



Atom Probe Tomography at M&M 2019

MONDAY, August 5, 2019

Focused Interest Group: Atom Probe Field Ion Microscopy (Room C120)

12:15 PM chaired by Arun Devaraj

A04.1 Recent Development in Atom Probe Tomography (Room F151, 1:30PM-3PM)

1:30 PM **16 (Invited)** *Exploring New Science Domains with Atom Probe Tomography Enabled by an Environmental Transfer Hub*; **DE Perea**, DK Schreiber, A Devaraj, DD Reilly, SV Lambeets, EJ Kautz, TG Lach, MG Wirth, JE Evans

2:00 PM **17** *A Toolchain for the Analysis of Hydrogen in Materials at the Atomic Scale*; **PJ Felfer**

2:15 PM **18** *Comprehensive Analysis of Hydrogen, Deuterium, Tritium and Isotopic Ratios of Other Light Elements in Neutron Irradiated TPBAR Components*; **A Devaraj**, B Matthews, B Arey, EJ Kautz, G Sevigny, D Senior

2:30 PM **19 (Invited)** *Building Laboratory-on-Tip for Imaging Biological Samples with Atom Probe Tomography*; **J Fu**

P09.1 The Success of TMBA: TEM and STEM Developments in Techniques, Applications and Education (Room D137, 2:30PM)

2:30 PM **60 (Invited)** *Analytical Electron Microscopy: Rivaling/Complementing Atom Probe Tomography*; **M Burke**, JJH Lim

TUESDAY, August 6, 2019

A04.2 Recent Development in Atom Probe Tomography (Room F151, 8:30AM-10AM)

8:30 AM **165 (Invited)** *Atomistic-Simulation Based Modeling of Atom Probe Tomography*; **C Oberdorfer**, T Withrow, EA Marquis, W Windl

9:00 AM **166** *A Mesoscopic Field Evaporation Model*; C Hatzoglou, **F Vurpillot**

9:15 AM **167 (STUDENT)** (**M&M MEETING SCHOLAR AWARD**) *Fast Continuum Models for Atom Probe Simulation and Reconstruction*; **CEA Fletcher**, MP Moody, D Haley

9:30 AM **168** *Interpreting Voids in Atom Probe Tomography Data via Experiment and Theory*; **J Poplawsky**, X Wang, C Hatzoglou, W Guo, K Jin, H Bei, Y Wang, W Weber, Y Zhang, F Vurpillot, K More

9:45 AM 169 (STUDENT) *Improving Spatial Accuracy in Atom Probe Tomography through a Crystallography-Mediated Reconstruction (CMR)*; **AC Day**, AV Ceguerra, SP Ringer

A04.3 Recent Development in Atom Probe Tomography (Room F151, 10:30AM-12PM)

10:30 AM 245 (Invited) *Bridging Reciprocal and Direct Space by Using the Small-Angle Scattering Formalism for Atom Probe Tomography*; **F De Geuser**

11:00 AM 246 (STUDENT) *Multiplicity vs. Composition Study to Understand the Field Evaporation of Polar Al_xGa_{1-x}N Heterostructures: A New Approach*; B Mazumder, **OG Licata**

11:15 AM 247 *On Strong Scaling Open Source Tools for Mining Atom Probe Tomography Data*; **M Kuhbach**, P Bajaj, A Breen, EA Jagle, B Gault

11:30 AM 248 *Modularity Optimization for Fast Automated Detection of Solute Clusters in Atom Probe Tomography*; A Mukherjee, **S Broderick**, T Zhang, K Rajan



11:45 AM 249 *Improved Data Analysis with IVAS 6 and AP Suite*; **DA Reinhard**, TR Payne, EM Strennen, E Oltman, BP Geiser, GS Sobering, J Mandt

P11.3 Advances in Characterization of Geological and Extraterrestrial Samples (Room B112)



11:30 AM 316 *A Nanoscale Record of Impact-Induced Pb Mobility in Lunar Zircon*; **TB Blum**, DA Reinhard, MA Coble, MJ Spicuzza, Y Chen, AJ Cavosie, L Nasdala, C Chanmuang N, TJ Prosa, DJ Larson, JW Valley

