesday 3:00 PM • Room: C123-24

**POSTER # 206**

3:00 PM **460** *Complex Web Construction: a Possible Clue to Mechanical Properties an Investigation by Middle School Students in Collaboration with MIT and JEOL, USA*; DX Shattuck; Concord Middle School, Massachusetts

# Scientific Program

Wednesday, July 27

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—WEDNESDAY MORNING

### A01.1 Vendor Symposium

#### SESSION CHAIRS:

Paul Kotula, Sandia  
Teresa Ruiz, University of Vermont

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C110

- 8:30 AM **461** *Innovative Air Protection Sample Holder for Ion Milling-SEM-SPM and Shared-Alignment Sample Holder for SEM-SPM*; U Diestelhorst, T Yamaoka, H Tsujikawa, K Ando; Hitachi High-Tech Science Corporation, Japan; Y Dan, M Sakaue, A Kaneko, Y Hashimoto; Hitachi High-Technologies Corporation, Japan
- 8:45 AM **462** *A New, Versatile, High Performance SEM*; EJRVesseur; FEI Company, Netherlands; P Wandrol; FEI Company, Czech Republic; A Sandu, D Hahn; FEI Company, Netherlands
- 9:00 AM **463** *Sample Preparation Using Broad Argon Ion Beam Milling for Electron Backscatter Diffraction (EBSD) Analysis*; P Nowakowski, J Schlenker, M Ray, P Fischione; E.A. Fischione Instruments
- 9:15 AM **464** *The Nanoworkbench: Automated Nanorobotic System Inside of Scanning Electron or Focused Ion Beam Microscopes*; D Peters, I Burkart, V Klocke, E Burkart; Klocke Nanotechnik GmbH, Germany
- 9:30 AM **465** *Enhancing Materials and Device Analysis Capability in the SEM and FIB-SEM by Using a Nanomanipulator*; M Hiscock, C Lang; Oxford Instruments Nanoanalysis, United Kingdom; F Bauer; Oxford Instruments Nanoanalysis, Germany; C Hartfield; Oxford Instruments Nanoanalysis; P Statham; Oxford Instruments Nanoanalysis, United Kingdom
- 9:45 AM **466** *The Application of the AZtec EBSD System to the Study of Strain in the SEM*; J Goulden, A Bewick; Oxford Instruments Nanoanalysis, United Kingdom

### A03.2 X-Ray Imaging and Analysis

#### SESSION CHAIR:

Jeff Davis, PNDetector

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C115

- 8:30 AM **467** (INVITED) *Current State of Combined EDS-WDS Quantitative X-Ray Mapping*; K Moran; Moran Scientific, Australia; R Wuhler; Western Sydney University, Australia
- 9:00 AM **468** *Compositional Stage Mapping by EPMA and Micro-XRF*; PK Carpenter; Washington University in St. Louis
- 9:15 AM **469** **M&M 2016 STUDENT AWARDEE** *X-Ray Microanalysis Phase Map on Rare Earth Minerals with a Conventional and an Annular Silicon Drift Detector*; C Teng, H Demers, N Brodusch, KE Waters, R Gauvin; McGill University, Canada

- 9:30 AM **470** (INVITED) *X-Ray Mapping of an Impact-Resistant Crustacean-Derived Biocomposite*; NA Yaraghi; University of California, Riverside; N Guarín-Zapata; Purdue University; E Hintsala; University of Minnesota; S Bhowmick; Hysitron Inc.; L Sheppard; Western Sydney University, Australia; PD Zavattieri; Purdue University; R Wuhler; Western Sydney University, Australia, D Kisailus; University of California, Riverside

### A06.5 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

#### SESSION CHAIRS:

Chaoying Ni, University of Delaware  
Peter van Aken, Max Planck Institute for Solid State Research  
Masashi Watanabe, Lehigh University

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C224-25

- 8:30 AM **471** (INVITED) *Plasmons in Mesoscopic Gold Tapers*; W Sigle, N Talebi, S Guo, C Knipf; Max Planck Institute for Solid State Research, Germany; C Lienau, M Esmann, R Vogelgesang; Carl Von Ossietzky University Oldenburg, Germany, PA van Aken; Max Planck Institute for Solid State Research, Germany; et al.
- 9:00 AM **472** *Temperature Dependence of the Volume Plasmon in Silicon Nanoparticles*; M Mecklenburg; University of Southern California; B Zutter, BC Regan; University of California, Los Angeles
- 9:15 AM **473** *Hyperspectral Imaging of Surface-Plasmon-Enhanced Local Electric Fields by EELS with Tunable <60meV Energy Resolution*; P Abellan; SuperSTEM Laboratory, United Kingdom; PZ El-Khoury; Pacific Northwest National Laboratory; FS Hage; SuperSTEM Laboratory, United Kingdom; J Cottom; University of Leeds, United Kingdom; AG Joly, WP Hess; Pacific Northwest National Laboratory; RBrydson; University of Leeds, United Kingdom, QM Ramasse; SuperSTEM Laboratory, United Kingdom
- 9:30 AM **474** (INVITED) *Unveiling Nanometric Plasmons Optical Properties with Advanced Electron Spectroscopy in the Scanning Transmission Electron Microscope*; M Kociak; Centre National de la Recherche Scientifique, France

## A07.1 Surface and Subsurface Microscopy and Analysis

### SESSION CHAIR:

Vincent Smentkowski, General Electric

### PLATFORM SESSION

Wednesday 8:30 AM • Room: C216

- 8:30 AM **475** (INVITED) *A Novel Hybrid Dual Analyzer SIMS Instrument for Improved Surface and 3D-Analysis*; A Pirkkl, R Moellers, H Arlinghaus, F Kollmer, E Niehuis; ION-TOF GmbH, Germany; A Makarov, S Horning; Thermo Fisher Scientific, Germany, M Passarelli; National Physical Laboratory, United Kingdom; et al.
- 9:00 AM **476** (INVITED) *Complementing Secondary Ion Mass Spectrometry with other Ion-, Electron- and Photon-Based Analytical Microscopies*; F Horr ard, P Peres, A Merkulov; CAMECA Instruments, Inc., France; DJ Larson; CAMECA Instruments, Inc.
- 9:30 AM **477** (INVITED) *New Data Analysis Tools for X-Ray Photoelectron Spectroscopy (XPS) and Spectroscopic Ellipsometry (SE): Uniqueness Plots and Width Functions in XPS, and Distance, Principal Component, and Cluster Analyses in SE*; MR Linford; Brigham Young University

## A08.1 Quantitative and Qualitative Microanalysis by EPMA and SEM

### SESSION CHAIR:

Paul Carpenter, Washington University in St. Louis

### PLATFORM SESSION

Wednesday 8:30 AM • Room: C113

- 8:30 AM **478** (INVITED) *Rigorous Quantitative SEM/EDS Microanalysis Requires Careful Inspection of the Peak-Fitting Residual Spectrum to Reveal Hidden Constituents*; DE Newbury, NW Ritchie; National Institute of Standards and Technology
- 9:00 AM **479** *Uncertainty Is Our Friend - Rethinking Microanalysis Around Uncertainty Metrics*; NW Ritchie, DE Newbury; National Institute of Standards and Technology
- 9:15 AM **480** *X-Ray Emission From Thin Films on a Substrate - Experiments and Simulation*; Y Yuan, H Demers, N Brodusch, R Gauvin; McGill University, Canada
- 9:30 AM **481** *Quantitative Stage Mapping of a Zircon grain by WDS on an SEM*; SM Seddio; Thermo Fisher Scientific; RC Economos; Southern Methodist University
- 9:45 AM **482\*** *Spectral Deconvolution and Quantification in EDS Using Low Energy X-Ray Lines from Steel Spectra*; R Terborg; Bruker, Germany; T Salge; Natural History Museum, United Kingdom; PT Pinard, S Richter; RWTH Aachen University, Germany
- \*MOVED TO POSTER SESSION A08.P1 - THURSDAY.**

## A09.4 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

### SESSION CHAIR:

Doug Medlin, Sandia National Laboratories

### PLATFORM SESSION

Wednesday 8:30 AM • Room: C220

- 8:30 AM **483** (INVITED) *Fluctuation Electron Microscopy and Computational Structure Refinement for the Structure of Amorphous Materials*; JJ Maldonis, P Zhang, L He, A Gujral, MD Ediger, PM Voyles; University of Wisconsin-Madison
- 9:00 AM **484** *Radial Distribution Function Imaging by Diffraction Scanning Electron Microscopy*; X Mu, D Wang; Karlsruhe Institute of Technology, Germany; T Feng; Nanjing University of Science and Technology, China; C K bel; Karlsruhe Institute of Technology, Germany
- 9:15 AM **485** *Effect of Medium Range Order on Crystallization Kinetics of  $Cu_xZr_{1-x}$  Thin Film Metallic Glasses*; TT Li, GH Campbell; Lawrence Livermore National Laboratory
- 9:30 AM **486** *Development of Diffraction Scanning Techniques for Beam Sensitive Polymers*; KC Bustillo; Lawrence Berkeley National Laboratory; O Panova; University of California, Berkeley; C Gammer; Lawrence Berkeley National Laboratory; EB Trigg; University of Pennsylvania; XC Chen; Lawrence Berkeley National Laboratory; L Yan; University of Pennsylvania; NP Balsara; University of California, Berkeley, KI Winey; University of Pennsylvania; et al.
- 9:45 AM **487** *Study of Structure of Li- and Mn-rich transition Metal Oxides Using 4D-STEM*; AK Shukla; SuperSTEM Laboratory, United Kingdom; C Ophus; Lawrence Berkeley National Laboratory; C Gammer; University of Vienna, Austria; Q Ramasse; SuperSTEM Laboratory, United Kingdom

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION

SYMPOSIA—WEDNESDAY MORNING *continued*

### A11.5 Advances in Scanning Electron/Ion Instrumentation and Detectors

#### SESSION CHAIR:

Bradley Thiel, SUNY Polytechnic Institute

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C123-124

- 8:30 AM **488** (INVITED) *New methods for Measuring Chemistry and Temperature Using Scanning Ion and Electron Beams*; R Hull, H Parvaneh, X Wu; Rensselaer Polytechnic Institute
- 9:00 AM **489** *Hydrogen Ion Beams from Nanostructured Gas Field Ion Sources*; H Moritani; Hitachi High-Tech Science Corporation, Japan; R Urban; University of Alberta, Canada; M Salomons; National Institute for Nanotechnology, Canada; R Wolkow; University of Alberta, Canada; J Pitters; National Institute for Nanotechnology, Canada
- 9:15 AM **490** *Novel Scanning Ion Microscope with H<sub>3</sub><sup>+</sup> Gas Field Ionization Source*; S Matsubara, H Shichi; Hitachi, Ltd., Japan; Y Kawanami; Hitachi High-Tech Science Corporation, Japan; T Hashizume; Hitachi, Ltd., Japan
- 9:30 AM **491** *Reactive Gas Ion Beam Generation Using Single Atom W(111) Gas Field Ion Sources*; R Urban; University of Alberta, Canada; H Moritani; Hitachi High-Tech Science Corporation, Japan; RA Wolkow; University of Alberta, Canada; JL Pitters; National Research Council Canada
- 9:45 AM **492** *Nanometer Scale Time-of-Flight Back Scattering Spectrometry in the Helium Ion Microscope*; N Klingner, G Hlawacek, R Heller, J von Borany, S Facsko; Helmholtz-Zentrum Dresden-Rossendorf, Germany

### A13.3 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

#### SESSION CHAIR:

Xiaoqing Pan, University of California, Irvine

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C221

- 8:30 AM **493** *Fast Atomic-Scale Chemical Imaging by STEM EDS for study of Crystalline Materials and Dynamic Phase Transformations*; P Lu; Sandia National Laboratories; RL Yuan, JM Zuo; University of Illinois Urbana-Champaign
- 8:45 AM **494** (INVITED) *Atomic Scale In Situ Electron Microscopy: Challenges and Opportunities*; JR Jinschek; FEI Company, Netherlands
- 9:15 AM **495** **M&M 2016 STUDENT AWARDEE** *Increasing the Dimensionality of In Situ Electron Microscopy Data Sets by On-the-fly and Analytical Electron Tomography*; R Lin; Stony Brook University; L Han, HL Xin; Brookhaven National Laboratory
- 9:30 AM **496** (INVITED) *Transmission Electron Microscopy at Atmospheric Pressure*; X Pan; University of California, Irvine; S Zhang, S Dai, G Graham; University of Michigan

### A14.1 Single Atom Electron Microscopy and Spectroscopy

#### SESSION CHAIR:

Jingyue (Jimmy) Liu, Arizona State University

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C212

- 8:30 AM **497** (INVITED) *Electron Diffraction from a Single Atom and Optimal Signal Detection*; DA Muller; Cornell University
- 9:00 AM **498** *In-line Holography with Single Atom Sensitivity: Challenges and Achievements*; C Kisielowski; Lawrence Berkeley National Laboratory; P Specht; University of California, Berkeley; ID Sharp, J Yang; Lawrence Berkeley National Laboratory
- 9:15 AM **499** (INVITED) *Exploration of Single-Atom X-Ray Analysis in an Analytical Electron Microscope*; M Watanabe; Lehigh University
- 9:45 AM **500** *Observation of Single Atoms in Liquid and Liquid Inhomogeneous Structures*; T Miyata, T Mizoguchi; The University of Tokyo, Japan

B

## BIOLOGICAL SCIENCES SYMPOSIA—WEDNESDAY MORNING

### B03.1 Super Resolution Visualization of Cellular and Inter-Cellular Processes in Health and Disease

#### SESSION CHAIRS:

Rob Gourdie, Virginia Tech Carilion Research Institute

Sai Veeraraghavan, Virginia Tech Carilion Research Institute

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C111

- 8:30 AM **501** (INVITED) *Dissecting the Connexin43 Vesicular Transport Pathway by Super-Resolution Microscopy*; MJ Zeitz, CC James, JW Smyth; Virginia Polytechnic Institute and State University
- 9:00 AM **502** (INVITED) *Use of Super-Resolution Immunofluorescence Microscopy to Analyze Tight Junction Protein Interactions In Situ*; M Koval, SA Molina, B Schlingmann; Emory University School of Medicine
- 9:30 AM **503** (INVITED) *Single Molecule Localization Microscopy of DNA Damage Response Pathways in Cancer*; DR Whelan, Y Yin, K Bermudez-Hernandez, S Keegan, D Fenyo, E Rothenberg; New York University School of Medicine



## PHYSICAL SCIENCES SYMPOSIA—

WEDNESDAY MORNING

### P02.5 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

Chris Kiely, Lehigh University

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: E160AB

- 8:30 AM **504** (INVITED) *Imaging of Fuel Cell and Battery Electrodes Using Focused Ion Beam Scanning Electron Microscopy*; S Barnett, S Wang, Z Liu, D Kennouche, K Yakal-Kremiski; Northwestern University
- 9:00 AM **505** *Investigating Side Reactions and Coating Effects on High Voltage Layered Cathodes for Lithium Ion Batteries*; P Yan, C Wang; Pacific Northwest National Laboratory
- 9:15 AM **506** *Enhanced Stability of Pt-TiO<sub>2</sub>-CNT Heterostructure Composite Cathodes for Li-O<sub>2</sub> Batteries Studied by High-Resolution AEM*; VP Oleshko; National Institute of Standards and Technology; M Noked, MA Schroeder, C Liu, AJ Pearse, SB Lee; University of Maryland; CL Soles; National Institute of Standards and Technology, GW Rubloff; University of Maryland
- 9:30 AM **507** *Dynamics of Electrochemical Conversion of Nanoscale Metal-Metal Oxide Multilayer Architecture*; FC Castro, Q Li, G Evmenenko, B Buchholz, J Wu, M Bedzyk, V Dravid; Northwestern University
- 9:45 AM **508** *Aberration Corrected STEM and High-Resolution EELS Study Investigating Magnesium Intercalation in Vanadium Pentoxide Cathode*; A Mukherjee; University of Illinois, Chicago; N Sa; Argonne National Laboratory; PJ Phillips; University of Illinois, Chicago; J Andrews, S Banerjee; Texas A&M University; AK Burrell; Argonne National Laboratory; RF Klie; University of Illinois, Chicago

### P05.1 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### SESSION CHAIRS:

Lax Saraf, Clemson University

Ian McClaren, University of Glasgow

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C114

- 8:30 AM **509** (INVITED) *Quantification of Atomic Arrangements at Heterostructure Interfaces*; DN Leonard, O Dyck, J Poplawsky, KL More; Oak Ridge National Laboratory; L Edge, C Jackson, E Pritchett, P Deelman; HRL Laboratories, LLC
- 9:00 AM **510** *Growth and In Situ Characterization of Oxide Epitaxial Heterostructures with Atomic Plane Precision*; Q He, S Jesse, A Lupini, M Fuentes-Cabrera; Oak Ridge National Laboratory; A Akbashev, J Spanier; Drexel University; S Kalinin, A Borisevich; Oak Ridge National Laboratory; et al.

- 9:15 AM **511** *Observing Misfit Dislocation Interactions Across Thin Film Oxide Heterostructures*; ED Grimley, E Sachet; North Carolina State University; BF Donovan, PE Hopkins; University of Virginia; J-P Maria, JM Lebeau; North Carolina State University
- 9:30 AM **512** *Characterization of a Ferroelectric BaTiO<sub>3</sub>/SrTiO<sub>3</sub> Heterostructure with Interface-Induced Polarization*; H Wu, T Aoki; Arizona State University; P Ponath, AA Demkov; The University of Texas, Austin; MR McCartney, DJ Smith; Arizona State University
- 9:45 AM **513** *Stability Studies of MAPbI<sub>3</sub>: Identification of Degradation Pathways and Strategies for Observing the Native Structure of Lead Halide Perovskites*; MC Scott, J Suh, J Wu, AM Minor; University of California, Berkeley

### P10.1 Microscopy and Characterization of Ceramics, Polymers and Composites

#### SESSION CHAIRS:

R Parrington, Engineering Systems, Inc.

Richard Chinn, National Energy Technology Laboratory

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C214

- 8:30 AM **514** *Microstructural Development of Green Micro-Machined Injection-Molded Silicon Carbide*; RE Chinn; U.S. Department of Energy; SV Atre, KH Kate; University of Louisville; R Onler, OB Ozdoganler; Carnegie Mellon University
- 8:45 AM **515** *Correlative Microscopy in Characterization of Polycrystalline YAG Fibers*; KN Shugart, HJ Kim; UES, Inc.; R Hay; U.S. Air Force Research Laboratory, WPAFB; B Griffin, A Kadhim; UES, Inc.
- 9:00 AM **516** *Imaging 180° Polarization Reversal in Ferroelectric Oxides with Electron Backscatter Diffraction*; MJ Burch, CM Fancher, S Patala, EC Dickey; North Carolina State University
- 9:15 AM **517** *Electron-Beam-Induced Antiphase Boundary Reconstructions in ZrO<sub>2</sub>-La<sub>2</sub>/3 Sr<sub>1/3</sub>MnO<sub>3</sub> Pillar-Matrix Structures*; D Zhou, W Sigle, M Kelsch, HU Habermeier, PA van Aken; Max Planck Institute for Solid State Research, Germany
- 9:30 AM **518** *Formation of Strontium Titanate Bicrystal by the Spark Plasma Sintering Method*; LA Hughes, K van Benthem; University of California, Davis
- 9:45 AM **519** *Atomically Resolved Local Structure of Conductive Domain Walls in Ferroelectric BiFeO<sub>3</sub>*; A Bencan; Jozef Stefan Institute, Slovenia; G Drazic; National Institute of Chemistry, Ljubljana, Slovenia; H Ursic; Jozef Stefan Institute, Slovenia; N Sakamoto; Shizuoka University, Japan; B Jancar, B Malic; Jozef Stefan Institute, Slovenia; D Damjanovic; Swiss Federal Institute of Technology, Switzerland, T Rojac; Jozef Stefan Institute, Slovenia; et al.

# Scientific Program

P

## PHYSICAL SCIENCES SYMPOSIA—

WEDNESDAY MORNING *continued*

### P11.3 Metallography and Microstructural Characterization of Metals

#### SESSION CHAIRS:

George Vander Voort, Vander Voort Consulting LLC  
Coralee McNee, United Technologies

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C112

- 8:30 AM **520** (INVITED) *Characterization of T8 tempered Al-Li-Cu alloy (AA2195) by Using AC-STEM*; DH Anjum; King Abdullah University of Science & Technology, Saudi Arabia; M Khushaim; Taibah University, Saudi Arabia; ZC Leseman; University of New Mexico
- 9:00 AM **521** *Hexagonal to Orthorhombic Symmetry Reduction in a Lamellar Ti-42Al-8.5Nb Alloy*; H Gabrisch, U Lorenz, F Pyczak, M Rackel, A Stark; Helmholtz-Zentrum Geesthacht, Germany
- 9:15 AM **522** *In Situ TEM Straining of Ultrafine-Grained Aluminum Films of Different Textures Using Automated Crystal Orientation Mapping*; E Izadi; Arizona State University; A Darbal; AppFive LLC; P Peralta, J Rajagopalan; Arizona State University
- 9:30 AM **523** *TEM Study of Cu-Ni Core-Shell Nanowires*; J-G Zheng; University of California, Irvine; Q Wang; Yangzhou University, China; Y Ma; Nanjing University of Posts and Telecommunications, China
- 9:45 AM **524** *Revealing Transformation and Deformation Mechanisms in NiTiHf and NiTiAu High Temperature Shape Memory Alloys Through Microstructural Investigations*; L Casalena, JM Sosa; The Ohio State University; DR Coughlin; Los Alamos National Laboratory; F Yang; The Ohio State University; GS Bigelow, RD Noebe; NASA Glenn Research Center; MJ Mills; The Ohio State University

### P12.1 Microscopy and Analysis in Forensic Science

#### SESSION CHAIRS:

S. Frank Platek, U.S. Food and Drug Administration Forensic Chemistry Center  
Stefanie L. Heckman, U.S. Food and Drug Administration Forensic Chemistry Center

#### PLATFORM SESSION

Wednesday 8:30 AM • Room: C213

- 8:30 AM **525** (INVITED) *The Utilization of Microscopy in Developing Investigative Leads from the Examination of Microscopic Trace Evidence in Forensic Investigations*; SJ Palenik, CS Palenik; Microtrace LLC
- 9:00 AM **526** *Case Study: Not a Normal Hair Case—An Alpaca Hair Comparison*; EN Weber; Hamilton County Coroner's Office Crime Laboratory

- 9:15 AM **527** *Determination of Needle Size Based on Measurements of Punctures in Pharmaceutical Vial Stoppers*; SL Heckman, SF Platek; U.S. FDA Forensic Chemistry Center
- 9:30 AM **528** *Standard Operating Procedure for the Microscopical Analysis of Foreign Object Debris (FOD)*; RS Brown; MVA Scientific Consultants
- 9:45 AM **529** *Analysis of Pedological Traces in Forensic Practice and New Possibilities in this Field*; M Kotrly; Institute of Criminalistics Prague, Czech Republic

T

## BIOLOGICAL SCIENCES TUTORIAL—

WEDNESDAY MORNING

### X40 Career Tracks in Government and Industry

#### SESSION CHAIR:

Patrick Phillips, University of Illinois-Chicago

- 8:30 AM **530** *Navigating the Job Market for Careers Inside and Outside of Academia*; S Stagg; Florida State University; B Bammes; Direct Electron; G Kiss; FEI Company; P Flicker; National Institute of General Medical Sciences, NIH

A

## ADVANCES IN INSTRUMENTATION

SYMPOSIA—WEDNESDAY MORNING

### A01.2 Vendor Symposium

#### SESSION CHAIRS:

Paul Kotula, Sandia  
Teresa Ruiz, University of Vermont

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C110

- 10:30 AM **531** *New Developments in RISE Microscopy: Correlative Raman and SEM Imaging*; U Schmidt, P Ayasse, O Hollricher; WITec GmbH, Germany
- 10:45 AM **532** *Scanning Electron Microscopes with Integrated Raman Spectrometer Revealing New Complementary Information*; S Freitag; Carl Zeiss Microscopy GmbH, Germany
- 11:00 AM **533** *Why We Need to Use 3D Fourier Transform Analysis to Evaluate a High Performance TEM?*; K Ishizuka; HREM Research Inc., Japan; K Kimoto; National Institute for Materials Science, Japan
- 11:15 AM **534** *Reducing the Missing Wedge in TEM Tomography*; A Genc; FEI Company; L Kovarik; Pacific Northwest National Laboratory; L Pullan, J Ringnalda; FEI Company
- 11:30 AM **535** *Array Tomography and Beam Deceleration – High-Throughput Imaging with the ZEISS GeminiSEM Using Atlas 5 and Beam Deceleration*; R Kirmse, I Angert; Carl Zeiss Microscopy GmbH, Germany; K Czymmek; Carl Zeiss Microscopy GmbH; M Thaler; Carl Zeiss Microscopy GmbH, Germany
- 11:45 AM **536** *Helios G4: Pushing the Limits of TEM Sample Preparation and STEM Resolution*; T Vystavěl, L Tůma, J Skalický, R Young; FEI Company, Czech Republic

## A03.3 X-Ray Imaging and Analysis

### SESSION CHAIR:

Ric Wuhrer, University of Western Sydney

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C115

10:30 AM **537** (INVITED) *High Speed, High-Resolution imaging spectrometers Based on pnCCDs for XRF and XRD applications*; L Strueder, R Hartmann, P Holl; PNSensor GmbH, Germany; S Ihle, M Huth, J Schmidt, C Thamm; PNDetector GmbH, Germany, B Kanngießler; Technische Universität Berlin, Germany; et al.

