



9th Annual FIB SEM Workshop

Friday, February 19, 2016

Kossiakoff Center

Johns Hopkins Applied Physics Laboratory

Laurel, MD

Organizers

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Friday, February 19th, 2016

8:00 AM Breakfast & Sign-in

9:00 AM Welcome

Morning

9:15 AM **Tomáš Hrnčíř**¹, Edward Principe², Mikuláš Kocman¹, Jozef Vincenc Oboňa¹, Marek Šikula¹
¹TESCAN BRNO s.r.o., Brno, Czech Republic, ²TESCAN USA, Warrendale, PA
An overview of the latest Xe plasma FIB skills

9:30 AM **William McGehee**¹, Saya Takeuchi¹, Jennifer L. Schaefer², Truman M. Wilson^{1,3}, Kevin A. Twedt^{1,3,4}, Eddie H. Chang¹, Christopher L. Soles¹, Vladimir P. Oleshko¹, Jabez J. McClelland¹
¹NIST, ²University of Notre Dame, ³Science Systems and Applications Inc., ⁴University of Maryland
Cold Atom Focused Lithium Ion Beams: A New Paradigm for Battery R&D?

9:45 AM **Jamil J. Clarke**¹, Takeshi Ishikawa², Nick Beavers³
¹Hitachi High Technologies America, Inc., ²Hitachi High Technologies Corporation, ³Media Cybernetics
Orthogonal FIB-SEM

10:00 AM **Valery Ray**¹, Edward Principe²
¹AIM Laboratory, University of Maryland Nanocenter, ²TESCAN USA, Warrendale, PA
In-Situ Combination of ToF FIB-SIMS and EDS Analysis During Ion Sectioning

10:15 AM **Tara Nylese**, Jens Rafaelsen
EDAX
X-Ray Microanalysis with Silicon Nitride Detector Windows for FIB SEM Applications

10:30 AM **COFFEE BREAK**

11:00 AM **Remco Geurts**¹, D. Hahn²
¹FEI Company, Eindhoven, The Netherlands, ²FEI Company, Hillsboro, OR
A Computer Assisted TEM Sample Preparation Method to Accelerate Science

11:15 AM Anja Schreiber, **Richard Wirth**
Helmholtz Centre Potsdam, Potsdam, Germany
A novel technique to improve the quality of ex-situ lift-out FIB foils

11:30 AM Doug Wei, **Soeren Eyhusen**
Carl Zeiss Microscopy, LLC
TEM sample preparation with ORION NanoFab

11:45 AM **Michael J. Zachman**^{1,2}, Malcolm Thomas³, Cheryl Hartfield⁴, Lena F. Kourkoutis^{1,2}
¹School of Applied and Engineering Physics, Cornell University, ²Kavli Institute for Nanoscale Science, Cornell University, ³Cornell University, ⁴Oxford Instruments, Omniprobe Products
Advances in Cryo-FIB Lift-out Preparation of Intact Solid-Liquid Interfaces and Hard-Soft Composite Materials for Cryo-TEM