A04.4 Recent Development in Atom Probe Tomography (Room F151, 1:30PM-2:45PM)

1:30 PM 329 (Invited) *An Atomic Renaissance for Pulsed Field Ion Microscopy*; S Katnagallu, I Mouton, F Oliveira, B Gault, D Raabe, **LT Stephenson**

2:00 PM 330 (STUDENT) (**M&M MEETING SCHOLAR AWARD**) *An Integrated Workflow to Investigate Electrocatalytic Surfaces By Correlative X-Ray Photoemission Spectroscopy, Scanning Photoemission Electron Microscopy and Atom Probe Tomography*; **K Schweinar**, O Kasian, RL Nicholls, CR Rajamathi, P Zeller, M Amati, L Gregoratti, D Raabe, M Greiner, B Gault

2:15 PM 331 *In situ HR-TEM and Simulation of Si Field Emitter Tips under Field Evaporation*; Y He, DE Perea, SX Mao, C Wang, T Withrow, **C Oberdorfer**, W Windl

2:30 PM 332 (STUDENT) *Understanding Fundamental Processes on Au-Ag Catalysts during Oxidation Reactions: A Correlative Microscopy Approach*; **L Jacobs**, C Barroo, B von Boehn, M Homann, R Imbihl, TV de Bocarme

P02.1 Microscopy and Microanalysis of Nuclear and Irradiated Materials (Room D133-134, 2:45PM)

2:45 PM 375 *Using Atom Probe Tomography as a Forensic Tool to Determine Burnup from Nuclear Fuels*; **M Bachhav**, J Gan, J Giglio, D Wachs, D Keiser

WEDNESDAY, August 7, 2019

A04.5 Recent Development in Atom Probe Tomography (Room F151, 8:30AM-10AM)

8:30 AM **612 (Invited)** *Opportunities and Challenges in APT Metrology for Semiconductor Applications*; **C Fleischmann**, R Cuduvally, R Morris, D Melkonyan, JO de Beeck, I Makhotkin, P van der Heide, W Vandervorst

9:00 AM **613 (Invited)** *Atom Probe Tomography Using a Wavelength-Tunable Femtosecond-Pulsed Coherent Extreme Ultraviolet Light Source*; **AN Chiamonti**, L Miaja-Avila, PT Blanchard, DR Diercks, BP Gorman, NA Sanford

9:30 AM **614** *Using a Plasma FIB Equipped with Xe, N₂, O₂ and Ar for Atom Probe Sample Preparation – Ion Implantation and Success Rates*; **K Eder**, V Bhatia, B Van Leer, JM Cairney

9:45 AM **615** *Direct Observation of Zirconium Alloy Oxidation at the Nanoscale*; **EJ Kautz**, S Lambeets, B Gwalani, D Perea, L Kovarik, A Devaraj

P12.1 New Frontiers in Atom Probe Tomography Applications (Room D136, 8:30AM-10AM)

8:30 AM **686 (Invited)** *Correlative UHV-Cryo Transfer Suite: Connecting Atom Probe, SEM-FIB, Transmission Electron Microscopy via an Environmentally- Controlled Glovebox*; **J Cairney**, I McCarroll, Y-S Chen, K Eder, T Sato, Z Liu, A Rosenthal, R Wepf

9:00 AM **687** *Local Electrode Atom Probe Tomography of Carbon Fibre*; **RK Marceau**, AS Taylor, T Sato, SP Ringer, BL Fox, N Stanford, LC Henderson

9:15 AM **688** *New Applications to Atom Probe Tomography: Insights on Trace Element Diffusion in Naturally Deformed Minerals*; **R Dubosq**, B Gault, A Rogowitz, K Schweinar, S Zaefferer, D Schneider



9:30 AM 689 *Three-Dimensional Microstructural Characterization of Novel Chalcogenide Nanocomposites for Gradient Refractive Index Applications*; **HG Francois-Saint-Cyr**, M Kang, I Martin, S Antonov, TJ Prosa, K Richardson