11:00 AM **538** *Analysis of Polymorphs Using Simultaneous X-Ray Fluorescence and Diffraction with an Imaging Spectrometer*; JM Davis, J Schmidt, M Huth; PNDetector GmbH, Germany; R Hartmann; PNSensor GmbH, Germany; S Ihle, D Steigenhöfer, H Soltau; PNDetector GmbH, Germany, L Strueder; PNSensor GmbH, Germany

11:15 AM **539** *Applying Pattern Recognition to the Analysis of X-Ray Computed Tomography Data of Polymer Foams*; NL Cordes, ZD Smith, K Henderson, JC Mertens; Los Alamos National Laboratory; JJ Williams, T Stannard; Arizona State University; X Xiao; Argonne National Laboratory, N Chawla; Arizona State University; et al.

11:30 AM **540** *High-Resolution Tomography for Characterization of Microstructures in Lightweight Alloy*; T Wenzel; YXLON International GmbH, Germany; M Salamon, N Uhlmann; Fraunhofer-Entwicklungszentrum Röntgentechnik, Germany; D Steiner; COMET Technologies USA, Inc.; N Frindt; YXLON International GmbH, Germany

11:45 AM **541** *Non-Invasive Multi-Scale Imaging and Modeling Using X-Ray Microscopy*; M Andrew; Carl Zeiss X-Ray Microscopy, Inc., R Chica-Szot; Instytut Nafty i Gazu-PIB, Poland; S Linden; Math2Market GmbH, Germany; G Lesniak; Instytut Nafty i Gazu-PIB, Poland; A Wiegmann; Math2Market GmbH, Germany; J Gelb; Carl Zeiss X-Ray Microscopy, Inc.; M Marsh; Object Research Systems, Canada, A Steinbach; Carl Zeiss X-Ray Microscopy, Inc.; et al.

## A06.6 Analytical Electron Microscopy for Advanced Characterization from Multi-Dimensional Data Acquisition to Integrated Analysis

### SESSION CHAIRS:

Chaoying Ni, University of Delaware

Peter van Aken, Max Planck Institute for Solid State Research

Masashi Watanabe, Lehigh University

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C224-25

10:30 AM **542** (INVITED) *Strategies for Obtaining High Spatial Resolution in Imaging and Spectroscopy of Beam-Sensitive TEM Specimens*; R Egerton; University of Alberta, Canada

11:00 AM **543** *Quantitative Annular Dark-Field Imaging at Atomic Resolution*; S Yamashita; Kyushu University, Japan; S Koshiya; National Institute for Materials Science, Japan; K Ishizuka; HREM Research Inc., Japan; K Kimoto; National Institute for Materials Science, Japan

11:15 AM **544** *Integrated Differential Phase Contrast (iDPC) STEM: A New Atomic Resolution STEM Technique to Image All Elements Across the Periodic Table*; EG Bosch, I Lazić, S Lazar; FEI Company, Netherlands

11:30 AM **545 M&M 2016 STUDENT AWARDEE** *Linking Dopant Distribution and Interatomic Distortions at  $La_{1.6}M_{0.4}CuO_4/La_2CuO_4$  Superconducting Interfaces*; YE Suyolcu, Y Wang, W Sigle, G Cristiani, G Logvenov, PA van Aken; Max Planck Institute for Solid State Research, Germany

11:45 AM **546** *Improvement of Imaging Performance with a New ASCOR Probe-Corrector in a 200 kV JEM-ARM200CF*; M Watanabe; Lehigh University; T Nakamura; JEOL USA, Inc.; T Ishikawa; JEOL, Ltd., Japan

## A07.2 Surface and Subsurface Microscopy and Analysis

### SESSION CHAIR:

John A. Chaney, Aerospace Corp

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C216

10:30 AM **547** (INVITED) **M&M 2016 STUDENT AWARDEE** *Characterization of Protein G B1 Immobilized Gold Nanoparticles Using Time of Flight Secondary Ion Mass Spectrometry and X-Ray Photoelectron Spectroscopy*; Y-C Wang, DG Castner; University of Washington

11:00 AM **548** (INVITED) *A Revolutionary Approach for Molecular Imaging with TOF-SIMS Parallel Imaging MS/MS*; JS Hammond, GL Fisher, PE Larson, SR Bryan; Physical Electronics, Inc.

11:30 AM **549** *Sub-Micron Resolution Imaging with Bio-Molecular Identification by TOF-SIMS Parallel Imaging MS/MS*; GL Fisher; Physical Electronics, Inc.; N Ogrinc Potocnik, AL Bruinen; Maastricht University, Netherlands; JS Hammond, SR Bryan; Physical Electronics, Inc.; RM Heeren; Maastricht University, Netherlands

11:45 AM **550** *Imaging in Liquids Through Ultrathin Membranes: A Comparative Analysis of Scanning Electron and Scanning Microwave Microscopies*; A Tselev; Oak Ridge National Laboratory; J Velmurugan, A Kolmakov; National Institute of Standards and Technology

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—WEDNESDAY MORNING *continued*

### A08.2 Quantitative and Qualitative Microanalysis by EPMA and SEM

#### SESSION CHAIR:

Paul Carpenter, Washington University in St. Louis

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C113

- 10:30 AM **551** (INVITED) *Conditions for Low Voltage Microanalysis and X-Ray Mapping*; R Wuhrer; Western Sydney University, Australia
- 11:00 AM **552** *Determination of Soft X-Ray Emission Spectroscopy Parameters Using Experimental Data for Quantitative Microanalysis*; H Demers; McGill University, Canada; CM MacRae, NC Wilson; CSIRO, Australia; P Hovington, V Timoshevskii; Hydro-Quebec Research Institute, Canada; R Gauvin; McGill University, Canada; K Zaghbi; Hydro-Quebec Research Institute, Canada
- 11:15 AM **553** *Collecting and Analysing - 1.6eV - 20keV Emission Spectra in an EPMA*; CM MacRae, N Wilson, A Torpy; CSIRO, Australia; J Bergmann; Bruker, Australia; H Takahashi; JEOL, Ltd., Japan
- 11:30 AM **554** *What is the Effective Geometrical Collection Efficiency of Your XEDS Detector? A Routine Procedure Applied in a SEM Laboratory*; N Avishai, A Avishai; Case Western Reserve University; V-D Hodoroaba; Bundesanstalt für Materialforschung und -prüfung, Germany
- 11:45 AM **555** *Chemical States Analysis of Trace-Boron by Using an Improved SEM-SXES*; M Terauchi; Tohoku University, Japan; H Takahashi, M Takakura, T Murano; JEOL, Ltd., Japan; M Koike, T Imazono; Japan Atomic Energy Agency; T Nagano, H Sasai; Shimadzu Corporation, Japan; et al.

### A09.5 Advanced Scanning Diffraction: Mapping Functionality in Reciprocal Space at Nanometer Resolution

#### SESSION CHAIR:

Alex Eggeman, University of Cambridge

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C220

- 10:30 AM **556** (INVITED) *Solving Challenging Crystallographic Problems with Automated Electron Diffraction Tomography (ADT)*; U Kolb; Johannes Gutenberg-University, Germany
- 11:00 AM **557** *Three-Dimensional Nanostructure Determination Based on Scanning Electron Nanodiffraction*; Y Meng, J-M Zuo; University of Illinois Urbana-Champaign
- 11:15 AM **558** *Crystal Orientation Angular Resolution with Precession Electron Diffraction*; EF Rauch, M Veron; Université Grenoble Alpes-CNRS, France

- 11:30 AM **559** (INVITED) *Quantitative Structural Analysis of Complex Materials by Scanning Nanobeam Diffraction*; C Gammer; University of Vienna, Austria; BV Özdöl, KC Bustillo, J Ciston, AM Minor; Lawrence Berkeley National Laboratory

### A12.1 Research and Applications in Atom Probe Tomography

#### SESSION CHAIR:

Eric Steel, National Institute of Standards and Technology

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C226

- 10:30 AM **560** (INVITED) *On the Accuracy of Compositional Quantification for Atom Probe Tomography*; M Thuvander; Chalmers University of Technology, Sweden
- 11:00 AM **561** *Semi-Statistical Atom Probe Tomography Analysis of Thin Film Grain Boundaries*; A Stokes; Colorado School of Mines; M Al-Jassim; National Renewable Energy Laboratory; B Gorman; Colorado School of Mines
- 11:15 AM **562** *Atom Probe Tomography of Interfacial Segregation in CdTe-Based Solar Cells*; JD Poplawsky, W Guo; Oak Ridge National Laboratory; NR Paudel; The University of Toledo; C Li; The University of Vienna, Austria; A Ng; Vanderbilt University; KL More; Oak Ridge National Laboratory; Y Yan; The University of Toledo, SJ Pennycook; National University of Singapore
- 11:30 AM **563** (INVITED) *Experimental Evaluation of the Interrelationships Between Laser Energy, Temperature, Applied Bias, and Measured Composition in Laser Pulsed Atom Probe Tomography*; DR Diercks, BP Gorman; Colorado School of Mines

### A13.4 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

#### SESSION CHAIR:

Jorg R. Jinschek, FEI Company

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C221

- 10:30 AM **564** *Environmental TEM Studies of CoMn Nanoalloys as Model Fischer-Tropsch Catalysts*; CS Bonifacio; University of Pittsburgh; N Liakakos, M Salmeron; Lawrence Berkeley National Laboratory; JC Yang; University of Pittsburgh
- 10:45 AM **565** *Design and Application of an In Situ Illumination System for an Aberration-Corrected Environmental Transmission Electron Microscope*; Q Liu, L Zhang, PA Crozier; Arizona State University
- 11:00 AM **566** *The Synergic Effect of Atomic Hydrogen and Catalyst Spreading on Ge Nanowire Growth Orientation and Kinking*; M Kolíbal, T Pejchal; Brno University of Technology, Czech Republic; L Novák, T Vystavěl; FEI Company, Czech Republic; T Šíkola; Brno University of Technology, Czech Republic



- 11:15 AM **567** *Visualization of Phase Segregation and Surface Reconstruction of Pt-Based Bi-Metallic Clusters During In Situ Oxidation*; JY Howe; Hitachi High-Technologies Canada Inc.; Y-HC Chin, W Tu, Y Yang, J Shangguan; University of Toronto, Canada; S Dogel, D Hoyle; Hitachi High-Technologies Canada Inc., H Hosseinkhannazer; Norcada Inc., Canada; et al.
- 11:30 AM **568** *Monitoring the Dynamics of Heterogeneous Catalysts by Electron Microscopy*; R Farra, M Greiner, A Rinaldi, M-G Willinger, R Schlögl, J Cao; Fritz Haber Institute of The Max Planck Society, Germany
- 11:45 AM **569** *Operando Electron Microscopy of Catalysts*; BK Miller, PA Crozier; Arizona State University

## A14.2 Single Atom Electron Microscopy and Spectroscopy

### SESSION CHAIR:

Lawrence Allard, Oak Ridge National Laboratory

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C212

- 10:30 AM **570** (INVITED) *Microscopy and Spectroscopy of Catalysts and Energy Storage Materials*; S Prabhudev, S Stambula, L Chincilla, H Liu, D Rossouw, C Wiktor, M Bugnet, GA Botton; McMaster University, Canada; et al.
- 11:00 AM **571** *Dynamic Aberration-Corrected STEM of Bimetallic Nanocatalysts During Surface Diffusion*; V Ortalan, CW Han; Purdue University; R Zanella, A Aguilar-Tapia; Centro de Ciencias Aplicadas y Desarrollo Tecnológico, Mexico
- 11:15 AM **572** (INVITED) *Atomically Dispersed Precious Metal Species on Various Oxide Supports for Catalytic Hydrogen Upgrading and Emission Control*; M Yang; General Motors Research & Development Center; LF Allard; Oak Ridge National Laboratory; M Flytzani-Stephanopoulos; Tufts University
- 11:45 AM **573** *Catalysis by Supported Single Metal Atoms*; J Liu, S Duan, J Xu, B Qiao, Y Lou; Arizona State University

B

## BIOLOGICAL SCIENCES SYMPOSIUM— WEDNESDAY MORNING

### B04.1 Microscopy and Morphogenesis

#### SESSION CHAIRS:

Rich Goodwin, University of South Carolina, Greenville

Jay Potts, University of South Carolina School of Medicine, Columbia

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C111

- 10:30 AM **574** (INVITED) *Utilizing Microscopy To Understand Mechanisms of Heart Valve Morphogenesis*; LJ Anstine, TE Horne, BF Austin, J Lincoln; Nationwide Children's Hospital
- 11:00 AM **575** (INVITED) *Use of a Novel Panel of Monoclonal Antibodies Against CENP-F for the Analysis of Cancerous Cells*; DM Bader; KA Compton; EL Mace, ER Pfaltzgraff, SC Borinstein; Vanderbilt University School of Medicine
- 11:30 AM **576** (INVITED) *Establishing Three Dimensional High-Throughput Imaging Pipeline for Deep Phenotyping Mouse Embryonic Development*; C-W Hsu, L Wong, S Kalaga, ME Dickinson; Baylor College of Medicine

# Scientific Program

Wednesday, July 27

P

## PHYSICAL SCIENCES SYMPOSIA— WEDNESDAY MORNING

### P02.6 Electron Microscopy of Materials for Electrochemical Power Systems

#### SESSION CHAIR:

Karren L. More, Oak Ridge National Laboratory

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: E160AB

- 10:30 AM **577** (INVITED) *Using TEM Operando Methods to Understand Energy Storage*; CB Carter, MT Janish; University of Connecticut; KL Jungjohann; Sandia National Laboratories; MG Norton; Washington State University
- 11:00 AM **578** *In Situ TEM Observation on Formation of Uniform Amorphous Layer on SnO<sub>2</sub> Nanotube*; JH Chang; Institute for Basic Science, Republic of Korea; JY Cheong, I-D Kim; Korea Advanced Institute of Science and Technology, Republic of Korea; JY Lee; Institute for Basic Science, Republic of Korea
- 11:15 AM **579** *In Situ TEM Study of Coating Layer Function on Silicon Anode Particle for Lithium Ion Battery*; C Wang, L Luo; Pacific Northwest National Laboratory
- 11:30 AM **580** (INVITED) *In Situ TEM for Electrochemical Energy Storage and Conversion Systems*; ME Holtz, Y Yu, J Rivera, HD Abruna, DA Muller; Cornell University

### P03.1 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design

#### SESSION CHAIR:

Paul Voyles, University of Wisconsin-Madison

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C210

- 10:30 AM **581** (INVITED) *Is HRTEM Image Simulation Correct? A Premise-Free Calibration Approach*; A Thust; Forschungszentrum Juelich, Germany; J Barthel; RWTH Aachen University, Germany; C-L Jia; Forschungszentrum Juelich, Germany
- 11:00 AM **582** *Surface and Point Defect Measurements of Detonation Nanodiamond Using Combined Cs-Cc Corrected TEM and Ab Initio Calculations*; SL Chang; Arizona State University; AS Barnard; CSIRO, Australia; C Dwyer; Arizona State University; CB Boothroyd; Forschungszentrum Jülich, Germany; E Osawa; Nanocarbon Research Institute, Japan; RJ Nicholls; University of Oxford, United Kingdom
- 11:15 AM **583** *The Origin of Magnetic Ordering in Sr<sub>3</sub>YCo<sub>4</sub>O<sub>10+x</sub>: T Kishida*; Asahi Kasei Corporation, Japan; MD Kapetanakis; Vanderbilt University; J Yan, BC Sales; Oak Ridge National Laboratory; ST Pantelides; Vanderbilt University; SJ Pennycook; National University of Singapore; MF Chisholm; Oak Ridge National Laboratory

11:30 AM **584** *Correlative Microscopic, Spectroscopic, and Computational Analysis of the Nucleation and Growth of Europium (III) Oxalate Nanoparticles*; JA Soltis, MA Conroy, WC Isley, GB Hall, S Chatterjee, Z Wang, SM Kathmann, JJ De Yoreo; Pacific Northwest National Laboratory; et al.

11:45 AM **585** *Atomistic Study of Model CdTe Grain Boundaries*; T Paulauskas; University of Illinois, Chicago; F Sen; Argonne National Laboratory; C Sun; University of Texas, Dallas; E Barnard; Lawrence Berkeley National Laboratory; K Moon; University of Texas, Dallas; M Chan; Argonne National Laboratory; S Sivalingham, R Klie; University of Illinois, Chicago; et al.

### P05.2 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### SESSION CHAIRS:

Donavan Leonard, Oak Ridge National Laboratory

Isabelle Martin, CAMECA Instruments, Inc.

#### PLATFORM SESSION

Wednesday 10:30 AM • Room: C114

- 10:30 AM **586** *Structural Properties of (Sn,Mn)Se<sub>2</sub> - A New 2D Magnetic Semiconductor with Potential for Spintronic Applications*; V Kanzyuba, S Dong, X Liu, S Rouvimov; University of Notre Dame; S Vishwanath, D Jena, HG Xing; Cornell University, J Furdyna; University of Notre Dame; et al.
- 10:45 AM **587** *Crystallization Kinetics of the Phase Change Material GeSb<sub>6</sub>Te Measured with Dynamic Transmission Electron Microscopy*; MM Winseck; Oregon State University; HY Cheng; Macronix International Co. Ltd., Taiwan; GH Campbell; Lawrence Livermore National Laboratory; MK Santala; Oregon State University
- 11:00 AM **588** *High-Resolution STEM Study of Dy-Doped Bi<sub>2</sub>Te<sub>3</sub> Thin Films*; V Srot; Max Planck Institute for Solid State Research, Germany; P Schönherr; University of Oxford, United Kingdom; B Bussmann; Max Planck Institute for Solid State Research, Germany; SE Harrison; University of Oxford, United Kingdom; PA van Aken; Max Planck Institute for Solid State Research, Germany; T Hesjedal; University of Oxford, United Kingdom
- 11:15 AM **589 M&M 2016 STUDENT AWARDEE** *Impurity Segregation via Extended Defects in Oxide Thin Films Probed by Aberration-Corrected STEM-EELS*; DJ Baek; Cornell University; D Lu; Stanford University; Y Hikita; SLAC National Accelerator Laboratory; HY Hwang; Stanford University; LF Kourkoutis; Cornell University
- 11:30 AM **590** *Combining STEM Imaging and EELS Mapping to Understand the Growth of La<sub>2</sub>CoMnO<sub>6</sub> Double Perovskites on (111) Oriented Perovskite Substrates*; I MacLaren, T-M Yu, B Sala; University of Glasgow, United Kingdom; D Hernandez-Maldonado, D Kepaptsoglou; SuperSTEM Laboratory, United Kingdom; J Kleibeuker, E-M Choi, JL MacManus Driscoll; University of Cambridge, United Kingdom

11:45 AM **591** *Correlative Aberration-Corrected STEM-HAADF and STEM-EELS Analysis of Interface-Induced Polarization in LaCrO<sub>3</sub>-SrTiO<sub>3</sub> Superlattices*; SR Spurgeon; Pacific Northwest National Laboratory; DM Kepaptsoglou; SuperSTEM Laboratory; L Jones; University of Oxford; RB Comes; Pacific Northwest National Laboratory; QM Ramasse; SuperSTEM Laboratory; P-V Ong, PV Sushko, SA Chambers; Pacific Northwest National Laboratory

## P10.2 Microscopy and Characterization of Ceramics, Polymers and Composites

### SESSION CHAIRS:

R Parrington, Engineering Systems, Inc.

Richard Chinn, National Energy Technology Laboratory

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C214

10:30 AM **592** (INVITED) *The Use of Mechanical Testing, Photomicrography, and Electron Microscopy to Characterize an Insulating Fiberglass Composite Post-Electrical Arc Failure*; RJ Pieper; Element Materials Technology

11:00 AM **593** (INVITED) *Void Content in Out-of-Autoclave Manufacturing Processes*; CL Wilson; Exponent, Inc.; E Currens, JF Rakow; Exponent, Inc.

11:30 AM **594** *Non-Destructive, Multi-Scale 3D Fractographic Analysis of a Carbon Fiber Composite Hockey Stick after Compressive Failure*; J Gelb, W Harris, N Kotwal, W Broderick, L Lavery, H Bale, A Merkle; Carl Zeiss X-Ray Microscopy, Inc.

11:45 AM **595** *TEM Sample Preparation of Ceramic Matrix Composites Using FIB*; S Poges, JE Cloud, M Aindow, SL Suib; University of Connecticut

## P11.4 Metallography and Microstructural Characterization of Metals

### SESSION CHAIRS:

George Vander Voort, Vander Voort Consulting LLC

Coralee McNee, United Technologies

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C112

10:30 AM **596** (INVITED) *On the Current State of Powder Characterization*; JW Newkirk, CS Kriewall; Missouri University of Science & Technology

11:00 AM **597** *Effect of Thermal Exposure on Microstructure in P/M Superalloys*; B Bedard; University of Connecticut; MA Kaplan, MP Bochiechio; Pratt & Whitney; M Aindow; University of Connecticut

11:15 AM **598** *Microstructural Characterization of Additively Manufactured Inconel 625*; BW Baker, JJ Schubbe, ME Hamp; U.S. Naval Academy; KE Knipling; U.S. Naval Research Laboratory

11:30 AM **599** *Microstructure Characterization of a Fe-25Mn-3Al-3Si TWIP-TRIP Steel*; J Benzing; Vanderbilt University; J Bentley; Microscopy and Microanalytical Sciences; W Poling, K Findley; Colorado School of Mines; D Pierce; Oak Ridge National Laboratory; J Sosa, H Fraser; The Ohio State University, D Raabe; Max-Planck-Institut Für Eisenforschung, Germany; et al.

11:45 AM **600** *Chemical Segregation and Microstructural Evolution of Fiber Laser-Welded Low Carbon Sheet Steel*; AN Chiamonti, SL Miller, PT Blanchard, E Pfeif; National Institute of Standards and Technology

## P12.2 Microscopy and Analysis in Forensic Science

### SESSION CHAIRS:

Stefanie L. Heckman, U.S. Food and Drug Administration Forensic Chemistry Center

S. Frank Platek, U.S. Food and Drug Administration Forensic Chemistry Center

### PLATFORM SESSION

Wednesday 10:30 AM • Room: C213

10:30 AM **601** (INVITED) *Pharmaceutical Characterization Meets Forensics Science: What Happened to Our Product?!*; A Vogt, J Roth, M Pheil, J Neilly; Abbvie, Inc.