9:45 AM 690 *Correlative Analysis in the Semiconductor Industry*; **DJ Larson**, TJ Prosa, I Martin, A-S Robbes, A Merkulov, N Bernier, V Delaye, P vander Heide, O Dulac, D Reinhard, R Ulfig

P02.2 Microscopy and Microanalysis of Nuclear and Irradiated Materials (Room D133-134, 9:00AM)

9:00 AM **662** *Investigating Effects of Alloy Chemical Complexity on Helium Bubble Formation by Accurate Segregation Measurements Using Atom Probe Tomography*; **X Wang**, K Jin, D Chen, H Bei, Y Wang, WJ Weber, Y Zhang, J Poplawsky, KL More

P12.2 New Frontiers in Atom Probe Tomography Applications (Room D136, 10:30AM-12PM)

10:30 AM **783 (Invited)** *APT Tip Shape Modifications During Analysis, Its Implications, and the Potential to Measure Tip Shapes in Real Time via Soft X-Ray Ptychography*; **PA van der Heide**, I Mathotkin, W Vandervost, C Fleischmann

11:00 AM [784](#) *Hydride Growth Mechanism in Zircaloy-4: Investigation of the Partitioning of Alloying Elements*; **I Mouton**, Y Chang, S Wang, AJ Breen, A Szczepaniak, LT Stephenson, D Raabe, B Britton, B Gault

11:15 AM [785](#) *Understanding the Growth Mechanism of β -(Al_xGa_{1-x})₂O₃ by Atom Probe Tomography*; **J Sarker**, Y Zhang, M Zhu, S Rajan, J Hwang, B Mazumder

11:30 AM [786](#) *Multimodal Atomic-Scale Characterization of Structural and Compositional Changes during Shear Deformation of Materials*; **B Gwalani**, EJ Kautz, T Kaspar, L Kovarik, VV Joshi, SN Mathaudhu, A Rohatgi, P Sushko, A Devaraj

11:45 AM [787](#) (STUDENT) *Quantification of Solute Deuterium in Titanium Deuteride by Atom Probe Tomography with Both Laser Pulsing and High-Voltage Pulsing: Influence of the Global and Local Surface Electric Field*; **Y Chang**, I Mouton, L Stephenson, M Ashton, G Zhang, A Szczepaniak, D Ponge, D Raabe, B Gault

P12.3 New Frontiers in Atom Probe Tomography Applications (Room D136, 1:30PM-3PM)

1:30 PM [874 \(Invited\)](#) (STUDENT) *Application of Atom Probe Tomography to Complex Microstructures of Laser Additively Manufactured Samples*; **P Kurnsteiner**, A Hariharan, HY Jung, N Peter, MB Wilms, A Weisheit, P Barriobero-Vila, B Gault, D Raabe, EA Jagle

2:00 PM [875](#) (STUDENT) *Combined APT, TEM and SAXS Characterisation of Nanometre-Scale Precipitates in Titanium Alloys*; **FF Dear**, P Kontis, B Gault, J Ilavsky, H Gardner, PA Bagot, MP Moody, D Rugg, D Dye

2:15 PM [876](#) *Nanoscale Spatially Resolved Mapping of Uranium Enrichment in Actinide-Bearing Materials*; EJ Kautz, TG Lach, D Reilly, V Joshi, C Lavender, **A Devaraj**

2:30 PM [877](#) *Atom Probe Tomography Analyses of Solute Segregation in Self-Ion Irradiated Electron Beam Welded SA508 Grade 3 Reactor Pressure Vessel Steels*; **JO Douglas**, PAJ Bagot, MG Burke, MP Moody

2:45 PM [878](#) *Direct Observation of Hydrogen in Cold-Drawn Pearlitic Steel Wires Using Cryogenic Atom Probe Tomography*; **AJ Breen**, Y Li, LT Stephenson, B Gault, M Herbig

THURSDAY, August 8, 2019

P12.4 New Frontiers in Atom Probe Tomography Applications (Room D136, 8:30AM-10AM)