11:00 AM **602** *Application of 3D and 2D Imaging Techniques in the Examination of Suspect Tablets for the Detection of Counterfeit FDA-Regulated Products*; N- Ranieri, SF Platek, JS Batson, D- Albright; U.S. Food and Drug Administration

11:15 AM **603** *Detection and Link Analysis of Counterfeit Altuzan® Printing Defects Using Light Microscopy and Digital Imaging*; DC Albright; U.S. FDA Forensic Chemistry Center

11:30 AM **604** *Development of a Compendium of Microcrystal Tests for Illicit Drugs*; SB Sparenga, KM Brinsko, D Golemis, MB King, GJ Laughlin; McCrone Research Institute

11:45 AM **605** *Characterization of Resultant Micro Chemical Test Crystalline Formations Using Optical, Fourier Transform Infrared (FT-IR) and Raman Microscopies*; MR Witkowski, JB Crowe; U.S. Food and Drug Administration

T

## PHYSICAL SCIENCES TUTORIAL— WEDNESDAY MORNING

## X44 Compressive Sensing Applications in Microscopy

### SESSION CHAIR:

Patrick Phillips, University of Illinois-Chicago

10:30 AM **606** *Compressive Sensing in Microscopy: A Tutorial*; A Stevens; Pacific Northwest National Laboratory; H Yang; Lawrence Berkeley National Laboratory; L Kovarik, N Browning; Pacific Northwest National Laboratory

# Scientific Program

Wednesday, July 27

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA— WEDNESDAY AFTERNOON

### A01.3 Vendor Symposium

#### SESSION CHAIRS:

Paul Kotula, Sandia

Teresa Ruiz, University of Vermont

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C110

- 1:30 PM **607** *Aberration Corrected Analytical Scanning and Transmission Electron Microscope for High-Resolution Imaging and Analysis for Multi-User Facilities*; H Inada, Y Taniguchi, T Yotsuji, Y Hirayama, T Dobashi, K Watanabe, H Kikuchi, H Muto; Hitachi High-Technologies Corporation, Japan; et al.
- 1:45 PM **608** *Ultra-High Vacuum Aberration-Corrected STEM for In Situ Studies*; MT Hotz, GJ Corbin, N Dellby, OL Krivanek; Nion Co; C Mangler, JC Meyer; University of Vienna, Austria
- 2:00 PM **609** *Integrated Differential Phase Contrast (iDPC) – Direct Phase Imaging in STEM for Thin Samples*; I Lazić, EG Bosch, S Lazar, M Wirix, E Yücelen; FEI Company, Netherlands
- 2:15 PM **610** *Mass Thickness Measurement in TEM: A New Single Standard Method for Convenient Quantification by TEM EDS*; PJ Statham, J Sagar, J Holland; Oxford Instruments Nanoanalysis, United Kingdom; J Manktelow, S Lozano-Perez; University of Oxford, United Kingdom
- 2:30 PM **611** *Novel Silicon Drift Detector Devices for Ultra-Fast, High-Resolution X-Ray Spectroscopy*; A Niculae, A Bechteler, R Eckhardt, K Hermenau, A Liebel; PNDetector GmbH, Germany; G Lutz; PNSensor GmbH, Germany; H Soltau; PNDetector GmbH, Germany, L Strüder; PNSensor GmbH, Germany
- 2:45 PM **612** *New Opportunities with Oval-Shaped Silicon Drift Detectors for High-Throughput EDX Analysis in Electron Microscopy*; A Niculae, A Bechteler, R Eckhardt, K Hermenau, A Liebel, A Schöning, H Soltau; PNDetector GmbH, Germany, L Strüder; PNSensor GmbH, Germany; et al.

### A03.4 X-Ray Imaging and Analysis

#### SESSION CHAIR:

Eric Telfeyan, GE Global Research

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C115

- 1:30 PM **613** (INVITED) *Towards Li Quantification at High Spatial Resolution Using EDS*; P Hovington, V Timoshevskii; Hydro-Quebec, Canada; S Burgess, P Statham; Oxford Instruments, United Kingdom; H Demers, R Gauvin; McGill University, Canada; K Zaghib; Hydro-Quebec, Canada

2:00 PM **614** *Windowless EDS Detection of N Lines and Their Practical Use in Sub 2 kV X-Ray Mapping to Optimize Spatial Resolution*; S Burgess, J Holland, P Statham, C McCarthy; Oxford Instruments Nanoanalysis, United Kingdom

2:15 PM **615** *X-Ray Mapping Characterisation of Materials that have a Large Dynamic Compositional Range*; R Wührer, K Moran; Western Sydney University, Australia

2:30 PM **616** *Detection of Osteogenesis in Explanted Synthetic Hydroxyapatite-Silicone Orbital Implants Using 3D X-Ray Microscopy*; M Hahn; University Medical Center Hamburg-Eppendorf, Germany; H Bale, L Lavery; Carl Zeiss X-Ray Microscopy, Inc., B Busse; University Medical Center Hamburg-Eppendorf, Germany

2:45 PM **617** *Novel, High Brightness X-Ray Source and High Efficiency X-Ray Optic for Development of X-Ray Instrumentation*; W Yun, SJ Lewis; Sigray, Inc.

### A07.3 Surface and Subsurface Microscopy and Analysis

#### SESSION CHAIR:

Chanmin Su, Bruker

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C216

- 1:30 PM **618** (INVITED) *Atomic force Microscopy of Polymer Systems: From Morphology to Properties to Chemical Imaging and Spectroscopy*; GF Meyers; The Dow Chemical Company
- 2:00 PM **619** *Surface Modifications During a Catalytic Reaction: a Combined APT and FIB/SEM Analysis of Surface Segregation*; C Barroo, N Janvelyan, B Zugic, AP Magyar, AJ Akey; Harvard University; J Biener; Lawrence Livermore National Laboratory; CM Friend, DC Bell; Harvard University
- 2:15 PM **620** (INVITED) *A Review of Recent Developments in Low Energy Ion Scattering (LEIS) and Its Applications*; P Brüner, T Grehl, HH Brongersma, E Niehuis; ION-TOF GmbH, Germany
- 2:45 PM **621** *Atomic Surface Structures of Oxide Nanoparticles with Well-Defined Shapes*; J Wen; Argonne National Laboratory; Y Lin; Northwestern University; H Sheng, L Wang, DJ Miller; Argonne National Laboratory; Z Wu; Oak Ridge National Laboratory; KR Poeppelmeier, LD Marks; Northwestern University; et al.

### A08.3 Quantitative and Qualitative Microanalysis by EPMA and SEM

#### SESSION CHAIR:

Julien Allaz, University of Colorado Boulder

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C113

- 1:30 PM **622** (INVITED) *Low Voltage FEG-EPMA in Earth Sciences – Problems and Solutions for Analysis of Unstable Materials*; SL Kearns, B Buse; University of Bristol, United Kingdom



- 2:00 PM **623** *Low Voltage Analysis: How Accurately Do You Need to Know Your Coating Thickness?*; MB Matthews, SL Kearns, B Buse; University of Bristol, United Kingdom
- 2:15 PM **624** *Calibrated Procedure for Setting Pulse-Height Parameters in Wavelength-Dispersive Spectrometry*; PK Carpenter; Washington University in St. Louis
- 2:30 PM **625** *Low Voltage Soft X-Ray Emission Analysis from 100 V for Depth Chemical Information from a Few nm to Several Hundred nm*; H Takahashi, S Asahina, T Kanazawa, Y Yamamoto, Y Sakuda; JEOL, Ltd., Japan; M Terauchi; Tohoku University, Japan; V Robertson, P McSwiggen; JEOL USA, Inc., et al.

## A12.2 Research and Applications in Atom Probe Tomography

### SESSION CHAIR:

Frederick Meisenkothen, National Institute of Standards and Technology

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C226

- 1:30 PM **626** (INVITED) *Assessing the Composition of Wide Bandgap Compound Semiconductors by Atom Probe Tomography: A Metrological Problem*; L Rigutti, L Mancini, E Di Russo, I Blum, F Moyon, W Lefebvre, D Blavette, F Vurpillot; University of Rouen, France; et al.
- 2:00 PM **627** *Mapping Isotopes in Nanoscale and Quantum Materials Using Atom Probe Tomography*; S Mukherjee; Ecole Polytechnique, Montreal, Canada; D Isheim, DN Seidman; Northwestern University; O Moutanabbir; École Polytechnique, Montréal, Canada
- 2:15 PM **628** *Correlated Atom-Probe Tomography and Transmission Electron Microscopy of Meteoritic Nanodiamonds*; JB Lewis; Washington University in St. Louis; D Isheim; Northwestern University; C Floss, TL Daulton; Washington University in St Louis; DN Seidman; Northwestern University
- 2:30 PM **629** (INVITED) *Oxide Scales Revealed by Atom Probe Tomography*; Y Dong, T Barth; University of Michigan; Y Chen; CAMECA Instruments, Inc., EA Marquis; University of Michigan

## A13.5 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

### SESSION CHAIR:

Peter Ercius, Lawrence Berkeley National Laboratory

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C221

- 1:30 PM **630** (INVITED) *Data Analytics Applied to Chemical Transformations in Liquids*; RR Unocic, AV Ievlev, S Jesse, X Sang, KL More, SV Kalinin; Oak Ridge National Laboratory

- 2:00 PM **631** (INVITED) *Liquid Cell TEM Study of Nanoparticle Diffusion and Interaction in Liquids*; H Zheng; Lawrence Berkeley National Laboratory; AS Powers; University of California, Berkeley; H-G Liao; Lawrence Berkeley National Laboratory

- 2:30 PM **632** *Direct Observation of the Growth of Au-Pd Core-Shell Nanoparticles Using Low-Dose STEM with the Liquid Cell In Situ*; N Bhattarai, T Prozorov; Ames Laboratory

- 2:45 PM **633** **M&M 2016 STUDENT AWARDEE** *Biom mineralization of Hydroxyapatite Revealed by In Situ Electron Microscopy*; X Wang, J Yang, C Andrei, L Soleymani, K Grandfield; McMaster University, Canada

## A14.3 Single Atom Electron Microscopy and Spectroscopy

### SESSION CHAIR:

David Muller; Cornell University

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C212

- 1:30 PM **634** (INVITED) *Single Atom Imaging and Spectroscopy of Impurities in 2D Materials*; W Zhou, AR Lupini; Oak Ridge National Laboratory; J Lin; Vanderbilt University; Y Gong; Rice University; Z Liu; Nanyang Technological University, Singapore; MD Kapetanakis; Vanderbilt University; MP Oxley, JC Idrobo; Oak Ridge National Laboratory; et al.
- 2:00 PM **635** *Z-Contrast Imaging as a Tool for Atomic Level Analysis of Bimetallic Structures*; MC Akatay, SI Sanchez, SA Bradley; Honeywell UOP, LLC
- 2:15 PM **636** *Every Atom has a Story to Tell: Using Single-Atom-Sensitivity Imaging and Spectroscopy to Determine Origins of Cosmic Nanodiamonds*; RM Stroud, ND Bassim; U.S. Naval Research Laboratory
- 2:30 PM **637** (INVITED) *Single-Atom Spectroscopy in Low-Dimensional Materials Using Low-voltage STEM*; K Suenaga; National Institute of Advanced Industrial Science and Technology, Japan

## A16.1 New Frontiers in Monochromated EELS

### SESSION CHAIR:

Ian MacLaren, University of Glasgow

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C224-25

- 1:30 PM **638** (INVITED) *Monochromated EELS to Probe the Local Optical Properties of Low-Dimensional Materials*; K Suenaga; National Institute of Advanced Industrial Science and Technology, Japan
- 2:00 PM **639** (INVITED) *Opportunities and Challenges in Ultra-High Energy Resolution EELS*; OL Krivanek, N Dellby, MV Hoffman, TC Lovejoy; Nion Company
- 2:30 PM **640** *Mapping EELS Vibrational Modes in MgO Nanocubes*; MJ Lagos, PE Batson; Rutgers University

# Scientific Program

**B****BIOLOGICAL SCIENCES SYMPOSIUM—**  
WEDNESDAY AFTERNOON

## B04.2 Microscopy and Morphogenesis

**SESSION CHAIRS:**

Jay Potts, University of South Carolina School of Medicine, Columbia  
Rich Goodwin, University of South Carolina, Greenville

**PLATFORM SESSION****Wednesday 1:30 PM • Room: C111**

- 1:30 PM **641** (INVITED) *Aintegumenta-Like6 can Functionally Replace Aintegumenta but Alters Arabidopsis Flower Development When Misexpressed at High Levels*; H Han, B Krizek; University of South Carolina
- 2:00 PM **642** *Exceptionally High Ni Concentration in Phloem of Roots of Nickel-Hyperaccumulating Berkheya zeyheri subsp. rehmannii var. rogersiana*; J Mesjasz-Przybylowicz, AD Barnabas, WJ Przybylowicz; iThemba LABS, South Africa
- 2:15 PM **643** (INVITED) *Multiple-Beam Laser Guidance-Based Microscope for Patterning Adult Cardiomyocytes*; L Schmidt, Z Wang, N Erdman, T Ye; Clemson University; TK Borg; Medical University of South Carolina; BZ Gao; Clemson University
- 2:45 PM **644** *STORM-Based Quantitative Assessment of Sodium Channel Localization Relative to Junctional Proteins within the Cardiac Intercalated Disk*; R Veeraraghavan, RG Gourdie; Virginia Technical College Carilion Research Institute

**P****PHYSICAL SCIENCES SYMPOSIUM—**  
WEDNESDAY AFTERNOON

## P02.7 Electron Microscopy of Materials for Electrochemical Power Systems

**SESSION CHAIR:**

Mark Aindow, University of Connecticut

**PLATFORM SESSION****Wednesday 1:30 PM • Room: E160AB**

- 1:30 PM **645** (INVITED) *Electron Energy-loss Spectroscopy and Energy-Filtered TEM Imaging for the In Situ Assessment of Reduction-Oxidation Reactions in Ni-Based Solid Oxide Fuel Cells*; Q Jeangros, AB Aebersold; École Polytechnique Fédérale de Lausanne, Switzerland; TW Hansen, JB Wagner; Technical University of Denmark; RE Dunin-Borkowski; Forschungszentrum Jülich, Germany; C Hébert, J Van Herle, A Hessler-Wyser; École Polytechnique Fédérale de Lausanne, Switzerland
- 2:00 PM **646** *Electronic Structure Analysis of Aged Commercial LiFePO<sub>4</sub> Battery Cathodes Using Low Loss Electron Energy Loss Spectroscopy*; SA Channagiri, M Canova, DW McComb; The Ohio State University
- 2:15 PM **647** *ETEM Study of Oxygen Activity in LiNi<sub>0.8</sub>Co<sub>0.15</sub>Al<sub>0.05</sub>O<sub>2</sub> (NCA) Cathode Materials at Various States of Charge*; K Karki; Brookhaven National Laboratory; Y Huang, S Whittingham; Binghamton University; E Stach; Brookhaven National Laboratory; G Zhou; Binghamton University
- 2:30 PM **648** (INVITED) *Morphological and Chemical Evolution of Silicon Nanocomposite During Cycling*; YS Meng, M Sina, J Alvarado, H Shobukawa; University of California, San Diego

## P03.2 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design

**SESSION CHAIR:**

Paul Voyles, University of Wisconsin-Madison

**PLATFORM SESSION****Wednesday 1:30 PM • Room: C210**

- 1:30 PM **649** (INVITED) *Probing the Subtleties of Atomic Distortions Through Accurate STEM Imaging and Density Functional Theory*; JM Lebeau, X Sang, JH Dycus, C Nui, DL Irving; North Carolina State University
- 2:00 PM **650 M&M 2016 STUDENT AWARDEE** *Direct Observation of Local Chemistry and Local Cation Displacements in the Relaxor Ferroelectric PMN-PT*; MJ Cabral; North Carolina State University; S Zhang; University of Wollongong, Australia; EC Dickey, JM Lebeau; North Carolina State University
- 2:15 PM **651** (INVITED) *Denoising of Atomic-Scale Images Based on Automatic Grain Segmentation, Unsupervised Primitive Unit Cell Extraction and Periodic Block-Matching*; B Berkels, N Mevenkamp; RWTH Aachen University, Germany

**Wednesday, July 27**

2:45 PM **652** *Combining Non-Rigid Registration with Non-Local Principle Component Analysis for Atomic Resolution EDS Mapping*; C Zhang, A Oh; University of Wisconsin-Madison; A Yankovich; Chalmers University of Technology, Sweden; T Slater, S Haigh; University of Manchester, United Kingdom; R Willett, P Voyles; University of Wisconsin-Madison

## P05.3 Microscopy for Metal, Semiconductor and Insulator Thin Films

### SESSION CHAIRS:

Steven Spurgeon, Pacific Northwest National Laboratory

Q. He, Oak Ridge National Laboratory

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C114

- 1:30 PM **653** *Atomic and Electronic Structure Study of a  $\text{Co}_2\text{FeAl}_{0.5}\text{Si}_{0.5}$  Half-Metal Thin Film on Si(111)*; D Kepaptsoglou; SuperSTEM Laboratory, United Kingdom; B Kuerbanjiang, Z Nedelkoski, A Ghasemi; University of York, United Kingdom; Q Ramasse; SuperSTEM Laboratory, United Kingdom; V Lazarov; University of York, United Kingdom
- 1:45 PM **654** *High-Precision Stress Mapping and Defect Characterization of Thin Films of  $\text{LaMnO}_3$  Grown on  $\text{DyScO}_3$  Substrate*; AV Kvit, J Feng, C Zhang, D Morgan, P Voyles; University of Wisconsin-Madison
- 2:00 PM **655** *Nanobeam Diffraction and Geometric Phase Analysis for Strain Measurements in Si/SiGe Nanosheet Structures*; J Li; IBM; S Reboh; CEA; R Chao, N Loubet, M Guillorn, T Yamashita, J Gaudiello; IBM
- 2:15 PM **656** *Strain at Coalescence of Patterned (Al)GaN Nanorod Arrays formed by Selective Area Growth for Optoelectronic Devices*; A Pofelski, SY Woo; McMaster University, Canada; BH Le, X Liu, S Zhao, Z Mi; McGill University, Canada; G Botton; McMaster University, Canada
- 2:30 PM **657** *Application of STEM EELS Quantification Relative Compositional Ratio Mapping to Characterize SiCOH - Ultra Low-k Dielectric Materials in Si-Based Devices*; WW Zhao, M Gribelyuk; GlobalFoundries, Inc.
- 2:45 PM **658** *Atomic Scale Analysis of Dopants in CMOS Structures by Atom Probe Tomography*; I Martin; CAMECA Instruments, Inc., Åland Islands; R Estivill, M Juhel; STMicroelectronics, France; A Grenier; Université Grenoble Alpes, France; TJ Prosa, DJ Larson; CAMECA Instruments, Inc.

## P10.3 Microscopy and Characterization of Ceramics, Polymers and Composites

### SESSION CHAIRS:

Ronald Parrington, Engineering Systems, Inc.

Richard Chinn, National Energy Technology Laboratory

### PLATFORM SESSION

Wednesday 1:30 PM • Room: C214

- 1:30 PM **659** *Defects and Strain Accommodation in Epitaxial  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{La}_{0.7}\text{Sr}_{0.3}\text{CoO}_3$  Heterostructures*; JP Byers, VK Malik, B Li, Y Takamura; University of California, Davis; ND Browning; Pacific Northwest National Laboratory
- 1:45 PM **660** *Monochromated Low-Dose Aberration-Corrected Transmission Electron Microscopy of Diamondoid Carbon Nanothreads*; SJ Juhl, X Li, JV Badding, N Alem; The Pennsylvania State University
- 2:00 PM **661** *Surface Crystal Plane Determination and Strong Metal-Support Interactions in  $\text{CeO}_2$  Nanorod-Supported CuOx Catalysts*; R Wang, SA Mock, E Zell; Youngstown State University
- 2:15 PM **662** *Understanding Initial Formation Stages of Nanomaterials Using Cryo-TEM*; KA Spoth, K Ma, U Wiesner, LF Kourkoutis; Cornell University
- 2:30 PM **663** *Electrospray Deposition of Nanoparticles on TEM Grids*; J Mielke; BAM Federal Institute for Materials Research and Testing, Germany; P Dohányosová, S López; Ramem S.A., Spain; V-D Hodoroba; BAM Federal Institute for Materials Research and Testing, Germany
- 2:45 PM **664** *Self-Catalyzed Epitaxial Growth of Core-Shell Ni@Graphene Nanoparticles from  $\text{Ni}(\text{OH})_2$ -Graphene Composites*; W Liu; University of Michigan; J Wu; University of Electronic Science and Technology of China; S Han, K Sun; University of Michigan

# Scientific Program

P

## PHYSICAL SCIENCES SYMPOSIA—

WEDNESDAY AFTERNOON *continued*

### P11.5 Metallography and Microstructural Characterization of Metals

#### SESSION CHAIRS:

George Vander Voort, Vander Voort Consulting LLC  
Coralee McNee, United Technologies

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C112

- 1:30 PM **665** (INVITED) *Stereological Techniques for Quantitative Characterization of Microstructures*; AM Gokhale; Georgia Institute of Technology
- 2:00 PM **666** *Understanding the Coarsening Behaviors of Nanoporous Gold via In Situ Heating*; A Elzoka, J Howe, RC Newman; University of Toronto, Canada; S Dogel; Hitachi High-Technologies Canada Inc., M Reynolds, H Hosseinkhannazer; Norcada Inc., Canada; DD Perovic; University of Toronto, Canada
- 2:15 PM **667** *Nondestructive Materials Characterization in 3D by Laboratory Diffraction Contrast Tomography – Applications and Future Directions*; C Holzner, LL Lavery, H Bale, A Merkle; Carl Zeiss X-Ray Microscopy, Inc., S McDonald, P Withers; University of Manchester, United Kingdom; Y Zhang, D Juul Jensen; Technical University of Denmark; et al.
- 2:30 PM **668** *TEM Study of Microstructure Evolution in Novel Environmentally Friendly Si Alloyed Lead-Free Brasses*; S Zormalia, P Tsakiridis, G Fourlaris; National Technical University of Athens, Greece
- 2:45 PM **669** *Characterization of Alpha/Beta Interface Structure in a Titanium Alloy Using Aberration-Corrected Scanning Transmission Electron Microscope*; Y Zheng, RE Williams, WA Clark, HL Fraser; The Ohio State University

### P12.3 Microscopy and Analysis in Forensic Science

#### SESSION CHAIRS:

S. Frank Platek, U.S. Food and Drug Administration Forensic Chemistry Center  
Stefanie L. Heckman, U.S. Food and Drug Administration Forensic Chemistry Center

#### PLATFORM SESSION

Wednesday 1:30 PM • Room: C213

- 1:30 PM **670** (INVITED) *Statistical Aspects of Gunshot Residue (GSR) Analysis*; N Kaplan-Damary, M Mandel; The Hebrew University of Jerusalem, Israel; N Levin; Private forensic scientist, Israel; E Izraeli; Israel Police Headquarters, Israel

- 2:00 PM **671** *Advances in the Analysis of Gunshot Residue and Other Trace Evidence Using EDS and EBSD in the SEM*; C Lang; Oxford Instruments Nanoanalysis, United Kingdom; F Bauer; Oxford Instruments Nanoanalysis, Germany; M Hiscock; Oxford Instruments Nanoanalysis, United Kingdom

- 2:15 PM **672** *Quantitative Metrics for Classifying Candidate Gun-Shot Residue Particles*; NW Ritchie, DE Newbury; National Institute of Standards and Technology

- 2:30 PM **673** *Improving Worker Safety for Handling Nanomaterials at the Benchtop*; B Gates, K Cadieux, M Matt, I Guo, T Hildago Castillo, T Chung, T Ngo, C Bright Davies; Simon Fraser University, Canada

- 2:45 PM **674** *Analysis of Forensic Casework Utilizing Infrared Microspectroscopic Imaging*; A Lanzarotta; U.S. FDA Forensic Chemistry Center

T

## BIOLOGICAL SCIENCES TUTORIAL—

WEDNESDAY AFTERNOON

### X41 Effective Tactics for Getting an Equipment Grant

#### SESSION CHAIR:

Scott Stagg, Florida State University

- 1:30 PM **675** *Effective Tactics for Getting an Equipment Grant*; KA Taylor; Florida State University

O

## MICROSCOPY OUTREACH—

WEDNESDAY AFTERNOON

### X91 A Family Affair

#### ORGANIZERS:

Elaine Humphrey  
Frauke Hogue  
Stuart McKernan

Wednesday 1:30 PM • Room: C121-121

Designed for attendees' families and friends, this fun and exciting session will pique the scientific interest of children of all ages - no previous microscopy experience is necessary!