8:30 AM **1140 (Invited)** *Isotopic Composition and Origin of Meteoritic Nanodiamonds Studied by Atom-Probe Tomography and Complementary Techniques*; **JB Lewis**, C Floss, D Isheim, TL Daulton, DN Seidman, RC Ogliore

9:00 AM **1141** *Novel Synthesis and Multi-technique Characterisation of Au-Cu Nanoparticles*; Q Yang, M Danaie, V Broadley, DE Joyce, TL Martin, E Marceau, MP Moody, **PAJ Bagot**

9:15 AM **1142** *Atomic-Scale Observation of Hydroxyapatite Nanoparticle*; **Y-S Chen**, DS Mosiman, L Yang, TH Pham, B Hawkett, BJ Marinas, JM Cairney

9:30 AM **1143 (Invited)** *Atomic-Scale Characterisation of Catalyst Nanoparticles in Ionic Liquids by Atom Probe Tomography*; **T Li**, H Meyer, A Ludwig



Atom Probe Tomography at M&M 2019

POSTERS

TUESDAY, August 6, 2019

A04.P1 Recent Development in Atom Probe Tomography (Exhibit Hall, 3PM-5PM)

POSTER # 110

3:00 PM [436](#) *Mechanical Precision Preparation of Atom Probe Tips*; A Bachmaier, GB Rathmayr, **P Felfer**

POSTER # 111

3:00 PM [437](#) *Imaging Belgian Chocolate by Field Ion Microscopy*; L Jacobs, TV de Bocarme, **C Barroo**

POSTER # 112

3:00 PM [438](#) *Hough Transform Based Accurate Composition Extractions from Correlation Histograms in Atom Probe Tomography*; M Fathidoost, **L Stephenson**, D Raabe, B Gault, S Katnagallu

POSTER # 113

3:00 PM [439](#) (STUDENT) *Three-Dimensional Electric Field Mapping of an Electrically-biased Atom Probe Needle Using Off-axis Electron Holography*; F Zheng, V Migunov, J Caron, H Du, G Pozzi, **RE Dunin-Borkowski**



POSTER # 114

3:00 PM [440](#) *Investigation of Microstructure and Dispersoids/ Precipitates in Additively Manufactured Aluminum Alloys*; L Zhou, H Hyer, S Park, Y Sohn, **KP Rice**, Y Chen

POSTER # 115

3:00 PM [441](#) *Surface/Subsurface Interactions during Rh Oxidation Revealed by Atom Probe Tomography and Microscopy*; **SVM Lambeets**, T Visart-de-Bocarme, N Kruse, DE Perea

WEDNESDAY, August 7, 2019

A04.P2 Recent Development in Atom Probe Tomography (Exhibit Hall, 3PM-5PM)

POSTER # 297

3:00 PM [910](#) (STUDENT) *Interpreting the Simplified Multicomponent Short-Range Order Parameter*; **WJ Davids**, AV Ceguerra, SP Ringer

POSTER # 298

3:00 PM [911](#) (STUDENT) *Mass Spectrometry Inside Single Proteins by Atom Probe Tomography*; **S Qiu**, C Zheng, V Garg, J Li, RK Marceau, J Fu



POSTER # 299

3:00 PM [912](#) *Reconstruction Metrics in Atom Probe Tomography*; **BP Geiser**, **DA Reinhard**, JH Bunton, TR Payne, KP Rice, Y Chen, DJ Larson



POSTER # 300

3:00 PM [913](#) (STUDENT) *Recent Developments in APT Analysis Automation and Support for User-Defined Custom Analysis Procedures in IVAS 6*; **AC Day**, H Francois-Saint-Cyr, BP Geiser, T Payne, E Oltman, SP Ringer, DA Reinhard

POSTER # 301

3:00 PM [914](#) *New Science with Atom Probe Tomography Enabled via an Environmental Transfer Hub*; **MG Wirth**, DE Perea

P12.P1 New Frontiers in Atom Probe Tomography Applications (Exhibit Hall, 3PM-5PM)

POSTER # 448

3:00 PM [1059](#) *Atom Probe Tomography of Oxidised Grain Boundaries in Highly Irradiated SS316*; K Lindgren, A Jenssen, O Tengstrand, P Ekstrom, P Efsing, **M Thuvander**