Attendees interested in developing outreach opportunities at their home institutions are encouraged to attend as well.



## ADVANCES IN INSTRUMENTATION POSTER SESSIONS— WEDNESDAY AFTERNOON

### A01.P1 Vendor Symposium

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

##### POSTER # 207

3:00 PM **676** *Is Sputtering Sufficient for Production of Replicas?*; N Vaskovicova, K Hrubanova, V Krzyzanek; Institute of Scientific Instruments ASCR, Czech Republic

##### POSTER # 208

3:00 PM **677** *Remote Plasma Cleaning and Radical Recombination*; R Vane; E Kosmowka; XEI Scientific, Inc.

##### POSTER # 209

3:00 PM **678** *120kV TEM Equipped with an Ultra High-Resolution Lens and its Application*; K Tamura, T Kubo, H Mise, M Wayama, K Nakano, M Shirai, H Matsumoto, T Yaguchi; Hitachi High-Technologies Corporation, Japan; et al.

##### POSTER # 210

3:00 PM **679** *The First Results of the Low Voltage Cold-FE SEM/STEM System Equipped with EELS*; Y Yamazawa, S Okada, Z Yasenjiang, T Sunaoshi, K Kaji; Hitachi High-Technologies Corporation, Japan

##### POSTER # 211

3:00 PM **680** *Performance Evaluation of Dual Bruker XFlash6 | 100 EDS Detector Integrated in FEI Themis with Analytical Objective Pole Piece*; E Yücelen, M Ovsyanko, D Cats, M Niestadt, M Oosting, V Jongenelen, J van Engelshoven, D Foord; FEI Company, Netherlands; et al.

##### POSTER # 212

3:00 PM **681** *Use Electrons Sparingly but Efficiently, the Battle to get All the Required Information Needed While Minimizing Dose and Maximizing Data Collection at the Highest Resolution*; J Ringnalda, A Genc, E Van Capellen; FEI Company

##### POSTER # 213

3:00 PM **682** *Xe Plasma FIB Delayering of IC Based on 14 nm Node Technology*; JV Obona, T Hrnecir, S Sharang, M Sikula; TESCAN Brno, s.r.o., Czech Republic; A Denisjuk; TESCAN Orsay Holding a.s., Czech Republic

### A13.P1 *In Situ* Electron Microscopy and Big Data Analytics in 2D and 3D

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

##### POSTER # 214

3:00 PM **683** *Environment Induced Shape Change of Palladium Nanocrystals*; A Yoon, J-M Zuo; University of Illinois Urbana-Champaign

##### POSTER # 215

3:00 PM **684** *Probing the Oxidation Mechanism of Ta Nanoparticles via In Situ and Ex Situ Ultra-Fast Heating TEM/STEM*; JB DeLisio, GC Egan, S-C Liou, W-A Chiou, MR Zachariah; University of Maryland

##### POSTER # 216

3:00 PM **685** *Ex Situ and In Situ Microscopy Study of ZrO<sub>2</sub>-Stabilized Pd/Al<sub>2</sub>O<sub>3</sub> Catalysts*; S Zhang; University of Michigan; T Onn, R Gorte; University of Pennsylvania; G Graham; University of Michigan; X Pan; University of California, Irvine

##### POSTER # 217

3:00 PM **686** *The Dynamics of Active Metal Catalysts Revealed by In Situ Electron Microscopy*; MG Willinger, J Cao, A Rinaldi, Z-J Wang, R Farra, R Schloegl; Fritz Haber Institute of The Max Planck Society, Germany

##### POSTER # 218

3:00 PM **687** *Investigation of Gas Cooling Effect on the In Situ Heating Stage Inside Environmental TEM*; M Li, D Xie; Xi'an Jiaotong University, China; X Zhang; King Abdullah University of Science & Technology, Saudi Arabia; Z Shan; Xi'an Jiaotong University, China

##### POSTER # 219

3:00 PM **688** *Three Dimensional Parallel Automated Segmentation of Neural Soma in Large KESM Images of Brain Tissue*; L Saadatifard, DM Mayerich; University of Houston

##### POSTER # 220

3:00 PM **689** *Revealing the Working Active Sites of M1 Phase for Ethane Oxidation*; Y Zhu, E Jensen, PV Sushko, L Kovarik; Pacific Northwest National Laboratory; D Melzer, M Sanchez-Sanchez, JA Lercher; Technical University of Munich, Germany, ND Browning; Pacific Northwest National Laboratory

##### POSTER # 221

3:00 PM **690** *Initial Stages of Reduction of  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> Nanoblades*; W Zhu; Binghamton University; JP Winterstein, R Sharma; National Institute of Standards and Technology; G Zhou; Binghamton University

# Scientific Program

Wednesday, July 27

A

## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—

WEDNESDAY AFTERNOON *continued*

### A14.P1 Single Atom Electron Microscopy and Spectroscopy

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 222

3:00 PM **691 M&M 2016 STUDENT AWARDEE** *Strain Accommodation and Coherency in Laterally-Stitched WSe<sub>2</sub>/WS<sub>2</sub> Junctions*; Y Han, S Xie, B Savitzky, R Hovden, H Gao, LF Kourkoutis, J Park, DA Muller; Cornell University

#### POSTER # 223

3:00 PM **692** *ZnO Nanowire Supported Metal Single Atoms for CO oxidation*; J Xu, J Liu; Arizona State University

#### POSTER # 224

3:00 PM **693** *Quantification of the Effects of Small Mistilts on Dopant Visibility in Nanocrystals*; JT Held, S Duncan, KA Mkhoyan; University of Minnesota

#### POSTER # 225

3:00 PM **694** *Imaging at the Single-Atom Level in Closed-Cell In Situ Gas Reactions*; LF Allard; Oak Ridge National Laboratory; S Duan, J Liu; Arizona State University

#### POSTER # 226

3:00 PM **695** *Performance of the SALVE-Microscope: Atomic Resolution TEM Imaging at 20kV*; M Linck, P Hartel, S Uhlemann, H Müller; Corrected Electron Optical Systems GmbH, Germany; J Biskupek; Universität Ulm, Germany; M Niestadt; FEI Company, Netherlands; U Kaiser; Universität Ulm, Germany, M Haider; Corrected Electron Optical Systems GmbH, Germany; et al.

#### POSTER # 227

3:00 PM **696** *Engineering the Contrast Transfer Through the CC/CS Corrected 20–80 kV SALVE Microscope*; F Börrnert, J Biskupek, Z Lee; Universität Ulm, Germany; M Linck, P Hartel, H Müller, M Haider; CEOS GmbH, Germany, UA Kaiser; Universität Ulm, Germany

#### POSTER # 228

3:00 PM **697** *Correlation Averaging of Single-Atomic-Column STEM-EDX Images for Sub-Atomic Information*; JS Jeong, KA Mkhoyan; University of Minnesota

#### POSTER # 229

3:00 PM **698** *Atomic Resolution Studies of W Dopants Effect on the Phase Transformation of VO<sub>2</sub>*; H Asayesh-Ardakani; Michigan Technological University; A Nie; University of Illinois, Chicago; Y Zhu; King Abdullah University of Science & Technology, Saudi Arabia; P Phillips; University of Illinois, Chicago; R Klie; University of Illinois, Chicago; S Banerjee; Texas A&M University; G Odegard; Michigan Tech University, R Shahbazian-Yassar; University of Illinois, Chicago

B

## BIOLOGICAL SCIENCES POSTER SESSIONS—WEDNESDAY AFTERNOON

### B03.P1 Super Resolution Visualization of Cellular and Inter-Cellular Processes in Health and Disease

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 230

3:00 PM **699** *Fluorescent Nanodiamonds as Fiducial Markers or Nanodiamonds Are Forever*; VA Barr, JC Yi; National Cancer Institute, NIH; J Hong, KC Neuman; National Heart, Lung, and Blood Institute, NIH

### B04.P1 Microscopy and Morphogenesis

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 231

3:00 PM **700** *Laticifer and Rubber Particle Ontogeny in Taraxacum kok-saghyz (Rubber Dandelion) Roots*; MA Abdul Ghaffar, T Meulia, K Cornish; The Ohio State University

#### POSTER # 232

3:00 PM **701** *Ascospore Topographical Pattern as an Analytical Mycological Resource*; EA Favret, LM Setten; Instituto Nacional de Tecnología Agropecuaria, Argentina; SM Romero; Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina; RM Comerio; Instituto Nacional de Tecnología Agropecuaria, Argentina; AI Romero; Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina

#### POSTER # 233

3:00 PM **702** *Automated GPU-Accelerated Segmentation of Volumetric Fiber Networks Using a Predictor-Corrector Algorithm*; PA Govyadinov, D Mayerich; University of Houston

#### POSTER # 234

3:00 PM **703** *Structural and Biomechanical Study of Clarinet Reeds Made from Arundo donax*; M Kawasaki; JEOL USA, Inc.; T Nobuchi; Kyoto University, Japan; Y Nakafusi, M Nose; University of Toyama, Japan; M Shibata; JEOL USA, Inc.; M Shiojiri; Kyoto Institute of Technology, Japan

#### POSTER # 235

3:00 PM **704** *Quantification of Methylene Blue Exclusion for Tracking of Regenerative Re-Epithelialization*; M Milyavsky, R Dickie; Towson University

#### POSTER # 236

3:00 PM **705** *A Comparative Study of Three Marker Detection Algorithms in Electron Tomography*; P Trampert, S Bogachev, T Dahmen, P Slusallek; German Research Center for Artificial Intelligence GmbH, Germany

**POSTER # 237**

3:00 PM **706** *Palynology of Eleven Species of the Genus Tectaria Cav. (Tectariaceae-Polypodiaceae)*; G Gonzalez-Mancera; Universidad Nacional Autónoma de México; L Pacheco, E Velazquez, A Sanchez Morales; Universidad Autónoma Metropolitana, Mexico

**POSTER # 238**

3:00 PM **707** *Morphological Characterization from Pollen of Some Species of Genus Echeveria from Mexican Territory*; G Gonzalez-Mancera, J Reyes-Santiago, MD Luna-Islas, NA Sanchez-Luna; Universidad Nacional Autónoma de México

Institute for Basic Science, Republic of Korea; JY Cheong; Korea Advanced Institute of Science and Technology, Republic of Korea; HK Seo; Institute for Basic Science, Republic of Korea; I-D Kim; Korea Advanced Institute of Science and Technology, Republic of Korea; JY Lee; Institute for Basic Science, Republic of Korea

**POSTER # 244**

3:00 PM **713** *Size-Controlled Intercalation to Conversion Transition in Lithiation of Transition Metal Chalcogenides-NbSe<sub>3</sub>*; L Luo; Pacific Northwest National Laboratory; B Zhao, B Xiang; University of Science and Technology of China; C Wang; Pacific Northwest National Laboratory

**POSTER # 245**

3:00 PM **714** *Cycling and Aging Studies of Li-Based Cathode Materials via Aberration-Corrected STEM*; P Phillips; University of Illinois, Chicago; D Abraham; Argonne National Laboratory; R Klie; University of Illinois, Chicago

**POSTER # 246**

3:00 PM **715** *In Situ TEM Observations of Carbon Deposition on Solid Oxide Fuel Cell Anode Materials*; EL Lawrence, PA Crozier; Arizona State University

**POSTER # 247**

3:00 PM **716** *Versatile Fluidic Cell for In Situ Electrochemical Measurements in SEM*; J Velmurugan, A Stevanovic, F Yi, D Lavan, A Kolmakov; National Institute of Standards and Technology

**POSTER # 248**

3:00 PM **717** *Study of Stability and Structural Changes Occurring During High Thermal Load of the High Voltage Cathode Material by In Situ Scanning Electron Microscopy*; T Kazda; Brno University of Technology, Czech Republic; L Novák, T Vystavěl, J Stárek; FEI Company, Czech Republic; J Vondrák; Brno University of Technology, Czech Republic

**POSTER # 249**

3:00 PM **718** *Effect of Mechanical Stress on Lithiation and Sodiation Process*; H Asayesh-Ardakani; Michigan Technological University; A Nie; University of Illinois, Chicago; Y Yuan; Michigan Technological University; R Shahbazian-Yassar; University of Illinois, Chicago

**POSTER # 250**

3:00 PM **719** *In Situ Video Observations of the Lithiation of Single Microcrystal Graphite*; JJ Lodico, E Garcia, BC Regan; University of California, Los Angeles

**POSTER # 251**

3:00 PM **720** *Similarities and Differences in Kinetics and Dynamics During Li and Na Transport in MoS<sub>2</sub> Nanostructures*; C Shi, P Gao; Peking University, China

**POSTER # 252**

3:00 PM **721** *Electron Microscopy Observations Over the Processes Yielding to Obtaining TiO<sub>2</sub> from Natural Ilmenite Mineral*; LM Caceres Montero, G Solorzano, EA Brocchi; Pontificia Universidade Católica do Rio de Janeiro, Brazil

P

## PHYSICAL SCIENCES POSTER

### SESSIONS—WEDNESDAY AFTERNOON

#### P02.P2 Electron Microscopy of Materials for Electrochemical Power Systems

**POSTER SESSION**

Wednesday 3:00 PM • Room: Exhibit Hall

**POSTER # 239**

3:00 PM **708** *In Situ TEM Observation on the Growth and Agglomeration of Propylene Carbonate-Based Electrolytes During Sodiation with Graphene Liquid Cell*; JH Chang; Institute for Basic Science, Republic of Korea; JY Cheong, ID Kim; Korea Advanced Institute of Science and Technology, Republic of Korea; JY Lee; Institute for Basic Science, Republic of Korea

**POSTER # 240**

3:00 PM **709** *Structural Integrity of SnO<sub>2</sub> Nanotubes During Sodiation Examined by In Situ TEM Observation with Graphene Liquid Cell*; JY Cheong; Korea Advanced Institute of Science and Technology, Republic of Korea; JH Chang, JY Lee; Institute for Basic Science, Republic of Korea; I-D Kim; Korea Advanced Institute of Science and Technology, Republic of Korea

**POSTER # 241**

3:00 PM **710** *In Situ TEM Study on the Growth Process of Amorphous Layer on SnO<sub>2</sub> Nanoparticle During Sodiation on Real Time Scale*; JY Cheong; Korea Advanced Institute of Science and Technology, Republic of Korea; JH Chang, JY Lee; Institute for Basic Science, Republic of Korea; I-D Kim; Korea Advanced Institute of Science and Technology, Republic of Korea

**POSTER # 242**

3:00 PM **711** *Real-Time Observation of Two-Phase Separation in LiFePO<sub>4</sub> at Elevated Temperature*; S-Y Chung; Korea Advanced Institute of Science and Technology, Republic of Korea; S-Y Choi; Korea Institute of Materials Science, Republic of Korea

**POSTER # 243**

3:00 PM **712** *Case Examination on Volume Expansion of Crystalline Si Nanoparticles under Sodiation: In Situ TEM Study Using Graphene Liquid Cells*; FJ Mweta, SJ Kim, JH Chang;

# Scientific Program

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## PHYSICAL SCIENCES POSTER SESSIONS— WEDNESDAY AFTERNOON *continued*

### P05.P1 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

#### POSTER # 253

3:00 PM **722** *Twin-Assisted Growth Mechanism of Heterogeneous Interfaces Between Gold Nanoparticles and Nominally Stable Substrates*; F Liu, DY Xie, Y-S Fu, G-Z Zhu; Shanghai Jiao Tong University, China

#### POSTER # 254

3:00 PM **723** *Nanocharacterization of Strontium Titanate Thin Films and Oxide-Electrode Interfaces in Resistive Switching Devices*; WJ Bowman; Arizona State University; E Sediva; ETH Zürich, Switzerland; PA Crozier; Arizona State University; J Rupp; ETH Zürich, Switzerland

#### POSTER # 255

3:00 PM **724** *Investigation of N-Polar AlGaIn/GaN and InAlN/GaN Thin Films Grown by MBE*; TO McConkie; Arizona State University; MT Hardy, DF Storm, BP Downey, DS Katzer, DJ Meyer; U.S. Naval Research Laboratory; N Nepal; Sotera Defense Solutions, DJ Smith; Arizona State University

#### POSTER # 256

3:00 PM **725** *Local Strain Relaxation by A-Type Dislocation Clusters in In<sub>x</sub>Ga<sub>1-x</sub>N/GaN Film with Indium Compositions of x=0.07 and 0.12*; H Xie, S Wang, AM Fischer; Arizona State University; H McFavilen; Soitec Phoenix Labs; FA Ponce; Arizona State University

#### POSTER # 257

3:00 PM **726** **M&M 2016 STUDENT AWARDEE** *Temperature Dependence of the Silicon Nitride Volume Plasmon*; BT Zutter; University of California, Los Angeles; M Mecklenburg; University of Southern California; BC Regan; University of California, Los Angeles

#### POSTER # 258

3:00 PM **727** *Microstructural Characteristics of GaN/AlN Thin Films Grown on a Si(110) Substrate by Molecular Beam Epitaxy: Transmission Electron Microscopy Study*; YH Kim, JH Lee, SJ Ahn; Korea Research Institute of Standards and Science, Republic of Korea; Y-K Noh; IV Works Co, Ltd., Republic of Korea; M-D Kim; Chungnam National University, Republic of Korea; J-E Oh; Hanyang University, Republic of Korea

#### POSTER # 259

3:00 PM **728** *Bismuth Particle Formation in Annealed Dilute GaAs<sub>1-x-y</sub>PyBi<sub>x</sub> Alloys*; ZR Lingley, Y Sin, B Foran, M Brodie, NP Wells, SC Moss; The Aerospace Corporation; L Mawst, K Forghani; University of Wisconsin-Madison; et al.

#### POSTER # 260

3:00 PM **729** *Interfacial Electrical Conductivity Controlled Crystallization of Amorphous LaAlO<sub>3</sub> Under Electron-Beam Irradiation*; G Lee; Yonsei University, Republic of Korea; J Kim; Seoul National University, Republic of Korea; S. Moon; Yonsei University, Republic of Korea; SH Baek; Korea Institute of Science and Technology, Republic of Korea; D-H Kim; Yonsei University, Republic of Korea; HJ Chang; Korea Institute of Science and Technology, Republic of Korea

#### POSTER # 261

3:00 PM **730** *High Temperature Stability of Amorphous Zn-O Transparent Conductive Oxides Investigated by In Situ TEM and X-Ray Diffraction*; Q Jeangros; École Polytechnique Fédérale de Lausanne, Switzerland; M Duchamp; Forschungszentrum Jülich, Germany; E Rucavado, F Landucci, C Spori; École Polytechnique Fédérale de Lausanne, Switzerland; RE Dunin-Borkowski; Forschungszentrum Jülich, Germany; C Hébert, M Morales-Masis; École Polytechnique Fédérale de Lausanne, Switzerland; et al.

#### POSTER # 262

3:00 PM **731** *Dislocation Analysis of Thermal-Cycle-Annealed Mesa-Structured HgCdTe/HgTe/CdTe/ZnTe/Si (211)*; M Vaghayenagar; Arizona State University; S Simingalam, Y Chen; U.S. Army Research Laboratory; DJ Smith; Arizona State University

#### POSTER # 263

3:00 PM **732** *Characterizing InGaAs/GaAs Quantum Dots Using Low-kV FESEM Imaging and EDS Analysis at the Nanometer Scale*; L Han; Carl Zeiss Microscopy GmbH, Germany; S Burgess, X Li; Oxford Instruments Nanoanalysis, United Kingdom; F Zhou; Carl Zeiss Microscopy GmbH, Germany

#### POSTER # 264

3:00 PM **733** *In Situ Atomic-Scale Visualization of CuO Nanowire Growth*; W Zhu; Binghamton University; JP Winterstein, R Sharma; National Institute of Standards and Technology; G Zhou; Binghamton University

#### POSTER # 265

3:00 PM **734** *3D Reconstruction and Separation of Nickel and Zirconia Based Phases from Solid Oxide Fuel Cell Anode Using Backscatter Electron Imaging*; G Wetzels, T Darroudi, L Saraf; Clemson University

#### POSTER # 266

3:00 PM **735** *Annular Bright Field STEM Investigation of the (0001) Stacking Fault in Alumina*; E Tochigi, T Mizoguchi; The University of Tokyo, Japan; A Nakamura; Nagoya University, Japan; N Shibata, Y Ikuhara; The University of Tokyo, Japan

#### POSTER # 267

3:00 PM **736** *The Effects of Seeding Strategies on Morphology of Electroless Deposited Pd Thin Film*; T Gutu; University of Zimbabwe; E Minnaar, JE Olivier; Nelson Mandela Metropolitan University, South Africa; J Kurehwatira, K Munjeri, BS Mpofu, MJ Myers; University of Zimbabwe

Wednesday, July 27



## POSTER # 268

3:00 PM **737** *Size Effect on Spontaneous Flux-Closure Domains in BiFeO<sub>3</sub> Thin Films*; L Li; University of Michigan; F Xue; Pennsylvania State University; C Nelson; University of Michigan; A Melville, C Heikes, D Schlom; Cornell University; L Chen; Pennsylvania State University, X Pan; University of California, Irvine

## POSTER # 269

3:00 PM **738** *Characterizing Epitaxial Growth of Nd<sub>2</sub>Ir<sub>2</sub>O<sub>7</sub> Pyrochlore Thin Films via HAADF-STEM Imaging and EDX*; BD Esser, JC Gallagher, R Morrow, SR Dunsiger, RE Williams, PM Woodward, F Yang, DW McComb; The Ohio State University

## POSTER # 270

3:00 PM **739** *TEM Studies of TiO<sub>2</sub>-Based Passivated Contacts in c-Si Solar Cells*; H Ali; University of Central Florida; X Yang; Australian National University, Australia; KO Davis; University of Central Florida; K Weber; Australian National University, Australia; WV Schoenfeld; University of Central Florida

## POSTER # 271

3:00 PM **740** *S/TEM Investigation of the Structure of (Bi,Sb)<sub>2</sub>Te<sub>3</sub>/h-BN Heterostructures Grown by Molecular Beam Epitaxy*; D Reifsnnyder Hickey; University of Minnesota; JS Lee; The Pennsylvania State University; RJ Wu; University of Minnesota; N Samarth; The Pennsylvania State University; KA Mkhoyan; University of Minnesota

## POSTER # 272

3:00 PM **741** *Study on Chemical Vapor Deposition Growth and Transmission Electron Microscopy MoS<sub>2</sub>/h-BN Heterostructure*; YT Kim, JB Seol, CM Kwak, CG Park; Pohang University of Science and Technology, Republic of Korea

## POSTER # 273

3:00 PM **742** *Fast Identification of Dislocations in Semiconductor Materials by Electron Channeling Contrast Imaging Using a Scanning Electron Microscope*; L Han; Carl Zeiss Microscopy GmbH, Germany; Y Zhou; Carl Zeiss Microscopy GmbH, Singapore

## POSTER # 274

3:00 PM **743** *Direct Observation of Conducting Path with Highly Reduced Graphene Oxide in Au/GO/Al Resistive Switching Memory*; SK Kim, JY Lee; Korea Advanced Institute of Science and Technology, Republic of Korea; HY Jeong; Ulsan National Institute of Science and Technology, Republic of Korea

## POSTER # 275

3:00 PM **744** *Crystallite Size Evaluation of ZnO Nanoparticles via Transmission Electron Microscopy and X-Ray Powder Diffraction*; JE Cowen; Case Western Reserve University; AE Harris, CC Pena, SC Bryant, AJ Christy, JD Harris; Northwest Nazarene University

## POSTER # 276

3:00 PM **745** *Atomic Arrangement of Contamination on Graphene*; Y Maehara, K Yamazaki, K Gohara; Hokkaido University, Japan

## POSTER # 277

3:00 PM **746** *Refined Phase Imaging by Electron Diffractive Imaging*; J Yamasaki, Y Shimaoka; Osaka University, Japan; H Sasaki; Furukawa Electric Co, Ltd., Japan

## POSTER # 278

3:00 PM **747** *Atomic Structure of Self-Pillared, Single-Unit-Cell Sn-MFI Zeolite Nanosheets*; P Kumar, L Ren, Q Guo; University of Minnesota; X Zhang; The Pennsylvania State University; M Tsapatsis, A Mkhoyan; University of Minnesota

## P10.P1 Microscopy and Characterization of Ceramics, Polymers and Composites

### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

## POSTER # 279

3:00 PM **748** *High-Resolution Transmission Electron Microscopy Study of Montmorillonite Subjected to Rapid Compression*; Y Zhang; Center for High Pressure Science and Technology Advanced Research, China; M Wei; Jilin Normal University, China; Y Ma, J Chaudhuri; Texas Technology University

## POSTER # 280

3:00 PM **749** *Characterization of Burnt Clays by X-Ray Diffraction Analysis, Chemical Analysis and Environmental Scanning Electron Microscopy*; E Navrátilová, V Neděla; Institute of Scientific Instruments ASCR, Czech Republic

## POSTER # 281

3:00 PM **750** *Electron Microscopy Study of Nd Doped Misfit Layer Structures in the Pb-Nb-Se System*; LC Otero Diaz, R Varadé-López, D Ávila-Brandé, A Gómez-Herrero; Universidad Complutense de Madrid, Spain

## POSTER # 282

3:00 PM **751** *Direct Observation of Ferroelectric Domain Walls in Improper Ferroelectric (Ca,Sr)<sub>3</sub>Ti<sub>2</sub>O<sub>7</sub>*; K Kurushima; Toray Research Center, Japan; W Yoshimoto, H Tsukasaki, Y Ishii; Osaka Prefecture University, Japan; S-W Cheong; Rutgers University; S Mori; Osaka Prefecture University, Japan

## POSTER # 283

3:00 PM **752** *Structural Anisotropy in a Crustacean Claw Calcified with Amorphous Calcium Phosphate*; M Vittori; University of Ljubljana, Slovenia; V Srot, B Bussmann, PA van Aken; Max Planck Institute for Solid State Research, Germany; J Štrus; University of Ljubljana, Slovenia

## POSTER # 284

3:00 PM **753** *High-Energy Ball-milling of ZrB<sub>2</sub> and HfB<sub>2</sub> Powders: Effect on Particle Size and Crystalline Grain Distribution*; NV Seetala, OL Reedy; Grambling State University; LE Matson; Wright-Patterson Air Force Base; TS Key, H Lee; UES, Inc.