POSTER # 449

3:00 PM [1060](#) (STUDENT) *Nanoindentation, EPMA and Atom Probe Tomography Characterisation of Oxygen-rich Layer formed on a Titanium Jet Engine Component*; **HM Gardner**, A Radecka, D Rugg, D Armstrong, M Moody, P Bagot

POSTER # 450

3:00 PM [1061](#) *Spatial Reconstruction of Atom Probe Data from Zircon*; **DW Saxey**, D Fougereuse, WDA Rickard, SM Reddy

POSTER # 451

3:00 PM [1062](#) *Deformation of Borides in Nickel-Based Superalloys: a Study of Segregation at Dislocations*; L Lilensten, S Antonov, D Raabe, S Tin, **B Gault**, P Kontis

POSTER # 452

3:00 PM [1063](#) (STUDENT) *Characterization of p-type Doping in Silicon Nanocrystals Embedded in SiO₂*; **R Demoulin**, M Roussel, S Duguay, D Muller, D Mathiot, P Pareige, E Talbot

POSTER # 453

3:00 PM [1064](#) (STUDENT) *Influence of Composition and Structure on Measured H Concentration in beta Ti Alloys via Atom Probe Tomography*; **J Ballor**, E Kautz, B Gwalani, C Boehlert, A Devaraj

POSTER # 454

3:00 PM [1065](#) *Complementary SEM-EDS / FIB-SEM Sample Preparation Techniques for Atom Probe Tomography of nanophase-FeO in Apollo 16 Regolith Sample 61501,22*; **P Gopon**, JO Douglas, J Wade, MP Moody



POSTER # 455

3:00 PM [1066](#) *Atom Probe Tomography Investigation on the Effect of Ni Additions on the Site Occupation and Partitioning Behavior in Co-Based Superalloys*; **S Antonov**, A Day, H Francois-Saint-Cyr, S Lu, W Li, Q Feng

POSTER # 456

3:00 PM [1067](#) *In Situ Crystallization of Metallic Glass in an Atom Probe Instrument*; **DR Diercks**, R Jha, CV Ciobanu, AP Stebner



POSTER # 457

3:00 PM [1068](#) *Performance of Ultra-Violet Laser Pulsing with a Wire-Geometry, Moderately Focused Atom Probe System (EIKOS)*; **RM Ulfig**, J Bunton, D Lenz, Y Chen, KP Rice, TJ Prosa, PH Clifton, DJ Larson

POSTER # 458

3:00 PM [1069](#) *An Atom-Probe Tomography Study of the Stability of Oxide-Dispersion Strengthening Particles in 14YWT Exposed to Neutron Irradiation*; **K Kruska**, DJ Edwards, J Wang, T Yamamoto, CH Henager, RJ Kurtz, GR Odette

POSTER # 459

3:00 PM [1070](#) *Post-FIB Specimen Preparation of Atom Probe Specimens under Controlled Environments for Correlative Microscopy*; **CS Bonifacio**, P Nowakowski, K Costello, ML Ray, R Morrison, PE Fischione



Atom Probe Tomography at M&M 2019

VENDOR SYMPOSIUM

TUESDAY, August 6, 2019

A07.2 Vendor Symposium (Room C120-121, 10:30AM-11:30AM)



10:30 AM 255

Atom Probe Tomography Productivity Enhancements; DA Reinhard, TR Payne, EM Strennen, E Oltman, BP Geiser, GS Sobering, DR Lenz, J Mandt, GA Groth, DJ Larson, RM Ulfig, TJ Prosa



11:15 AM 258

Cryogenic UHV Specimen Preparation for APT: A Transfer Solution; KP Rice, RM Ulfig, U Maier, RG Passey

TUTORIALS

WEDNESDAY, August 7, 2019

X31.1 Technologists' Forum Roundtable: Technical Careers in Microscopy – For the Love of Microscopy (Room B110, 9:30AM)

9:30AM 699 (Invited) *My Life as a Microscopist; Two Dual Beams and an Atom Probe; RL Martens, TF Kelly, GB Thompson*