# Scientific Program

P

## PHYSICAL SCIENCES POSTER SESSIONS

WEDNESDAY AFTERNOON *continued*

### POSTER # 285

3:00 PM **754** *Focused Ion Beam (FIB) and Energy Dispersive X-Ray (EDX) Analysis in Adhesive Dentistry*; L Rotkina; Ioffe Physical-Technical Institute of Russian Academy of Science; C Zbaeren; University of Pennsylvania; J Katsoulis; University of Bern, Switzerland; T Takagaki; Tokyo Medical and Dental University, Japan; M Blatz; University of Pennsylvania

### POSTER # 286

3:00 PM **755** *Analysis of H<sub>2</sub> and SiH<sub>4</sub> in the Deposition of pm-Si:H Thin Films by PECVD Process for Solar Cell Applications*; A Garcia-Barrientos; Universidad Autonoma de San Luis Potosí, Mexico; J Plaza-Castillo; Universidad del Atlántico, Barranquilla, Colombia; M Moreno-Moreno; Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico; J Arellano-Jiménez; University of Texas, San Antonio; KY Vizcaíno; Universidad del Atlántico, Barranquilla, Colombia; JL Bernal-Ponce; Universidad Politécnica de Pachuca, Mexico

### POSTER # 287

3:00 PM **756** *Evaluation of Low Temperature Degradation of 3Y-TZP in Artificial Saliva*; MDC Aragon Duarte, A Reyes Rojas, HE Esparza-Ponce; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 288

3:00 PM **757** *EBSD Characterisation of SPSed CeB<sub>6</sub> Thermionic Electron Emitter*; S Baskut, L Koroglu, E Ayas, S Turan; Anadolu University, Turkey

### POSTER # 289

3:00 PM **758** *TEM Characterization of the Deformed Region Beneath Knoop Indents in Boron Carbide*; SD Walck; TKC Global Solutions LLC; JC Lasalvia; U.S. Army Research Laboratory; KD Behler; TKC Global Solutions LLC

### POSTER # 290

3:00 PM **759** *Synthesis of Mg Doped ZnO with Hexagonal Shape by Hydrothermal Method*; A Corral-Aguado, P Martínez-Torres; Universidad Michoacana de San Nicolás de Hidalgo, Mexico; N Gomez-Ortiz; University of California, Riverside; J Pichardo-Molina; Centro de Investigaciones en Óptica A.C., Mexico; S De la Rosa-García; Universidad Juárez Autónoma de Tabasco, Mexico; SE Borjas-García, A Medina; Universidad Michoacana de San Nicolás de Hidalgo, Mexico

### POSTER # 291

3:00 PM **760** *FIB/SEM Tomography of Porous Ceramics*; A Rezikyan; Corning, Inc.

### POSTER # 292

3:00 PM **761** *Electron Microscopy Study on the Effect of Si<sub>3</sub>N<sub>4</sub> Addition to B<sub>4</sub>C-SiC-Al Composites*; P Kaya; Anadolu University, Turkey; A Kalemantas; Bursa Technical University, Turkey; G Arslan, F Kara, S Turan; Anadolu University, Turkey

### POSTER # 293

3:00 PM **762** *Effect of B<sub>4</sub>C Particles Addition on the Microstructure and Mechanical Performance of Some Aluminum-Based Composites*; C Carreño-Gallardo, J Mendoza-Duarte; Centro de Investigación en Materiales Avanzados, S.C., Mexico; C López-Meléndez; Universidad La Salle Chihuahua, Mexico; I Estrada-Guel, JL Reyes-Ronquillo, E Uriza-Vega, R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

### POSTER # 294

3:00 PM **763** *3D Investigation of the Microstructure Evolution in Hypereutectic Aluminum Silicon Alloy Using High-Resolution Phase Contrast X-Ray Microscopy*; AG Rao; Naval Materials Research Laboratory Ambarnath, India; H Bale, A Merkle; Carl Zeiss X-Ray Microscopy, Inc.; VP Deshmukh; Naval Materials Research Laboratory Ambarnath, India

### POSTER # 295

3:00 PM **764** *Characterization of Micronized/Nanoscale Copper Particles in Wood Dust by TEM/STEM*; C Wang, C Qi, AS Echt, AK Dozier, JE Fernback, ME Birch; National Institute for Occupational Safety and Health

### POSTER # 296

3:00 PM **765** *Characterization by TEM of Pt Nanoparticles Dispersed on TiO<sub>2</sub>Np, TiO<sub>2</sub>Nt and Al<sub>2</sub>O<sub>3</sub>*; C Angeles-Chavez, MA Cortes-Jacome, JA Toledo-Antonio; Mexican Institute of Petroleum

### POSTER # 297

3:00 PM **766** *Study of Dielectric Properties and Morphology of Epoxy Resin with Silicon Dioxide Microparticles and Nanoparticles*; J Hudec, V Neděla; Institute of Scientific Instruments ASCR, Czech Republic

### POSTER # 298

3:00 PM **767** *Cryo-SEM Imaging and Analysis of Frozen-Hydrated PEG-AA Microgels*; J Liang, F Teng, M Libera, T Chou; Stevens Institute of Technology

### POSTER # 299

3:00 PM **768** *Scanning Transmission Electron Microscopy of SiAlON/Graphene Nano Platelets Composites Obtained with a Novel Homogenization Approach*; U Savaci, A Cinar, TA Seyhan, S Turan; Anadolu University, Turkey

### POSTER # 300

3:00 PM **769** *In Situ Transformation of Amorphous Soot into Carbon-Nanostructures by High-Energy Ball Milling*; I Estrada-Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico; O Anderson-Okonkwo, FC Robles-Hernandez; University of Houston

### POSTER # 301

3:00 PM **770** *Aluminum Mechanical Enhancing with Gr-Cu Nanoparticles Addition via High-Energy Ball Milling*; JM Mendoza-Duarte, R Martínez Sánchez, C Carreño-Gallardo, I Estrada-Guel; Centro de Investigación en Materiales Avanzados, S.C., Mexico

Wednesday, July 27

# Scientific Program

## POSTER # 302

3:00 PM **771** *Interfacial Complexions and the Related Atomic Transport Behaviors in Gold-Oxide Systems*; G-Z Zhu, Y-S Fu, F Liu, A-C Yi, DY Xie, W Zhou; Shanghai Jiao Tong University, China

## POSTER # 303

3:00 PM **772** *Low loss Electron Energy Spectroscopy Characterization of Electronic Structure and Piezo-Response of  $Ba_{0.9}Ca_{0.1}Ti_{0.9}Zr_{0.1}O_3$  Nanocrystals*; G Herrera-Perez; Cátedras CONACYT, Mexico; D Morales C., F Paraguay-Delgado, A Hurtado-Macias; Centro de Investigación en Materiales Avanzados, S.C., Mexico; R Borja-Urby; Centro de Nanociencias, IPN, Mexico; G Tapia-Padilla; Cátedras CONACYT, Mexico; A Reyes-Rojas, LE Fuentes-Cobas; Centro de Investigación en Materiales Avanzados, S.C., Mexico

## POSTER # 304

3:00 PM **773** *Workplace Monitoring of Airborne Carbon Nanomaterials by HRTEM*; QT Birch; National Institute for Occupational Safety and Health; C Wang, JE Fernback, HA Feng, ME Birch, AK Dozier; National Institute for Occupational Safety and Health

## POSTER # 305

3:00 PM **774** *Microscale Self-Assembly of Longrange Ordered Cu Nanostructures*; S Han, W Liu; University of Electronic Science and Technology of China; K Sun; University of Michigan

## POSTER # 306

3:00 PM **775** *Nano-Particle TEM Sample Preparation Primer*; OM Vierrether, JR Terbush, CA Wisner; Missouri University of Science & Technology

## POSTER # 307

3:00 PM **776** *Synthesis of ZnO Crystals Hexagonal Ball Shape*; S Borjas, A Medina, L Bejar; Universidad Michoacana de San Nicolás de Hidalgo, Mexico; C Aguilar; Universidad Técnica Federico Santa María, Chile

## POSTER # 308

3:00 PM **777** *Synthesis of Mesoporous Ceria by Using CTAB as Template*; SE Borjas García, A Medina Flores, L Béjar Gómez, PG Martínez Torres, N Dasgupta-Schubert; Universidad Michoacana de San Nicolás de Hidalgo, Mexico; JL Bernal Ponce; Universidad Politécnica de Pachuca, Mexico

## POSTER # 309

3:00 PM **778** *Synthesis and Characterization of Pure and Mn-doped  $BaTiO_3$  Nanofibers*; MC Maldonado, F Espinosa, M Ochoa, J Sosa; Centro de Investigación en Materiales Avanzados, S.C., Mexico

## POSTER # 310

3:00 PM **779** *Resolving Difficult Multilayer Film Structure by Transmission Electron Microscopy*; S Qin, H Duan, W Dai; Avery Dennison Corporation

## POSTER # 311

3:00 PM **780** *Combining Post-Specimen Aberration Correction and Direct Electron Detection to Image Molecular Structure in Liquid Crystal Polymers*; EA Stach; Brookhaven National Laboratory; J Li; Stony Brook University; H Xin, DN Zakharov; Brookhaven National Laboratory; YH Kwon, E Reichmanis; Georgia Institute of Technology

## POSTER # 312

3:00 PM **781** *Morphology Study of Phosphonated Peptoid Block Copolymer*; J Sun; Qingdao University of Science and Technology, China; K Downing, R Zuckermann; Lawrence Berkeley National Laboratory; N Balsara; University of California, Berkeley; X Jiang; Lawrence Berkeley National Laboratory

## P12.P1 Microscopy and Analysis in Forensic Science

### POSTER SESSION

Wednesday 3:00 PM • Room: Exhibit Hall

## POSTER # 313

3:00 PM **782** *Transmission Electron Microscopy and X-Ray Photoelectron Spectroscopy Studies of Soot Particles Emitted from a Domestic Cook-Stove*; GA Carabali, TG Castro, OA Peralta; Universidad Nacional Autónoma de México; L Molina; Massachusetts Institute of Technology

## POSTER # 314

3:00 PM **783** *The Application of Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM-EDX) in Ancient Dental Calculus for the Reconstruction of Human Habits*; D Fialova; Masaryk University, Czech Republic; R Skoupy; Institute of Scientific Instruments ASCR, Czech Republic; E Drozdova; Masaryk University, Czech Republic; V Krzyzaneck; Institute of Scientific Instruments ASCR, Czech Republic; L Sin; Archaeological Centre Olomouc, Czech Republic; R Benus; Comenius University, Slovakia; B Klima; Masaryk University, Czech Republic

## POSTER # 315

3:00 PM **784** *Elemental Analysis of Particles  $PM_{2.5}$  by SEM-EDS*; R Ramirez-Leal, M Valle-Martinez, M Cruz-Campa; Sonora State University, Mexico

## POSTER # 316

3:00 PM **785** *Microscopy Analysis of Occupational and Environmental Health Investigations*; AA Havics; pH2, LLC

# Scientific Program

Thursday, July 28

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—THURSDAY MORNING

### A02.1 TEM Phase Plate Imaging in Biological and Materials Science

#### SESSION CHAIR:

Radostin Danev, Max Planck Institute

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C111

- 8:30 AM **786** (INVITED) *Optimizing the FEI Volta Phase Plate for Efficient and Artefact-Free Data Acquisition*; B Buijsse; FEI Company, Netherlands; R Danev; Max Planck Institute of Biochemistry, Germany; K Sader; FEI Company, United Kingdom; S Welsch; FEI Company, Netherlands
- 9:00 AM **787** (INVITED) *Contrast Enhancement of Long-Range Periodic Structures Using Hole-Free Phase Plate*; H Iijima, Y Konyuba, N Hosogi, Y Ohkura; JEOL, Ltd., Japan; H Jinnai, T Higuchi; Tohoku University, Japan
- 9:30 AM **788** *Contrast Enhancement of Nano-Materials Using Phase Plate STEM*; H Minoda, T Tamai; Tokyo University of Agriculture and Technology, Japan; H Iijima, Y Kondo; JEOL, Ltd., Japan
- 9:45 AM **789** *The Role of Secondary Electron Emission in the Charging of Thin-Film Phase Plates*; M Dries, R Janzen, T Schulze, J Schundelmeier, S Hettler; Karlsruhe Institute of Technology, Germany; U Golla-Schindler, B Jaud, U Kaiser; Ulm University, Germany; et al.

### A07.4 Surface and Subsurface Microscopy and Analysis

#### SESSION CHAIR:

Chanmin Su, Bruker

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C216

- 8:30 AM **790** *High Reproducible Scanning Near-Field Optical Microscopy with a Few Nanometer Lateral Spatial Resolution*; T Tachizaki; Tokai University, Japan; K Zhang, I Yamakawa, S-I Taniguchi; Hitachi, Ltd., Japan
- 8:45 AM **791** (INVITED) *Electronic Behaviors of Individual Defects and Boundaries in 2D Materials: A Spatially Resolved Study with Multi-Probe Scanning Tunneling Microscopy*; A-P Li; Oak Ridge National Laboratory
- 9:15 AM **792** (INVITED) *Surface Phonon Coupling Within Boron Nitride Nanotubes Resolved by a Novel Near-Field Infrared Pump-Probe Imaging Technique*; L Gilburd; University of Toronto, Canada; X Xu; Lehigh University; Y Bando, D Golberg; National Institute for Materials Science, Japan; G Walker; University of Toronto, Canada
- 9:45 AM **793** **MSA POST-DOCTORAL AWARDEE** *Submicron Spatial Resolution in Thermal Desorption Mass Spectrometry via Rapid Heating Functions Using Thermal AFM Probes*; S Somnath, S Jesse, GJ Van Berkel, SV Kalinin, OS Ovchinnikova; Oak Ridge National Laboratory

### A08.4 Quantitative and Qualitative Microanalysis by EPMA and SEM

#### SESSION CHAIR:

Julien Allaz, University of Colorado Boulder

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C113

- 8:30 AM **794** (INVITED) *Microanalytical Standards, Reference and Research Materials: Continuing the Effort Toward Breaking the Accuracy Barrier*; A von der Handt; University of Minnesota; JM Allaz; University of Colorado, Boulder; OK Neill; Washington State University
- 9:00 AM **795** *EPMA WDS Peak Position Analysis of Mineral Chemistry in Fossils*; DC Meier; McCrone Associates, Inc.; KK Foecke; The Pennsylvania State University; EP Vicenzi; Smithsonian Institution; PJ Heaney, R Graham; The Pennsylvania State University
- 9:15 AM **796** *Evaluation of MPI-DING Glasses for Use as Electron Probe Standards*; DK Ross; NASA Johnson Space Center
- 9:30 AM **797** (INVITED) *Iron Speciation Microanalysis: Evaluating Low Overvoltage Wavelength Dispersive Spectrometry Using Natural Reference Materials*; EP Vicenzi; Smithsonian Institution; DC Meier; National Institute of Standards and Technology; PK Carpenter; Washington University in St. Louis

### A10.1 Advances in Image Processing, Display and Analysis

#### SESSION CHAIR:

William Heeschen, Dow Chemical

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C115

- 8:30 AM **798** *Model-Based Super-Resolution of SEM Images of Nano-Materials*; S Sreehari; Purdue University; SV Venkatakrisnan; Lawrence Berkeley National Laboratory; JP Simmons, LF Drummy; U.S. Air Force Research Laboratory, WPAFB; CA Bouman; Purdue University
- 8:45 AM **799** *Self-Organizing Neural Networks: Parallels Between "Big Imaging" and Sparse Imaging in Electron Microscopy*; K Hujsak, VP Dravid; Northwestern University
- 9:00 AM **800** (INVITED) *Automatic Neural Reconstruction from Petavoxel of Electron Microscopy Data*; A Suissa-Peleg, D Haehn, S Knowles-Barley, V Kaynig, TR Jones, A Wilson, R Schalek, JW Lichtman; Harvard University; et al.
- 9:30 AM **801** (INVITED) *High-Throughput, Automated Image Processing for Large-Scale Fluorescence Microscopy Experiments*; AM Goodman, AE Carpenter; Broad Institute of MIT and Harvard



## A12.3 Research and Applications in Atom Probe Tomography

### SESSION CHAIR:

Eric Steel, National Institute of Standards and Technology

### PLATFORM SESSION

Thursday 8:30 AM • Room: C226

- 8:30 AM **802** (INVITED) *The Mystery of Missing Species in Atom Probe Tomography of Composite Materials*; HJ Kreuzer, M Karahka; Dalhousie University, Canada
- 9:00 AM **803** *Impact of Extreme Electrical Fields on Charge Density Distributions in Alloys*; C Loyola, J Peralta; Universidad Andrés Bello, Chile; SR Broderick, K Rajan; University at Buffalo
- 9:15 AM **804** *Dissociation of Molecular Ions During the DC Field Evaporation of ZnO in Atom Probe Tomography*; I Blum, D Zanuttini, L Rigutti, F Vurpillot; Université de Rouen-CNRS, France; J Douady, E Jacquet, P-M Anglade, B Gervais; Université de Caen-CNRS, France; et al.
- 9:30 AM **805** (INVITED) *Approaches for Promoting Accurate Atom Probe Reconstruction*; TJ Prosa, BP Geiser, D Reinhard, Y Chen, DJ Larson; CAMECA Instruments, Inc.

## A13.6 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

### SESSION CHAIR:

Peter Ercius, Lawrence Berkeley National Laboratory  
Cee See Wee, National University of Singapore

### PLATFORM SESSION

Thursday 8:30 AM • Room: C221

- 8:30 AM **806** **M&M 2016 STUDENT AWARDEE** *Quantitative Analysis of Viral Nanomachines in Liquid*; AC Varano; Virginia Polytechnic Institute and State University; MJ Dukes; Protochips Inc.; SM McDonald, S Poelzing, DF Kelly; Virginia Polytechnic Institute and State University
- 8:45 AM **807** *Hopping Diffusion of Gold Nanoparticles Observed with Liquid Cell TEM*; SW Chee, D Loh, Z Baraissov, P Matsudaira, U Mirsaidov; National University of Singapore
- 9:00 AM **808** (INVITED) *In Situ Electrochemical Cell TEM for Battery and Fuel Cell Systems*; ME Holtz, Y Yu, J Rivera, HD Abruña, DA Muller; Cornell University
- 9:30 AM **809** *Building with Ions: Development of In Situ Liquid Cell Microscopy for the Helium Ion Microscope*; V Iberi, I Anton, C Brown, AJ Rondinone, DC Joy, A Belianinov, RR Unocic, OS Ovchinnikova; Oak Ridge National Laboratory
- 9:45 AM **810** *Hydration Layer-Mediated Pairwise Interaction of Nanoparticles Resolved by In Situ TEM*; U Anand, U Mirsaidov; National University of Singapore

## A16.2 New Frontiers in Monochromated EELS

### SESSION CHAIR:

Peter Crozier, Arizona State University

### PLATFORM SESSION

Thursday 8:30 AM • Room: C224-25

- 8:30 AM **811** (INVITED) *High-Resolution Monochromatic EELS Really Is Different!*; P Rez, T Aoki; Arizona State University
- 9:00 AM **812** (INVITED) *Monochromated Electron Energy-Loss Spectroscopy of Organic Photovoltaics*; DW McComb; The Ohio State University
- 9:30 AM **813** *Taking Advantage of Scattering Delocalization to Reduce Radiation Damage in Vibrational or Valence-Loss EELS and Energy-Filtered TEM Images*; R Egerton; University of Alberta, Canada; T Aoki, P Crozier; Arizona State University
- 9:45 AM **814** *Ultra-High Energy Resolution EELS Mapping Using Aberration-Corrected Low-voltage STEM Equipped with Monochromator*; M Masaki, M Shigeyuki, S Hidetaka; JEOL, Ltd., Japan; S Kazu; National Institute of Advanced Industrial Science and Technology, Japan

P

## PHYSICAL SCIENCES SYMPOSIA— THURSDAY MORNING

## P03.3 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design

### SESSION CHAIR:

Andreas Thust, Forschungszentrum Julich

### PLATFORM SESSION

Thursday 8:30 AM • Room: C210

- 8:30 AM **815** (INVITED) *Theory and Parameter Free Calculations of EELS and X-Ray Spectra*; JJ Rehr, JJ Kas; University of Washington; K Jorissen; Amazon Web Services
- 9:00 AM **816** *Low-Loss Imaging of Defect Structures in Two Dimensional Materials Using Aberration Corrected Scanning Transmission Electron Microscopy*; MP Oxley; Oak Ridge National Laboratory; MD Kapetanakis; Vanderbilt University; W Zhou, J-C Idrobo; Oak Ridge National Laboratory; ST Pantelides; Vanderbilt University
- 9:15 AM **817** (INVITED) *Multimodal Acquisition of Properties and Structure with Transmission Electron Reciprocal-Space (MAPSTER) Microscopy*; J Ciston; Lawrence Berkeley National Laboratory
- 9:45 AM **818** *Quantitative Imaging of Probability Current Flow in Real and Momentum Space*; CS Chang, KX Nguyen, MC Cao, DA Muller; Cornell University

# Scientific Program

P

## PHYSICAL SCIENCES SYMPOSIA—

THURSDAY MORNING *continued*

### P04.1 Nuclear and Irradiated Materials

#### SESSION CHAIR:

Khalid Hattar, Sandia National Laboratory

#### PLATFORM SESSION

Thursday 8:30 AM • Room: E160AB

- 8:30 AM **819** (INVITED) *TEM with In Situ Ion Irradiation of Nuclear Materials under In-Service Conditions*; RW Harrison, H Amari, G Greaves, SE Donnelly, JA Hinks; University of Huddersfield, United Kingdom
- 9:00 AM **820** *Microscopy of Plasma-Materials Interactions in Tungsten for Fusion Power*; CM Parish; Oak Ridge National Laboratory; RP Doerner, MJ Baldwin; University of California, San Diego; D Donovan; University of Tennessee; KG Field, Y Katoh; Oak Ridge National Laboratory
- 9:15 AM **821** *Radiation Damage Behavior in Multiphase Ceramics*; KK Ohtaki; University of California, Irvine; M Patel; University of Tennessee; ML McCartney; University of California, Irvine
- 9:30 AM **822** *EFTEM Pre- and Post-Irradiation  $sp^2$  to  $sp^3$  R-Ratio Measurements of SiC/SiC Pyrolytic Carbon Interphases*; L Fave; Paul Scherrer Institute, Switzerland; C Hébert; École Polytechnique Fédérale de Lausanne, Switzerland; MA Pouchon; Paul Scherrer Institute, Switzerland
- 9:45 AM **823** *Cation-Dependent Hierarchical Assembly of  $U_{60}$  Nanoclusters into Blackberries Imaged via Cryogenic Transmission Electron Microscopy*; JA Soltis; University of Minnesota; CM Wallace; University of Notre Dame; RL Penn; University of Minnesota; PC Burns; University of Notre Dame

### P05.4 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### SESSION CHAIRS:

Katherine Junjohann, Sandia National Laboratory

Vladimir P. Oleshko, National Institute of Standards and Technology

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C114

- 8:30 AM **824** (INVITED) *Structure-Properties Relations in III-Nitride Nanostructures for Optoelectronics*; RC Myers, S Carnevale, AG Sarwar, T Kent; Ohio State University; P Phillips; University of Illinois, Chicago; C Selcu; Ohio State University; R Klie; University of Illinois, Chicago, F Yang; Ohio State University; et al.
- 9:00 AM **825** *Advancement of Heteroepitaxial III-V/Si Thin Films Through Defect Characterization*; J Deitz, D McComb; The Ohio State University; T Grassman; The Ohio State University

9:15 AM **826** *Characterization of Defects in III-V Semiconductor Materials (InP, GaAs and InGaAs/InP on Si) in Nano-sized Patterns by Transmission Electron Microscopy*; JH Lee, YD Cho, IG Lee, DH Ko; Yonsei University, Republic of Korea; CS Shin, WK Park; Korea Advanced Nano Fab Center, Republic of Korea; DH Kim; Kyungpook National University, Republic of Korea

9:30 AM **827** *Imaging Graphene by Field Ion Microscopy*; C Barroo; Harvard University; T Visart de Bocarmé; Université Libre de Bruxelles, Belgium

9:45 AM **828** *(S)TEM Characterization of Chemically Exfoliated Black Phosphorus*; A Ng, TE Sutto; U.S. Naval Research Laboratory; Y Deng; Purdue University; R Stroud, TH Brintlinger; U.S. Naval Research Laboratory; PD Ye; Purdue University; ND Bassim; U.S. Naval Research Laboratory

### P08.1 Microscopy of Additive Manufacturing and 3D Printing in Materials and Biology

#### SESSION CHAIR:

Daniel P Dennies, Consulting Metallurgical Engineer

#### PLATFORM SESSION

Thursday 8:30 AM • Room: C213

- 8:30 AM **829** (INVITED) *Microstructure Development in Powder Bed Additive Manufacturing*; JR Porter, M Velez, B Hayes; UES, Inc.; T Hall, H McCrabb; Faraday Technology, Inc.
- 9:00 AM **830** *Microstructural Differences as a Function of Specimen Position on Tube Parts Additively Manufactured Nickel Based Super Alloy*; Y Idell, C Campbell, L Levine; National Institute of Standards and Technology
- 9:30 AM **831** *Understanding the Thermal Annealing Behaviour of Metal Laser Sintered SUS316L Stainless Steel*; JJ Lim, F Harda, LR Malheiros, MG Burke; The University of Manchester, United Kingdom
- 9:45 AM **832** *Nanoscale Spatio-Temporal Resolution In Situ TEM and Numerical Modeling of Rapid Solidification Microstructure Evolution in Al Alloys After Laser Melting*; JM Wieszorek, C Liu, K Zweigacker; University of Pittsburgh; JT McKeown; Lawrence Livermore National Laboratory; T La Grange; École Polytechnique Fédérale de Lausanne, Switzerland; BW Reed; Integrated Dynamic Electron Solutions, Inc.; GH Campbell; Lawrence Livermore National Laboratory

Thursday, July 28

## P10.4 Microscopy and Characterization of Ceramics, Polymers and Composites

### SESSION CHAIRS:

R Parrington, Engineering Systems, Inc.

Richard Chinn, National Energy Technology Laboratory

### PLATFORM SESSION

Thursday 8:30 AM • Room: C214

- 8:30 AM **833** (INVITED) *Identifying ESC Failures Using Fractography*; DB Edwards; Engineering Systems, Inc.
- 9:00 AM **834** *Knit Line Failure of a Glass-Filled Polysulfone Pipe Fitting and Fractographic Comparison to Laboratory-Produced Fractures*; RJ Parrington; Engineering Systems, Inc.
- 9:15 AM **835** *Quantification of Thermal Aging in Cable Insulation Using Contact Resonances of a U-Shaped Atomic Force Microscope Probe*; E Rezaei; University of Nebraska-Lincoln; P Ramuhalli, SW Glass, LS Fifield; Pacific Northwest National Laboratory; JA Turner; University of Nebraska-Lincoln
- 9:30 AM **836** *Microscopic Characterization of Fracture Mechanisms in Polystyrene Grafted Nanoparticle Assemblies: The Role of Film Thickness and Grafting Density*; M-S Hsiao, Y Jiao, RA Vaia, LF Drummy; U.S. Air Force Research Laboratory, WPAFB
- 9:45 AM **837** *Time-Lapse Observation of the Deformation of Polyethylene Lamellae by AFM*; RC Savage; Exxonmobil Chemical Company; JK Hobbs; University of Sheffield, United Kingdom

A

## ADVANCES IN INSTRUMENTATION

### POSTER SESSIONS—THURSDAY MORNING

## A02.P1 TEM Phase Plate Imaging in Biological and Materials Science

### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

#### POSTER # 317

10:00 AM **838** (INVITED) **M&M 2016 STUDENT AWARDEE** *Structural Characterization of Mutant Huntingtin Inclusion Bodies by Cryo-Electron Tomography*; FJ Bäuerlein, I Saha, A Mishra, M Hipp, R Klein, UF Hartl, W Baumeister, R Fernández-Busnadiego; Max Planck Institute of Biochemistry, Germany; et al.

#### POSTER # 318

10:00 AM **839** *Single Particle Analysis with the Volta Phase Plate*; R Danev, M Khoshouei, W Baumeister; Max Planck Institute of Biochemistry, Germany

## A07.P1 Surface and Subsurface Microscopy and Analysis

### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

#### POSTER # 319

10:00 AM **840** *Utilizing Scanning Probe Microscopy to Investigate Preferential Conductive Paths Through Polycrystalline BaTiO<sub>3</sub> Dielectric Layer of MLCCs*; T Ayvazian, G Bersuker, MJ Brodie, ZR Lingley, BJ Foran; The Aerospace Corporation

#### POSTER # 320

10:00 AM **841** *Scanning Electron Microscopy Study of the Activation of Porous Stainless Steel for Pd Electroless Plating*; MJ Myers; University of Zimbabwe

#### POSTER # 321

10:00 AM **842** *Analysis of Thin Phase-Shifter Films Using Surface Analysis Techniques*; VS Smentkowski, L Le Tarte, H Piao; GE Global Research Center; M Marko; Wadsworth Center

# Scientific Program

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## ADVANCES IN INSTRUMENTATION POSTER SESSIONS—

THURSDAY MORNING *continued*

### A08.P1 Quantitative and Qualitative Microanalysis by EPMA and SEM

#### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

##### POSTER # 316

10:00 AM **843** *The Investigation of Chemical Shift of Silicon X-Ray Energy in Different Stoichiometry or Structure with Microcalorimeter EDS*; L Lai; Semiconductor Manufacturing International Corporation, Shanghai, China; R Cantor, M Carpenter; STAR Cryoelectronics; H Naito; HKN, Inc.

##### POSTER # 323

10:00 AM **844** *Oxidation State Determination from Chemical Shift Measurements Using a Cryogen-Free Microcalorimeter X-Ray Spectrometer on a SEM*; R Cantor; STAR Cryoelectronics; MP Croce, GJ Havrilla; Los Alamos National Laboratory; M Carpenter; STAR Cryoelectronics; K McIntosh; Los Alamos National Laboratory; A Hall; STAR Cryoelectronics; SA Kozimor; Los Alamos National Laboratory, H Naito; HKN, Inc.; et al.

##### POSTER # 324

10:00 AM **845** *Standardless Quantification at Trace Elemental (PPM) Levels Using a Novel Attachment within an Electron Microscope and Microprobe*; S Lau, W Yun, SJ Lewis; Sigray, Inc.

##### POSTER # 325

10:00 AM **846** *Combined EDX and Micro XRF Analysis on SEMs*; R Terborg, B Hansen, S Böhm; Bruker, Germany

##### POSTER # 326

10:00 AM **847** *Low Voltage X-Ray Mapping: The Complementary Methods of the Oxford Instruments X-Max Extreme Windowless EDS Detector and the JEOL Soft X-Ray Emission Spectroscopy (SXES)*; G McMahon, G Burke; University of Manchester, United Kingdom; S Burgess; Oxford Instruments Nanoanalysis, United Kingdom; M Takakura, H Takahashi; JEOL, Ltd., Japan

##### POSTER # 327

10:00 AM **848** *Pushing the XEDS Boundaries in Materials Research: Low Voltage XED Spectrum Imaging in the FEG-SEM*; A Janssen, MG Burke; University of Manchester, United Kingdom; S Burgess; Oxford Instruments Nanoanalysis, United Kingdom

##### POSTER # 328

10:00 AM **849** *Comparing the Intensities and Spectral Resolution Achieved by Wavelength-Dispersive Spectrometers on Microprobes and SEMs*; SM Seddio; Thermo Fisher Scientific; JJ Donovan; University of Oregon

##### POSTER # 329

10:00 AM **850** *SEM/EDS-Assisted LAM-ICPMS Analyses of Tourmaline of Tourmalinites Hosted in Serpentinites of the Paso Del Dragón Complex, Northeastern Uruguay*; GM Garda, S Andrade; São Paulo University, Brazil; E Peel-Canabal; The University of the Republic, Uruguay

##### POSTER # 330

10:00 AM **851** *Development of a Reference Material for Image Sharpness Evaluation in Scanning Electron Microscopy*; K Kumagai, A Kurokawa; National Institute of Advanced Industrial Science and Technology, Japan

##### POSTER # 331

10:00 AM **852** *Introducing a New NIST Reference Material: Multiwall Carbon Nanotube Soot*; AN Chiamonti, RM White, J Holm, E Mansfield; National Institute of Standards and Technology

##### POSTER # 332

10:00 AM **853** *Electrospun CeO<sub>2</sub>-ZnO Nanofibers Analyzed by Electron Probe Microanalyzer*; CH Young, JG Moch, SS Johnson, Z Luo; Fayetteville State University

##### POSTER # 333

10:00 AM **854** *Drainage Integration of the Salt and Verde Rivers in Arizona: Initial Insight from an Electron Microprobe Investigation of Basalts*; A Wittmann, R Dorn; Arizona State University

##### POSTER # 334

10:00 AM **855** *Use of a Laser Engraver in Relocations and Sample Preparation for SEM and Light Microscope Analysis*; AP Lindstrom, NW Ritchie, MJ Mengason; National Institute of Standards and Technology

##### POSTER # 335

10:00 AM **856** *A SXES and CL Spectral Library for the Analysis of Rare Earth Elements*; CM MacRae, NC Wilson, A Torpy; CSIRO, Australia; H Takahashi, M Takaura, T Murano; JEOL, Ltd., Japan; C Lenz; CSIRO, Australia

##### POSTER # 335.1

9:45 AM **482** *Spectral Deconvolution and Quantification in EDS Using Low Energy X-Ray Lines from Steel Spectra*; R Terborg; Bruker, Germany; T Salge; Natural History Museum, United Kingdom; PT Pinard, S Richter; RWTH Aachen University, Germany

### A10.P1 Advances in Image Processing, Display and Analysis

#### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

##### POSTER # 336

10:00 AM **857** *Noise Removal by Crystallographic Averaging and Information Content of an Image with Respect to Detections of Plane Symmetries*; P Moeck, A Dempsey, JC Straton; Portland State University



**POSTER # 337**

10:00 AM **858** *Landyne—A Software Suite for Electron Diffraction Simulation and Analysis*; X-Z Li; University of Nebraska-Lincoln

**POSTER # 338**

10:00 AM **859** *MIPAR™: 2D and 3D Image Analysis Software Designed for Materials Scientists, by Materials Scientists*; JM Sosa, DE Huber, BA Welk, HL Fraser; The Ohio State University

**POSTER # 339**

10:00 AM **860** *Silver Nanowire Diameter and Yield Characterization by High-Throughput SEM and Image Analysis*; CS Todd, WA Heeschen, PY Eastman, EC Keene; The Dow Chemical Company

**POSTER # 340**

10:00 AM **861** *Image Processing and Analysis for Characterization of Patterns in Polystyrene Foam*; WA Heeschen, VA Woodcraft; The Dow Chemical Company

**POSTER # 341**

10:00 AM **862** *An Evaluation of Image Quality Metrics for Scanning Electron Microscopy*; M Zotta, Y Han; Nanojehm, Inc.; M Bergkoetter; University of Rochester; E Lifshin; SUNY Polytechnic Institute

## **A12.P1** Research and Applications in Atom Probe Tomography

**POSTER SESSION**

Thursday 10:00 AM • Room: Exhibit Hall

**POSTER # 342**

10:00 AM **863** *Collected Data Set Size Considerations for Atom Probe Cluster Analysis*; MJ Swenson; Boise State University; JP Wharry; Purdue University

**POSTER # 343**

10:00 AM **864** **M&M 2016 STUDENT AWARDEE** *Comparing Plasma-FIB and Ga-FIB Preparation of Atom Probe Tomography Samples*; KB Fisher, EA Marquis; University of Michigan

**POSTER # 344**

10:00 AM **865** *Preparation and Characterization of Eu-Doped Diamond Samples by Atom Probe Tomography*; C Barroo, AP Magyar, AJ Akey, DC Bell; Harvard University

**POSTER # 345**

10:00 AM **866** *Application of Atom Probe on Fully Depleted Silicon-On-Insulator (FDSOI) Structures*; D Flatoff, B Fu, AK Kambham; GlobalFoundries, Inc.

**POSTER # 346**

10:00 AM **867** *Modeling Degradation of Metallic Surfaces by First Principles Calculations: A Case Study for Al, Au, Ag, and Pd*; T Carrasco; Universidad Andrés Bello, Chile; J Peralta; Universidad Andrés Bello, Chile; SR Broderick; University at Buffalo

**POSTER # 347**

10:00 AM **868** *Extracting Chemistry – Property Relationships by Mining Atom Probe Evaporation Events*; S Broderick, K Rajan; University at Buffalo

**POSTER # 348**

10:00 AM **869** *Atom-Probe Tomography: Detection Efficiency and Resolution of Nanometer-Scale Precipitates in a Ti-5553 Alloy*; D Isheim, JA Coakley; Northwestern University; A Radecka, D Dye; Imperial College London, United Kingdom; TJ Prosa, Y Chen; CAMECA Instruments, Inc.; PA Bagot; University of Oxford, United Kingdom, DN Seidman; Northwestern University

**POSTER # 349**

10:00 AM **870** *Direct In Situ Observation of Tempering-Induced Austenite Decomposition and Atom Probe Analyses of k-Carbide Precipitates in Lightweight Fe-Mn-Al-C Steels*; J-B Seol, H-S Park, C-G Park; Pohang University of Science and Technology, Republic of Korea

## **A13.P2** In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

**POSTER SESSION**

Thursday 10:00 AM • Room: Exhibit Hall

**POSTER # 350**

10:00 AM **871** *Inverse Problem Solution for Quantitative Investigations of Nanocrystals Formation and Growth*; AV Ievlev, S Jesse, V Iberi; Oak Ridge National Laboratory; T Cochell; University of Kentucky; R Unocic, O Ovchinnikova, S Kalinin; Oak Ridge National Laboratory

**POSTER # 351**

10:00 AM **872** *In Situ Analytical TEM of Asphaltene Formation and Aggregation from Crude Oil*; A Janssen; The University of Manchester, United Kingdom; NJ Zaluzec; Argonne National Laboratory; MA Kulzick; BP Research Centre; T Crosher, G Burke; The University of Manchester, United Kingdom

**POSTER # 352**

10:00 AM **873** *Transmission Electron Microscopy Studies of Calcium Phosphate Biomineralization*; K He, E Firlar, A Nie, C Sukotjo, R Shahbazian-Yassar, T Shokuhfar; University of Illinois, Chicago

**POSTER # 353**

10:00 AM **874** *Elucidation of Structure and Chemistry of Iron Core in Human Heart Ferritin via Graphene Liquid Cell*; S Narayanan, E Firlar, RS Yassar, T Shokuhfar; University of Illinois, Chicago

**POSTER # 354**

10:00 AM **875** *Depth Dependence of the Spatial Resolution in Scanning Transmission Electron Microscopy Experiments*; A Verch, N de Jonge; Leibniz Institute of New Materials, Germany

# Scientific Program

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## ADVANCES IN INSTRUMENTATION

### POSTER SESSIONS—

THURSDAY MORNING *continued*

#### POSTER # 355

10:00 AM **876** *Fractal Growth of Platinum Electrodeposits Revealed by In Situ Electron Microscopy*; L Wang, J Wen, H Sheng, DJ Miller; Argonne National Laboratory

#### POSTER # 356

10:00 AM **877** *Spatially Resolved Electron Energy Loss Spectroscopy Studies in Graphene Liquid Cell for the Investigation of the Biomineralization Processes in Human Body*; E Firlar, K He, R Shahbazian Yassar, T Shokuhfar; University of Illinois, Chicago

#### POSTER # 357

10:00 AM **878** *Real Time Observation of Gold Nanoparticle Aggregation Dynamics on a 2D Membrane*; X Tian; National University of Singapore; H Zheng; Lawrence Berkeley National Laboratory; PT Matsudaira, U Mirsaidov; National University of Singapore

#### POSTER # 358

10:00 AM **879** *Liquid In Situ Transmission Electron Tomography Using Hitachi HILEM IL1000 Ionic Liquid*; JP Kilcrease, E Voelkl; Hitachi High Technologies America, Inc.

#### POSTER # 359

10:00 AM **880** *The Mechanisms for Preferential Attachment of Nanoparticles in Liquid Determined Using Liquid Cell Electron Microscopy, Machine Learning, and Molecular Dynamics*; TJ Woehl; National Institute of Standards and Technology; DA Welch; University of California, Davis; C Park; Florida State University; R Faller; University of California, Davis; JE Evans, ND Browning; Pacific Northwest National Laboratory

#### POSTER # 360

10:00 AM **881** *In Situ, Real-Time Environmental SEM Imaging System Development for Water Splitting Reaction Using a Dynamic Light Illumination System*; T Daio; Osaka University, Japan; I Narita; Osaka Kyoiku University, Japan; T Gondo; Mel-Build, Japan; K Sugauma; Osaka University, Japan

#### POSTER # 361

10:00 AM **882** *In Situ Cooling and Heating Study of VO<sub>2</sub> Phase Transition*; H Asayesh-Ardakani; Michigan Technological University; A Nie; University of Illinois, Chicago; W Yao; Michigan Technological University; R Klie; University of Illinois, Chicago; S Banerjee; Texas A&M University; R Shahbazian-Yassar; University of Illinois, Chicago

#### POSTER # 362

10:00 AM **883** *In Situ Electrical Testing of Device-Relevant Nanocontacts in the Transmission Electron Microscope*; DH Alsem, S Sood, NJ Salmon; Hummingbird Scientific; TD Jacobs; University of Pittsburgh

#### POSTER # 363

10:00 AM **884** *Thermal Stability Study of Classically Immiscible Rh-Ag Alloy Nanoparticles by In Situ TEM*; CS Bonifacio; University of Pittsburgh; P Kunal, H Wan, SM Humphrey; University of Texas, Austin; JC Yang; University of Pittsburgh

#### POSTER # 364

10:00 AM **885** *In Situ TEM Heating Experiments on PVP-Capped Silver Nano-Cubes*; S Vijayan, S Thota, J Zhao, M Aindow; University of Connecticut

#### POSTER # 365

10:00 AM **886** *In Situ Investigation of Phase Transformation of Anatase into Rutile*; D Li; Pacific Northwest National Laboratory

#### POSTER # 366

10:00 AM **887** *Kinetics of Sodium and Selenium Reactions in Sodium Ion Batteries*; Q Li; Northwestern University; H Liu; Northwestern University, China; Z Yao, J Wu, C Wolverton, VP Dravid; Northwestern University

#### POSTER # 367

10:00 AM **888** *Aluminum Nanoparticles as Fiducials for Nanoscale Temperature Measurements*; M Mecklenburg; University of Southern California; B Zutter, BC Regan; University of California, Los Angeles

#### POSTER # 368

10:00 AM **889** *In Situ Study of Domain Walls Propagation and Pinning in Modulated Magnetic Nanowires*; S Lopatin, Y Ivanov, J Kosel; King Abdullah University of Science & Technology, Saudi Arabia; A Chuvilin; CIC nanoGUNE, Spain

#### POSTER # 369

10:00 AM **890** *Electrical Probing of Silver Nanowires In Situ Transmission Electron Microscopy*; D Alducin, JE Sanchez, M Jose-Yacamán, A Ponce; University of Texas, San Antonio

#### POSTER # 370

10:00 AM **891** *Understanding the Effect of Additives in Li-Sulfur Batteries by Operando ec-(S)TEM*; BL Mehdi, R Cao; Pacific Northwest National Laboratory; C Park; Florida State University; WA Henderson, W Xu, J Zhang, KT Mueller, ND Browning; Pacific Northwest National Laboratory

#### POSTER # 371

10:00 AM **892** *A Xe<sup>+</sup> Plasma FIB Milling and Lift-out Approach for Site-Specific Preparation of Large Volume Blocks for 3D-EBSD*; B Winiarski, TL Burnett, PJ Withers; The University of Manchester, United Kingdom

#### POSTER # 372

10:00 AM **893** *Nucleation and Crystal Growth of Zn<sub>0.3</sub>In<sub>1.4</sub>Sn<sub>0.3</sub>O<sub>3</sub> (ZITO-30) Thin Films Studied by In Situ TEM*; R Li, MM Moghadam, DB Buchholz, PW Voorhees, VP Dravid; Northwestern University

**POSTER # 373**

10:00 AM **894** *Nano-Manipulation of Ag/ZnO Nanoantennas for In Situ TEM Electrical Measurements*; JE Sanchez, M Jose Yacaman, A Ponce, U Santiago, D Alducin, JE Ortega; The University of Texas, San Antonio

**POSTER # 374**

10:00 AM **895** *In Situ TEM Investigation on Thermal Stability and Oxygen Release Behavior of Charged and Discharged LiCoO<sub>2</sub>*; S Sharifi-Asl; University of Illinois, Chicago; Y Yuan, H Asayesh-Ardakani; Michigan Technological University; A Nie, R Klie, R Shahbazian-Yassar; University of Illinois, Chicago

## A16.P1 New Frontiers in Monochromated EELS

**POSTER SESSION**

Thursday 10:00 AM • Room: Exhibit Hall

**POSTER # 375**

10:00 AM **896 M&M 2016 STUDENT AWARDEE** *Optimized Damage-Reduction 60 keV Monochromated Electron Energy-Loss Spectroscopy Measurements of Optical Properties at the Donor/Acceptor Interface in Organic Photovoltaic Devices*; JA Alexander, FJ Scheltens; The Ohio State University; LF Drummy, MF Durstock; U.S. Air Force Research Laboratory, WPAFB; JB Gilchrist, SE Heutz; Imperial College London, United Kingdom; DW McComb; The Ohio State University

**POSTER # 376**

10:00 AM **897** *Exploring Vibrational and Electronic Structure of Carbon Nitride Powders Using Monochromated Electron Energy-Loss Spectroscopy*; DM Haiber, T Aoki, PA Crozier; Arizona State University

**POSTER # 377**

10:00 AM **898** *STEM-EELS Study of Plasmonic Modes in Ag Nanotriangles: Size and Dielectric Dependence*; R Sachan; Oak Ridge National Laboratory; MA Roldan; King Abdullah University of Science & Technology, Saudi Arabia; D Jin; Massachusetts Institute of Technology; WJ Weber; University of Tennessee; NX Fang; Massachusetts Institute of Technology

**POSTER # 378**

10:00 AM **899** *Tuning the Resonance Frequency of Surface Plasmons Localized in Au-Ag Bimetallic Hollow Nanorods In Situ in a Transmission Electron Microscope*; S Yazdi, DF Swearer; Rice University; JR Daniel, D Boudreau; Laval University, Canada; E Ringe; Rice University

**POSTER # 379**

10:00 AM **900** *Investigating the Spatial Resolution of Vibrational Electron Energy Loss Spectroscopy*; K Venkatraman, Q Liu, T Aoki, P Rez, P Crozier; Arizona State University

**P****PHYSICAL SCIENCES POSTER SESSIONS—THURSDAY MORNING**

## P03.P1 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design

**POSTER SESSION**

Thursday 10:00 AM • Room: Exhibit Hall

**POSTER # 380**

10:00 AM **901** *Reducing Electron Dose and Sample Damage with Bayesian Machine Learning and Self-Organizing Neural Networks*; K Hujsak, BD Myers, E Roth, Y Li, VP Dravid; Northwestern University

**POSTER # 381**

10:00 AM **902 MSA POST-DOCTORAL AWARDEE** *New Insights into Deformation of Metallic Glasses by Combining Mesoscale Simulation and Fluctuation Electron Microscopy*; P Zhao, S Im, J Hwang, Y Wang; The Ohio State University

**POSTER # 382**

10:00 AM **903** *BIM-Sim: Interactive Simulation of Broadband Imaging Using Mie Theory*; S Berisha; University of Houston; TV Dijk; Maxima Medical Centre, Netherlands; R Bhargava, PS Carney; University of Illinois Urbana-Champaign; D Mayerich; University of Houston

**POSTER # 383**

10:00 AM **904** *The Power of Electron Diffraction Phase Analysis and Pattern Simulations Using the ICDD® Powder Diffraction File™ (PDF-4+)*; AM Gindhart, T Blanton, J Blanton, S Gates-Rector; International Centre for Diffraction Data

**POSTER # 384**

10:00 AM **905** *Single-Slice Nanoworlds Online*; P Fraundorf, DC Osborn, S Wedekind, T Savage; University of Missouri Saint Louis

**POSTER # 385**

10:00 AM **906** *Electrical and Structural Properties of In and In + C Doped Ge*; F Kremer, R Feng; The Australian National University; DJ Sprouster; Brookhaven National Laboratory; S Mirzaei; The Australian National University; S Decoster; Instituut Voor Kern-En Stralingsfysica, Belgium; CJ Glover; Australian Synchrotron, Australia; SA Medling, MC Ridgway; The Australian National University; et al.

**POSTER # 386**

10:00 AM **907 M&M 2016 STUDENT AWARDEE** *Library-Based Sparse Interpolation and Super-Resolution of S/TEM Images of Biological and Material Nano-Structures*; S Sreehari; Purdue University; SV Venkatakrishnan; Lawrence Berkeley National Laboratory; JP Simmons, LF Drummy; U.S. Air Force Research Laboratory, WPAFB; CA Bouman; Purdue University

# Scientific Program

Thursday, July 28

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## PHYSICAL SCIENCES POSTER SESSIONS—THURSDAY MORNING *continued*

### POSTER # 387

10:00 AM **908** (INVITED) *Quantifying Ordering Phenomena Through High-Resolution Electron Microscopy, Spectroscopy, and Simulation*; BD Esser, TM Smith; The Ohio State University; AJ Hauser; The University of Alabama; RE Williams, F Yang, MJ Mills, DW McComb; The Ohio State University

### POSTER # 388

10:00 AM **909** *Considerations and Challenges with Characterizing Si/SiGe Interfaces*; O Dyck, D Leonard, J Poplawsky; Oak Ridge National Laboratory; E Pritchett, AA Kiselev, CA Jackson, LF Edge; Hughes Research Laboratory

### POSTER # 389

10:00 AM **910** *Phase Determination from Atomically Resolved Images: Physics-Constrained Deep Data Analysis Through an Unmixing Approach*; RK Vasudevan, M Ziatdinov, S Jesse, SV Kalinin; Oak Ridge National Laboratory

### POSTER # 390

10:00 AM **911** *Structural Properties of SrTiO<sub>3</sub>/GaAs Hetero-Interfaces*; L Hong; University of Illinois, Chicago; R Droopad; Texas State University; S Ogut, RF Klie; University of Illinois, Chicago

### POSTER # 391

10:00 AM **912** **M&M 2016 STUDENT AWARDEE** *Thickness and Stacking Sequence Determination of Exfoliated Dichalcogenides Using Scanning Transmission Electron Microscopy*; P Liu, R Hovden; Cornell University; AW Tsen; Columbia University; P Kim; Harvard University; AH Pasupathy; Columbia University; LF Kourkoutis; Cornell University

### POSTER # 392

10:00 AM **913** *Quantitative Phase Imaging of Ba<sub>2</sub>NaNb<sub>5</sub>O<sub>15</sub>*; E Yücelen, I Lazić, E Bosch; FEI Company, Netherlands

## P04.P1 Nuclear and Irradiated Materials

### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

### POSTER # 393

10:00 AM **914** *Defects Generation and Surface Evolution of ZnO Nanobelts/Nanowires Under High-Energy Electron Beam Irradiation*; Y Ding, ZL Wang; Georgia Institute of Technology

### POSTER # 394

10:00 AM **915** *Electron Beam-Irradiation-Induced Annealing of Nanoscale Defects Created by Heavy Ion Beam Bombardment of Indium Phosphide*; AS Khalil; Tabbin Institute for Metallurgical Studies, Egypt

### POSTER # 395

10:00 AM **916** *Fission Product Distribution in Irradiated TRISO Fuel*; KE Wright, IJ van Rooyen; Idaho National Laboratory

### POSTER # 396

10:00 AM **917** *Irradiation Induced Defects in YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7-d</sub> Coated Conductors*; H Sheng, J Wen, L Wang, DJ Miller; Argonne National Laboratory

### POSTER # 397

10:00 AM **918** *Electron Probe Microanalysis of a High-Burnup (Th,Pu)O<sub>2</sub> Fuel Section*; P Pöml, S Brémier, J Himbert; European Commission, Germany

### POSTER # 398

10:00 AM **919** *Multi-Scale Characterization of Oxidized Zirconium Alloys*; Y Dong; University of Michigan; AT Motta; Pennsylvania State University; EA Marquis; University of Michigan

### POSTER # 399

10:00 AM **920** *Beam Induced Artifacts During In Situ Transmission Electron Microscopy Deformation of Nanocrystalline and Ultrafine-Grained Metals*; R Sarkar; Arizona State University; C Rentenberger; University of Vienna, Austria; J Rajagopalan; Arizona State University

### POSTER # 400

10:00 AM **921** *Grain Boundary Precipitation in Ni Based Superalloy 690 Investigated via Site-Specific Atom Probe Microscopy*; B Gwalani, T Alam; University of North Texas, Denton; M Kaufman; Colorado School of Mines; R Banerjee; University of North Texas, Denton

## P05.P2 Microscopy for Metal, Semiconductor and Insulator Thin Films

### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

### POSTER # 401

10:00 AM **922** *The Influence of Beam Convergence Angle on Channeling Effect during STEM/EDS Quantification of SiGe Concentration*; B Fu, M Gribelyuk, R Scott, E Chen, J Riendeau; GlobalFoundries, Inc.

### POSTER # 402

10:00 AM **923** *The Growth of Catalyst-Free NiO Nanowires*; W Zhu; Binghamton University; JP Winterstein, R Sharma; National Institute of Standards and Technology; G Zhou; Binghamton University

### POSTER # 403

10:00 AM **924** *Utilization of Scanning Electron Microscopy to Optimize Electroless Deposition of Pd Thin Film on Porous Stainless Steel*; BS Mpofo; University of Zimbabwe; WE Goosen; Nelson Mandela Metropolitan University, South Africa; J Kurehwatira, MJ Myers, K Munjeri, T Gutu; University of Zimbabwe



## POSTER # 404

10:00 AM **925** *Advanced TEM Characterization of New Electrical Contacts for High Efficiency c-Si Solar Cell*; Q Jeangros; École Polytechnique Fédérale de Lausanne, Switzerland; J Geissbühler; Swiss Center for Electronics and Microtechnology, Switzerland; J Bullock, A Javey; University of California, Berkeley; S De Wolf, A Hessler-Wyser, C Ballif; École Polytechnique Fédérale de Lausanne, Switzerland

## POSTER # 405

10:00 AM **926** *Atomic-Scale Characterization of the Oxygen Vacancy Ordering in  $La_{0.5}Sr_{0.5}CoO_3$  Thin Film Grown on  $SrTiO_3$  Using In Situ Cooling Experiments*; X Rui; University of Illinois, Chicago; J Walter, C Leighton; University of Minnesota; RF Klie; University of Illinois, Chicago

## POSTER # 406

10:00 AM **927** *Dewetting Transitions of Au/Ni Bilayer Films*; X Cen, AM Thron, X Zhang, K van Benthem; University of California, Davis

## POSTER # 407

10:00 AM **928** *Cadmium Sulfide (CdS) Preparation by High-Energy Ball Milling*; I Estrada-Guel, CD Gómez-Esparza; Centro de Investigación en Materiales Avanzados, S.C., Mexico; L González-Rodenas; Universidad Autónoma de Chihuahua, Mexico; R Martínez-Sánchez; Centro de Investigación en Materiales Avanzados, S.C., Mexico

## POSTER # 408

10:00 AM **929** *Morphological Modulation of Acoustic Phonons Imaged with Ultrafast Electron Microscopy*; D Cremons, D Plemmons, D Flannigan; University of Minnesota

## POSTER # 409

10:00 AM **930** *Observation of MEL Stacking Faults in Two-Dimensional MFI Zeolite Nanosheets*; P Kumar, H Zhang, N Rangnekar, M Tsapatsis, A Mkhoyan; University of Minnesota

## POSTER # 410

10:00 AM **931** *Thickness Analysis of  $TiO_2$  Thin Films on Quartz by Optical Spectroscopy*; SP Fowler, R Catabay, J Jiao; Portland State University

## POSTER # 411

10:00 AM **932** *Low-Dose Microscopy and Beam Damage Study of Infiltrated Zeolite Y*; P Moradifar, Y Liu, HY Cheng, J Badding, N Alem; Pennsylvania State University

## POSTER # 412

10:00 AM **933** *Study on Chemical Vapor Deposition Growth and Transmission Electron Microscopy  $MoS_2/h$ -BN Heterostructure*; F Zhang, M Abu Alsaud, M Hainey, K Wang, JM Redwing, N Alem; Pennsylvania State University

## POSTER # 413

10:00 AM **934** *Aloof Beam Plasmons in Silver Nanoparticles*; BT Zutter; University of California, Los Angeles; M Mecklenburg; University of Southern California; BC Regan; University of California, Los Angeles

## POSTER # 414

10:00 AM **935** *Microscopy of the Deformation of Tantalum*; MT Janish; University of Connecticut; WM Mook; Sandia National Laboratories; SJ Vachhani, EK Cerreta; Los Alamos National Laboratory; CB Carter; University of Connecticut

## POSTER # 415

10:00 AM **936** *Electron Microscopy Investigations of Doped ZnS Nanostructures*; CV Solomon; Youngstown State University; J-I Hong; Daegu Gyeongbuk Institute of Science & Technology, Republic of Korea

## POSTER # 416

10:00 AM **937** *Ex Situ TEM: Gaining Fundamental Insights into the Reduction-Oxidation-Reduction (ROR) Process in Small, Bimetallic Particles*; CE Kliewer, SL Soled, S Miseo; Exxonmobil Research & Engineering

## POSTER # 417

10:00 AM **938** *Practical Use of Scanning Low Energy Electron Microscope (SLEEM)*; I Müllerová, E Mikmeková, Š Mikmeková, I Konvalina, L Frank; Institute of Scientific Instruments ASCR, Czech Republic

## POSTER # 418

10:00 AM **939** *Transmission-EBSD Using High Current Electron Beams*; M Abbasi, D-I Kim; Korea Institute of Science and Technology, Republic of Korea; H-U Guim; Korea Basic Science Institute, Republic of Korea; W-S Jung; Korea Institute of Science and Technology, Republic of Korea

## POSTER # 419

10:00 AM **940** *Work Function of  $Cu_3Ge$  Thin Film*; F Wu, N Yao; Princeton University

## POSTER # 420

10:00 AM **941** *TEM Characterization of InAs Quantum Dots with GaAsSb Spacer Layers*; A Boley, Y Kim, K-Y Ban, CB Honsberg, DJ Smith; Arizona State University

## POSTER # 421

10:00 AM **942** *Resolving Atomic Scale Chemistry and Structure at NO and Ba Passivated SiC/SiO<sub>2</sub> Interfaces*; JH Dycus, W Xu; North Carolina State University; DJ Lichtenwalner, B Hull, JW Palmour; Wolfspeed, A Cree Company; JM Lebeau; North Carolina State University

## POSTER # 422

10:00 AM **943** *ELNES Analysis of  $\gamma$ - $Al_2O_3/SrTiO_3$  and  $LaTiO_3/SrTiO_3$  Interfaces*; S Lu; Arizona State University; K Kormondy, T Ngo, E Ortman; University of Texas, Austin; T Aoki; Arizona State University; A Posadas, J Ekerdt, A Demkov; University of Texas, Austin; et al.

## POSTER # 423

10:00 AM **944** *Imaging Photoinduced Structural and Morphological Dynamics of a Single  $MoS_2$  Flake with Ultrafast Electron Microscopy*; AJ McKenna, JK Eliason, DJ Flannigan; University of Minnesota

# Scientific Program

P

## PHYSICAL SCIENCES POSTER SESSIONS—THURSDAY MORNING *continued*

### POSTER # 424

10:00 AM **945** *Liquid Cell TEM Studies of Galvanic Displacement Reactions in Aqueous Solutions*; JH Park; IBM Thomas J Watson Research Center; DA Steingart; Princeton University; L Deligianni; IBM Thomas J Watson Research Center; S Kodambaka; University of California, Los Angeles; FM Ross; IBM Thomas J Watson Research Center

### POSTER # 425

10:00 AM **946** *Suspended and Bilayer Graphene Growth at Cu Grain Boundaries on Thin Film Cu*; LF Lampert, J Jiao; Portland State University

### POSTER # 426

10:00 AM **947** *Spectroscopic Investigations of the Structure of Graphitic Carbon Nitrides for H<sub>2</sub> Storage*; D Stalla, T Lam, M Lee, P Pfeifer; University of Missouri

### POSTER # 427

10:00 AM **948** *Supersonic Nanoparticle Interaction with Suspended CVD Graphene*; JL Swett; Lockheed Martin Advanced Technology Center; DA Cullen; Oak Ridge National Laboratory; PV Bedworth; Lockheed Martin Advanced Technology Center; JA Schultz; Ionwerks, Inc.; BE Brinson; Rice University; M McCully; Ionwerks, Inc.; SE Heise; Lockheed Martin Advanced Technology Center, RH Hauge; Rice University; et al.

## P08.P1 Microscopy of Additive Manufacturing and 3D Printing in Materials and Biology

### POSTER SESSION

Thursday 10:00 AM • Room: Exhibit Hall

### POSTER # 428

10:00 AM **949** *Electron Microscopy Investigation of Binder Saturation and Microstructural Defects in Functional Parts Made by Additive Manufacturing*; M Caputo, CV Solomon; Youngstown State University; P-K Nguyen, AE Berkowitz; University of California, San Diego

### POSTER # 429

10:00 AM **950** *Crystallographic Orientation Relationships of Grain Boundary Alpha in Additively Manufactured Ti-6Al-4V*; SD Sitzman, DB Witkin, PM Adams, TD McLouth; The Aerospace Corporation

### POSTER # 430

10:00 AM **951** *Microstructural Evaluation of Magnetocaloric Ni-Co-Mn-Sn Produced by Directed Energy Deposition*; E Stevens, J Toman, K Kimes; University of Pittsburgh; V Chernenko; BC Materials, Spain; A Wojcik, W Maziarz; Polish Academy of Sciences; M Chmielus; University of Pittsburgh

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—THURSDAY AFTERNOON

### A02.2 TEM Phase Plate Imaging in Biological and Materials Science

#### SESSION CHAIR:

Radostin Danev, Max Planck Institute

#### PLATFORM SESSION

Thursday 1:30 PM • Room: C111

1:30 PM **952** (INVITED) *Structure of the Ebola Virus Nucleocapsid Core by Single Particle Cryo-Electron Microscopy*; Y Sugita; Okinawa Institute of Science and Technology Graduate University, Japan; Y Kawaoka; University of Wisconsin-Madison; T Noda; Kyoto University, Japan; M Wolf; Okinawa Institute of Science and Technology Graduate University, Japan

2:00 PM **953** (INVITED) *High-Resolution Imaging of Reconstituted Protein-DNA Complexes Using Phase Plate Electron Cryo-Microscopy*; S Sandin; Nanyang Technological University, Singapore; R Danev, JM Plitzko; Max Planck Institute of Biochemistry, Germany; ECY Dao, VK Vogirala, ASW Wong; Nanyang Technological University, Singapore

2:30 PM **954** (INVITED) *Solution Conformations of Peroxiredoxins Visualised by Volta Phase Plates*; M Radjainia; Monash University, Australia; M Khoshouei; Max Planck Institute of Biochemistry, Germany; M Belousoff; Monash University, Australia; R Danev; Max Planck Institute of Biochemistry, Germany

### A07.5 Surface and Subsurface Microscopy and Analysis

#### SESSION CHAIR:

John A. Chaney, Aerospace Corp

#### PLATFORM SESSION

Thursday 1:30 PM • Room: C216

1:30 PM **955** (INVITED) *Making Light Work: Enhancing Surface and Thin Film Analysis Through In Situ Complementary Spectroscopies*; TS Nunney, P Mack; C Deeks; C Stephens, J Treacy; Thermo Fisher Scientific, United Kingdom

2:00 PM **956** *High Speed, Large Scan Area, Distortion Free Operation of a Single-Chip Scanning Probe Microscope*; N Sarkar, G Lee, D Strathearn, M Olfat, RR Mansour; University of Waterloo, Canada

2:15 PM **957** *Innovative Applications of Raman Microscopy*; P Wang; Bruker; J Sawatzki; Bruker, Germany; TJ Tague; Bruker

2:30 PM **958** *Full Information Acquisition and Analysis of Reflection High Energy Electron Diffraction Data for Epitaxial Growth Processes*; RK Vasudevan, AG Gianfrancesco, AP Baddorf, SV Kalinin; Oak Ridge National Laboratory

2:45 PM **959** *Field Ion Microscopy and Pulsed Field Desorption Mass Spectrometry: Unique Tools for Surface and Subsurface Analysis*; C Barroo; Harvard University; T Visart de Bocarmé; Université Libre de Bruxelles, Belgium

## A10.2 Advances in Image Processing, Display and Analysis

### SESSION CHAIR:

Kevin Eliceiri, University of Wisconsin-Madison

### PLATFORM SESSION

Thursday 1:30 PM • Room: C115

- 1:30 PM **960** (INVITED) *Measuring and Visualizing Clonal Development in Live Cell and Tissue Microscopy*; AR Cohen; Drexel University
- 2:00 PM **961** *Interactive Web-Based Spatio-Statistical Image Modeling from Gigapixel Images to Improve Discovery and Traceability of Published Statistical Models*; P Bajcsy, A Vandecreme, M Brady; National Institute of Standards and Technology
- 2:15 PM **962** *Image Texture Analysis and Application to Acicular Mullite Porous Ceramic Microstructure*; CS Todd, WA Heesch; The Dow Chemical Company
- 2:30 PM **963** *Studying The Atomic Structures By Aberration-Corrected and Conventional Electron Microscopy*; Y Wang; Institute of Physics Chinese Academy of Sciences
- 2:45 PM **964** *A Precise Description of Inorganic Nanoparticles in HRTEM Micrographs*; DJ Groom, A Bovik, P Ferreira, K Yu, S Rasouli; University of Texas, Austin

## A12.4 Research and Applications in Atom Probe Tomography

### SESSION CHAIR:

Frederick Meisenkothen, National Institute of Standards and Technology

### PLATFORM SESSION

Thursday 1:30 PM • Room: C226

- 1:30 PM **965** *A Round Robin Experiment: Analysis of Solute Clustering from Atom Probe Tomography Data*; EA Marquis, V Araullo-Peters; University of Michigan; A Etienne; Université de Rouen, France; S Fedotova; National Research Centre “Kurchatov Institute”, Russian Federation; K Fujii, K Fukuya; Institute of Nuclear Safety System, Inc., Japan; E Kuleshova; National Research Centre “Kurchatov Institute”, Russian Federation, A Legrand; CEA, France; et al.
- 1:45 PM **966** *Characterizing Alnico Alloy by Correlative STEM-EDS Tomography and Atom Probe Tomography*; W Guo, S Brian; Oak Ridge National Laboratory; L Zhou, W Tang, MJ Kramer; Ames Laboratory; DA Cullen, JD Poplawsky; Oak Ridge National Laboratory
- 2:00 PM **967** *Spinodal Decomposition in Alnico Alloy*; L Zhou, W Tang; Ames Laboratory; W Guo, JD Poplawsky; Oak Ridge National Laboratory; IE Anderson, MJ Kramer; Ames Laboratory
- 2:15 PM **968** *Designing and Characterizing a Complex Concentrated Gamma/Gamma Prime ‘Superalloy’*; B Gwalani, V Soni, T Alam, R Banerjee; University of North Texas, Denton

- 2:30 PM **969** *Grain Boundary Segregation and Core/Shell Structured Nanofeatures in Oxide-Dispersion Strengthened Fe-Cr alloys*; J-B Seol; Pohang University of Science and Technology, Republic of Korea; J-H Kim; Hanbat National University, Republic of Korea

- 2:45 PM **970** *Mechanisms of Particle Coarsening and Phase Transformation in Oxide Dispersion Strengthened Steels During Friction Stir Welding*; KE Knippling; U.S. Naval Research Laboratory; BW Baker; U.S. Naval Academy; DK Schreiber; Pacific Northwest National Laboratory

## A13.7 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

### SESSION CHAIRS:

Kai He, Northwestern University

Reza Shahbazian Yassa, University of Illinois, Chicago

### PLATFORM SESSION

Thursday 1:30 PM • Room: C221

- 1:30 PM **971** (INVITED) *In Situ TEM for Rechargeable Batteries*; R Shahbazian-Yassar; University of Illinois, Chicago
- 2:00 PM **972** *Direct Visualization of Lithium Intercalation in Spinel Iron Oxide by In Situ Bright-Field Scanning Transmission Electron Microscopy*; K He, J Li, Q Meng, E Stach, Y Zhu, D Su; Brookhaven National Laboratory
- 2:15 PM **973** **MSA PTSA AWARDEE** *Atomic Resolution In Situ TEM Studies of Lithium Electrochemistry in Co<sub>3</sub>O<sub>4</sub>-Carbon Nanotube Nanocomposite*; J Wu, Q Li, Z Yao, CM Wolverton; Northwestern University; MM Thackeray; Argonne National Laboratory; VP Dravid; Northwestern University
- 2:30 PM **974** *Temperature-Controlled Fluidic-Cell Scanning Electron Microscopy*; BD Myers, Q-Y Lin, M O'Brien, CA Mirkin, VP Dravid; Northwestern University
- 2:45 PM **975** *In Situ Observation of Pt Icosahedral Nanoparticles Transformation into FCC Single Crystal*; W Gao, J Wu, H Park, J Mabon, B Wilson, H Yang, J-M Zuo; University of Illinois Urbana-Champaign

# Scientific Program

Thursday, July 28

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## ADVANCES IN INSTRUMENTATION SYMPOSIA—THURSDAY AFTERNOON *continued*

### A16.3 New Frontiers in Monochromated EELS

#### SESSION CHAIR:

Ian MacLaren, University of Glasgow

#### PLATFORM SESSION

Thursday 1:30 PM • Room: C224-25

- 1:30 PM **976** (INVITED) *Recent Applications of Sub-20meV Monochromated STEM-EELS: From Phonon to Core Losses in Real and Momentum Spaces*; QM Ramasse, FS Hage, DM Kepaptsoglou, P Abellan; SuperSTEM Laboratory, United Kingdom; HC Nerl, V Nicolosi; Trinity College Dublin, Republic of Ireland; K Winther, K Thygesen; Denmark Technical University; et al.
- 2:00 PM **977** *The Low-Loss Spectrum of Individual Carbon Nanotubes Revisited at High Energy Resolution in Real and Momentum Space*; FS Hage, QM Ramasse; SuperSTEM Laboratory, United Kingdom
- 2:15 PM **978** *Monochromated Low-Voltage EELS of Optical Resonances in Quantum Materials*; DC Bell, F von Cube; Harvard University; P Rez, T Aoki; Arizona State University
- 2:30 PM **979** *Bandgap State Mapping via Valence-Loss EELS at Grain Boundaries in Non-Stoichiometric  $Pr_xCe_{1-x}O_{2-\delta}$* ; WJ Bowman; Arizona State University; E Sediva, JL Rupp; ETH Zürich, Switzerland; PA Crozier; Arizona State University
- 2:45 PM **980** *Nanoscale Probing of Bandgap States on Oxide Particles Using Electron Energy-Loss Spectroscopy*; Q Liu; Arizona State University; K March; Université Paris-Sud, France; P Crozier; Arizona State University

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## PHYSICAL SCIENCES SYMPOSIA— THURSDAY AFTERNOON

### P03.4 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design

#### SESSION CHAIR:

Matthew Weyland, Monash University

#### PLATFORM SESSION

Thursday 1:30 PM • Room: C210

- 1:30 PM **981** (INVITED) *Big, Deep, and Smart Data from Atomically Resolved Images: Exploring the Origins of Materials Functionality*; SV Kalinin, RK Vasudevan, A Borisevich, A Belianinov, RK Archibald, C Symons, EJ Lingerfelt, BG Sumpter; Oak Ridge National Laboratory; et al.
- 2:00 PM **982** *Deep Data Mining in a Real Space: Application to Scanning Probe Microscopy Studies on a “Parent” State of a High Temperature Superconductor*; M Ziatdinov, A Maksov, A Sefat, P Maksymovich, S Kalinin; Oak Ridge National Laboratory

- 2:15 PM **983** *Automated Data Acquisition and Indexing of Electron Channeling Patterns Using the Dictionary Approach*; S Singh, M De Graef; Carnegie Mellon University
- 2:30 PM **984** *EELS Mapping with Random Scan*; S Wang, D Li; Micron Technology, Inc.
- 2:45 PM **985** *Alloying in Flexible Transition Metal Chalcogenide Nanowires*; J Lin; National Institute of Advanced Industrial Science and Technology, Japan; Y Zhang; Vanderbilt University; W Zhou; Oak Ridge National Laboratory; S Pantelides; Vanderbilt University

### P04.2 Nuclear and Irradiated Materials

#### SESSION CHAIR:

Sam Briggs, University of Wisconsin-Madison

#### PLATFORM SESSION

Thursday 1:30 PM • Room: E160AB

- 1:30 PM **986** (INVITED) **M&M 2016 STUDENT AWARDEE** *Complementary Techniques for Quantification of  $\alpha'$  Phase Precipitation in Neutron-Irradiated Fe-Cr-Al Model Alloys*; SA Briggs; University of Wisconsin-Madison; PD Edmondson, KG Field, Y Yamamoto, KC Littrell, CR Daily; Oak Ridge National Laboratory; K Sridharan; University of Wisconsin-Madison
- 2:00 PM **987** *In Situ TEM Self-Ion Irradiation and Thermal Aging of Optimized Zirlo*; B Muntifer; Northwestern University; P-A Juan; Sandia National Laboratory; R Dingreville; Sandia National Laboratories; J Qu; Tufts University; K Hattar; Sandia National Laboratories
- 2:15 PM **988** (INVITED) *In Situ TEM Investigation of Interactions Between Irradiation Defects and Crystal Defects in Austenitic Stainless Steels*; B Cui, F Wang, Q Lu; University of Nebraska-Lincoln
- 2:45 PM **989** *TEM Identification of Phases in Metallic Pu-Based Fuels*; A Aitkaliyeva, JW Madden, CA Papesch; Idaho National Laboratory

### P05.5 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### SESSION CHAIRS:

Roberto Myers, The Ohio State University

Amy Ng, U.S. Naval Research Laboratory

#### PLATFORM SESSION

Thursday 1:30 PM • Room: C114

- 1:30 PM **990** *Thin Films of SnSe<sub>2</sub> Grown by Molecular Beam Epitaxy on GaAs (111)B Substrates*; BD Tracy; Arizona State University; X Liu, JK Furdyna; University of Notre Dame; DJ Smith; Arizona State University
- 1:45 PM **991** *Observation of a Quasi-Ordered Structure in Monolayer  $W_xMo_{(1-x)}S_2$  Alloys*; A Azizi, Y Wang, Z Lin, K Wang, M Terrones, VH Crespi, N Alem; The Pennsylvania State University



2:00 PM **992 MSA POST-DOCTORAL AWARDEE** *Mapping Periodic Lattice Distortions in Exfoliated Dichalcogenides with Atomic Resolution STEM*; R Hovden; Cornell University; A Tsen; University of Waterloo; P Liu, BH Savitzky; Cornell University; Y Liu, W Lu, Y Sun; Chinese Academy of Sciences, L Kourkoutis; Cornell University; et al.

2:15 PM **993** *Nanoscale Mapping of Interfacial Electrical Transport in Graphene-MoS<sub>2</sub> Heterostructures with STEM-EBIC*; ER White; Imperial College London, United Kingdom; A Kerelsky, WA Hubbard; University of California, Los Angeles; R Dhall, SB Cronin, M Mecklenburg; University of Southern California; BC Regan; University of California, Los Angeles

2:30 PM **994 (INVITED)** *Correlative and Multiplexed Microscopy for 2D Chalcogenide Semiconductors*; VP Dravid; Northwestern University

## P08.2 Microscopy of Additive Manufacturing and 3D Printing in Materials and Biology

### SESSION CHAIR:

Manuel Garcia-Leiner, Exponent

### PLATFORM SESSION

Thursday 1:30 PM • Room: C213

1:30 PM **995 (INVITED)** *Computed X-Ray Tomography of Powder Metallurgy Product for Rapid, Quantitative Size and Shape Distribution Analysis*; DP Dennies, D Wong, J Tucker, J Forman, ND Budiansky; Exponent, Inc.

2:00 PM **996 (INVITED)** *Enhancing Part Properties in Additive Manufacturing Through Material Design and Print Process Optimization*; MA Aubart, S Jain, D Liu, A Pedicini, S Serpe; Arkema, Inc.

2:30 PM **997** *In Situ Synchrotron X-Ray Tomographic Imaging of 3D Printed Materials During Uniaxial Loading*; BM Patterson, NL Cordes, K Henderson, M Herman, JC Mertens; Los Alamos National Laboratory; X Xiao; Argonne National Laboratory; J Williams, N Chawla; Arizona State University; et al.

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—THURSDAY AFTERNOON

### A02.3 TEM Phase Plate Imaging in Biological and Materials Science

#### SESSION CHAIR:

Radostin Danev, Max Planck Institute

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C111

3:30 PM **998 (INVITED)** *Cryo-FIB Sample Preparation for Cryo-ET with the Volta Phase Plate*; M Schaffer, BD Engels, M Wehmer, S Albert, E Sakata; Max Planck Institute of Biochemistry, Germany; A Rast, J Nickelsen; Ludwig-Maximilians-Universität, München, Germany, W Baumeister; Max Planck Institute of Biochemistry, Germany; et al.

4:00 PM **999 (INVITED)** *In Situ Structure of Viral RNA by Cryo-Electron Tomography with Volta Phase Plate, Energy Filtering and Direct Electron Counting*; ZH Zhou, WH Hui, J Zhang, I Atanasov; University of California, Los Angeles; CC Celma, P Roy; London School of Hygiene & Tropical Medicine, United Kingdom

4:30 PM **1000** *Phase Contrast Subtomogram Averaging at Sub-nm Resolution*; M Khoshouei, S Pfeffer, R Danev, F Förster, W Baumeister; Max Planck Institute of Biochemistry, Germany

4:45 PM **1001** *Towards Understanding of Charging Effects of Conductive Thin-Film Based Phase Plates*; R Janzen, J Schundelmeier, S Hettler, M Dries, D Gerthsen; Karlsruhe Institute of Technology, Germany

### A07.6 Surface and Subsurface Microscopy and Analysis

#### SESSION CHAIR:

Vincent Smentkowski, General Electric

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C216

3:30 PM **1002 (INVITED)** *XPS Spectromicroscopy as an Optimized Technique for Materials Characterization*; D Surman, C Moffitt; Kratos Analytical, Inc.; J Counsell, S Coultas, A Roberts, C Blomfield; Kratos Analytical Ltd., United Kingdom

4:00 PM **1003** *Observation of Moiré-like Fringes in HAADF-STEM Images of Heterostructures of Two-Dimensional Materials*; D Reifsnnyder Hickey, KA Mkhoyan; University of Minnesota

4:15 PM **1004** *Differentiation of Surface and Bulk Conductivities via Four-Probe Spectroscopy*; SM Hus, C Durand; Oak Ridge National Laboratory; X Zhang; University of Florida; C Ma, MA McGuire; Oak Ridge National Laboratory; Y Xu, YP Chen; Purdue University, A-P Li; Oak Ridge National Laboratory; et al.

4:30 PM **1005** *Atomistic Exploration of the Surface-Sensitive Oriented Attachment Growth of  $\alpha$ -MnO<sub>2</sub> Nanowires and the formation of Defective Interface with 2×3 and 2×4 Tunnel Intergrowth*; Y Yuan; Michigan Technological University; S Wood; University of Bath, United Kingdom; K He; Shandong University, China; W Yao; Michigan Technological University; D Tompsett; University of Bath, United Kingdom; J Lu; Argonne National Laboratory; S Islam; University of Bath, United Kingdom, R Shahbazian-Yassar; University of Illinois, Chicago; et al.

4:45 PM **1006** *Correlating Substrate Properties with Pressure Sensitive Adhesive Performance*; T Powell, M Pacholski, B Griffith, D Keely; The Dow Chemical Company

# Scientific Program

A

## ADVANCES IN INSTRUMENTATION SYMPOSIA—THURSDAY AFTERNOON *continued*

### A10.3 Advances in Image Processing, Display and Analysis

#### SESSION CHAIR:

Clifford Todd, Dow Chemical

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C115

- 3:30 PM **1007** *Unambiguous Detections of the Plane Symmetries That Noisy Experimental Images from Naturally Formed 2D Periodic Arrays of Physical Objects Most Likely Possess*; P Moeck; Portland State University
- 3:45 PM **1008** *Advances in Mapping Periodic Structural Modulations of Atomic Lattices*; I El Baggari, R Hovden, DJ Baek; Cornell University; AS Admasu, J Kim, S-W Cheong; Rutgers University; LF Kourkoutis; Cornell University
- 4:00 PM **1009** *Dictionary-Based Filling of the Missing Wedge in Electron Tomography*; P Trappert; German Research Center for Artificial Intelligence GmbH, Germany; D Chen; The Institute of Nanoscapy, Netherlands; S Bogachev, T Dahmen, P Slusallek; German Research Center for Artificial Intelligence GmbH, Germany
- 4:15 PM **1010** *An "Extra Dimension" in Electron Tomography: Automatic Parameter Determination for Next-Generation Reconstruction Methods*; Y Jiang, N Andrejevic, E Padgett, DA Muller; Cornell University
- 4:30 PM **1011** *Practical Implementation of Compressive Sensing for High-Resolution STEM*; D Muecke-Herzberg, P Abellan; SuperSTEM Laboratory, United Kingdom; M Sarahan; Continuum Analytics; I Godfrey; SuperSTEM Laboratory, United Kingdom; Z Zaghi, RK Leary; University of Cambridge, United Kingdom; A Stevens; Pacific Northwest National Laboratory; J Ma; Technische Universität Berlin, Germany; et al.
- 4:45 PM **1012** **M&M 2016 STUDENT AWARDEE** *Compressive STEM-EELS*; A Stevens, L Kovarik; Pacific Northwest National Laboratory; H Yang; Lawrence Berkeley National Laboratory; Y Pu, L Carin; Duke University; N Browning; Pacific Northwest National Laboratory

### A12.5 Research and Applications in Atom Probe Tomography

#### SESSION CHAIR:

Eric Steel, National Institute of Standards and Technology

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C226

- 3:30 PM **1013** *Field Evaporation Behavior of Metal Oxide/Metal Interfaces*; M Bachhav; University of Michigan
- 3:45 PM **1014** *Using Mass Resolving Power as a Performance Metric in the Atom Probe*; F Meisenkothen; National Institute of Standards and Technology; TF Kelly, E Oltman, JH Bunton; CAMECA Instruments, Inc.; L Renaud; CAMECA SAS, France; DJ Larson; CAMECA Instruments, Inc.
- 4:00 PM **1015** *Correlative t-EBSD Tomography and Atom Probe Tomography Analysis*; KP Rice, Y Chen, TJ Prosa; CAMECA Instruments, Inc.; MM Nowell, S Wright; EDAX, Inc.
- 4:15 PM **1016** *Correlative Analysis Using FIB-ToF-SIMS and Atom Probe Tomography on Geological Materials*; WD Rickard, SM Reddy, DW Saxey, D Fourgerouse, A van Riessen; Curtin University, Australia
- 4:30 PM **1017** *The Nanolathe - a Dedicated Two-axis Positioner for Concentric Sample Rotation*; AJ Smith, K Schock, S Kleindiek; Kleindiek Nanotechnik, Germany; S Gerstl; ETH Zürich, Switzerland
- 4:45 PM **1018** *The Effect of Group 5 (V, Nb, Ta) Additions on Precipitation in Al-Sc Alloys*; KE Knippling; U.S. Naval Research Laboratory

### A13.8 In Situ Electron Microscopy and Big Data Analytics in 2D and 3D

#### SESSION CHAIR:

Kai He, Northwestern University

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C221

- 3:30 PM **1019** (INVITED) *Nanoscale Size Effects on Crystallization Kinetics of Metallic Glass Nanorods by In Situ TEM*; SW Sohn; Yale University; Y Jung; University of Central Florida; Y Xie, C Osuji, J Schroers, JJ Cha; Yale University
- 4:00 PM **1020** *In Situ Thermal Testing on Nanostructures in TEM*; H Guo, WJ Hardy, P Zhou, DN Natelson, J Lou; Rice University
- 4:15 PM **1021** *Asymmetric Temperature Profiles in Joule-Heated in Aluminum Nanowires*; BC Regan, B Zutter, WA Hubbard; University of California, Los Angeles; S Aloni; Lawrence Berkeley National Laboratory; M Mecklenburg; University of California, Los Angeles
- 4:30 PM **1022** *In Situ-by-Ex Situ: FIB-less Preparation of Bulk Samples on Heating Membranes for Atomic Resolution STEM Imaging*; W Xu, ED Grimley, JM Lebeau; North Carolina State University

Thursday, July 28

4:45 PM **1023** *A Variable-Temperature Continuous-Flow Liquid-Helium Cryostat Inside a (Scanning) Transmission Electron Microscope*; F Börrnert; Universität Ulm, Germany; A Horst; Leibniz-Institut für Festkörper- und Werkstoffforschung, Dresden, Germany; MA Krzyzowski; CryoVac GmbH & Co KG, Germany; B Büchner; Leibniz-Institut für Festkörper- und Werkstoffforschung, Dresden, Germany

## **A16.4 New Frontiers in Monochromated EELS**

### SESSION CHAIR:

Peter Crozier, Arizona State University

### PLATFORM SESSION

Thursday 3:30 PM • Room: C224-25

- 3:30 PM **1024** (INVITED) *Very High-Resolution Electron Energy Loss Spectroscopy: Application in Plasmonics*; EP Bellido, IC Bicket, J McNeil, GA Botton; McMaster University, Canada
- 4:00 PM **1025** *Accessing High Spatial Resolution Low-Loss EELS Information Without Čerenkov Radiation*; JI Deitz, TJ Grassman, DW McComb; The Ohio State University
- 4:15 PM **1026** *Advances in Momentum-Resolved Dispersion Investigations via Monochromated Electron Energy-Loss Spectroscopy*; PA van Aken; Max Planck Institute for Solid State Research, Germany
- 4:30 PM **1027** *High Performance in Low Voltage HR-STEM Applications Enabled by Fast Automatic Tuning of the Combination of a Monochromator and Probe Cs-Corrector*; S Lazar, P Tiemeijer, A Henstra, T Dennemans; FEI Company, Netherlands; J Ringnalda; FEI Company; B Freitag; FEI Company, Netherlands
- 4:45 PM **1028** *Improvement of TEM Spatial Resolution at Low Accelerating Voltages (15 - 30 kV) with Monochromator*; S Morishita, M Mukai; JEOL, Ltd., Japan; K Suenaga; National Institute of Advanced Industrial Science and Technology, Japan; H Sawada; JEOL, Ltd., United Kingdom

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## PHYSICAL SCIENCES SYMPOSIA—

THURSDAY AFTERNOON

## **P03.5 Combining Simulation, Experiment, and Data Science for Materials Characterization and Design**

### SESSION CHAIR:

Mark Oxley, Oak Ridge National Laboratory

### PLATFORM SESSION

Thursday 3:30 PM • Room: C210

- 3:30 PM **1029** (INVITED) *Multidisciplinary Approach to Nanostructure Determination*; C Dwyer; Arizona State University
- 4:00 PM **1030** *Determination of Core/Double-Shell Architecture of a Single Tetragonal Bipyramidal Nanophosphor for Intense Dual-Mode Luminescence*; JS Jeong; University of Minnesota; SY Kim; Korea Institute of Science and Technology, Republic of Korea; HS Jang; Korea Institute of Science and Technology; KA Mkhoyan; University of Minnesota
- 4:15 PM **1031** (INVITED) *Making Every Electron Count: Materials Characterization by Quantitative Analytical Scanning Transmission Electron Microscopy*; M Weyland, Z Chen, Y Zhu, NV Medhekar; Monash University, Australia; C Dwyer; Arizona State University; DJ Taplin, SD Findlay; Monash University, Australia, LJ Allen; University of Melbourne, Australia; et al.
- 4:45 PM **1032** *Atomic Resolution Composition Mapping in EDS STEM*; NR Lugg, A Kumamoto, R Ishikawa, B Feng; The University of Tokyo, Japan; G Kothleitner; Graz University of Technology, Austria; N Shibata, Y Ikuhara; The University of Tokyo, Japan

## **P04.3 Nuclear and Irradiated Materials**

### SESSION CHAIR:

Peter Hosemann, University of California, Berkeley

### PLATFORM SESSION

Thursday 3:30 PM • Room: E160AB

- 3:30 PM **1033** (INVITED) *In Situ TEM Mechanical Testing: An Emerging Approach for Characterization of Polycrystalline, Irradiated Alloys*; JP Wharry; Purdue University; KH Yano, MJ Swenson, Y Wu; Boise State University
- 4:00 PM **1034** (INVITED) *Measuring Interfacial Shear Strength of  $Cu_xNi-Nb$  Alloys*; SJ Dillon, S Mao; University of Illinois Urbana-Champaign
- 4:30 PM **1035** *Heavy Ion Irradiation-Induced Microstructural Evolution in the Next Generation Nuclear Material – Alloy 800H*; JJ Lim, MG Burke; The University of Manchester, United Kingdom
- 4:45 PM **1036** *Microstructural Evolution of High-Strain-Rate Severe Plastic Deformation Processed 316L during Kr Ion Irradiation and Elevated Temperature Exposures*; JM Wiezorek, MA Gordillo; University of Pittsburgh; MA Kirk, PM Baldo; Argonne National Laboratory

# Scientific Program

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## PHYSICAL SCIENCES SYMPOSIA—

THURSDAY AFTERNOON *continued*

### P05.6 Microscopy for Metal, Semiconductor and Insulator Thin Films

#### SESSION CHAIRS:

Demie Kepaptsoglou, SuperSTEM Laboratory

Barry Carter, University of Connecticut

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C114

- 3:30 PM **1037** *Study of Direct Lithiation of Thin Si Membranes with Spatially-Correlative Low Energy Focused Li Ion Beam and Analytical Electron Microscopy Techniques*; VP Oleshko; National Institute of Standards and Technology; KA Twedt; University of Maryland; CL Soles, JJ McClelland; National Institute of Standards and Technology
- 3:45 PM **1038** *In Situ Dislocation Imaging During Deformation in High Entropy Alloys*; Y Hu, J-M Zuo; University of Illinois Urbana-Champaign
- 4:00 PM **1039** *Nanoscale Characterization of L10-ordered FePt Granular Films for Heat-Assisted Magnetic Recording Devices*; B Ozdol, Y Zhang, J Zhu, S Myers, A Greene; Western Digital Corporation
- 4:15 PM **1040** *Modification of Grain Boundary and Interfacial Structure in Al<sub>2</sub>O<sub>3</sub> Coatings*; S Tan; University of Pittsburgh
- 4:30 PM **1041** (INVITED) *Steel Corrosion Mechanisms During Pipeline Operation: In Situ Characterization*; KL Jungjohann; Sandia National Laboratories; SC Hayden, JT O'Brien; Aramco Services Company; WM Mook, C Chisholm, AG Ilgen, DC Bufford, K Hattar; Sandia National Laboratories; et al.

### P08.3 Microscopy of Additive Manufacturing and 3D Printing in Materials and Biology

#### SESSION CHAIR:

Michael Yost, Medical University of South Carolina

#### PLATFORM SESSION

Thursday 3:30 PM • Room: C213

- 3:30 PM **1042** *Recent Advancements in 3D X-Ray Microscopes for Additive Manufacturing*; L Lavery, W Harris, H Bale, A Merkle; Carl Zeiss X-Ray Microscopy, Inc.
- 3:45 PM **1043** (INVITED) *Alginate Hydrogel for 3D Bioprinting*; Y Mei; Clemson University
- 4:15 PM **1044** *Design and Fabrication of a Three-Dimensional In Vitro Model of Vascular Stenosis*; RS Jones; University of South Carolina; PH Chang; University of Michigan; T Perahia, KA Harmon, L Junor; University of South Carolina; MJ Yost; Medical University of South Carolina; D Fan, JF Eberth; University of South Carolina; et al.
- 4:45 PM **1045** *Electron Microscopy Analysis of 17-4 PH Powder for Additive Manufacturing*; Y Sun, M Aindow, RJ Hebert; University of Connecticut

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