12:00 PM **Lucille Giannuzzi**
EXpressLO, LLC
Advances in ex situ Lift Out

Lunch

12:15 PM Lunch

Poster Session

- 1:15 PM **Diana L. Ortiz-Montalvo**¹, Joseph M. Conny¹, Robert D. Willis²
¹NIST, Gaithersburg, MD ²U.S. EPA, Research Triangle Park, NC
3-D Representation of Ambient Dust Particles Using FIB-SEM-EDS: A Pathway to Study Aerosol Effects on Climate
- Edward Principe**¹, Emmanuel Camescasse²
¹Tescan USA, Warrendale, PA, ²Orsay Physics, Tescan Orsay Holding, Provence, France
An Overview of the NanoSpace Analytical UHV FIB-SEM
- Rosalinda M. Ring**¹, Randy Newkirk¹, Kevin Davidson¹, James Capriola¹, Dr. Jeremy Russell¹,
Andreas Rummel², Edward C. Carper³
1. GLOBALFOUNDRIES, 2. Kleindiek Nanotechnik, 3. FEI Company
Resistive Contrast Imaging, the Tool, Technique, and Applications on Leading-edge Semiconductor Technology Devices
- Valery Ray**¹, Edward Principe²
¹AIM Laboratory, University of Maryland Nanocenter, ²Tescan USA, Warrendale, PA
Combining Xe and Ga FIB to prepare XXXL TEM Samples
- Tobias Volkenandt¹, Michal Postolski¹, **Pascal Maria Anger**², Michael Rauscher¹, Fabián Pérez-Willard¹
¹Carl Zeiss Microscopy GmbH, Oberkochen, Germany, ²Carl Zeiss Microscopy, LLC, Thornwood, NY
Automatic Preparation of Straight Micropillars in FIB-SEM Instruments
- K. P. Purushotham**, András E. Vladár, Michael T. Postek
NIST, Gaithersburg, MD
Charge Particle Beam-Induced Contamination – Problems and Remedies
- Elias Garratt**
NIST, Gaithersburg, MD
Controlling Nanoepitaxy: Focused Beam Surface Effects of Low-dose Pulses
- Kerim Genc**¹, Philippe G. Young², Miki Miyazaki³
¹Simpleware Inc., Herndon, VA, ²Simpleware Ltd., Exeter, UK, ³JSOL Corporation, Osaka, Japan
Image-Based Meshing for FIB-SEM: Benefits and Applications
- Andrew J. Smith**, M. Kemmler, A. Rummel, S. Kleindiek
Kleindiek Nanotechnik, Reutlingen, Germany
iLO - intelligent LiftOut: A software tool for intuitive, fast, and reliable TEM & APT sample preparation
- Christoph Wigge, **William Rice**, Ed Eng, Ashleigh Raczkowski, Bridget Carragher, Clint Potter
Simons Electron Microscopy Center, New York Structural Biology Center
Focused Ion Beam/SEM as a tool for versatile quantitative imaging of cellular structures at the New York Structural Biology Center

Afternoon

- 2:30 PM **Steve Herschbein**, George Worth, Carmelo Scudato, Ed Hermann
GLOBALFOUNDRIES
Introduction to Focused Ion Beam (FIB) Chip Circuit Edit
- 2:45 PM Vighter Iberi^{1,2}, Anton Ilevlev^{1,4}, Ray Unocic^{1,4}, Holland Hysmith¹, Alex Belianinov^{1,4}, Adam J. Rondinone¹, David C. Joy^{1,2}, **Olga S. Ovchinnikova**^{1,4}
¹Center for Nanophase Materials Science, Oak Ridge National Laboratory, ²Department of Materials Science and Engineering, University of Tennessee, Knoxville, TN, ³Bredesen Center, University of Tennessee, Knoxville, TN, ⁴The Institute for Functional Imaging of Materials and the Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
Direct Writing of sub-10 nm Structures from Liquid with Helium Ions
- 3:00 PM **Alex Krechmer**
TechInsights
Circuit Tracing on Integrated Circuit Using FIB Passive Voltage Contrast Effect
- 3:15 PM William Harris¹, Jeff Gelb¹, **Lorenz Lechner**¹, Arno Merkle¹, Pascal Maria Anger¹, Heike Krebs², Ali Chirazi², George Thompson², Philip Withers²
¹Carl Zeiss X-ray Microscopy, Inc., Pleasanton, CA, ²University of Manchester, Manchester, UK
4D Correlative Microstructural Imaging of Mg Alloy Corrosion with X-ray Microscopy
- 3:30 PM **COFFEE BREAK**
- 4:00 PM **Tim Hsu**
Carnegie Mellon University
Microstructural Characterization of Solid Oxide Fuel Cell Cathodes using X-ray Computed Tomography and Dual Beam Xe-Plasma FIB-SEM
- 4:15 PM **Trevor Lancon**
FEI Company, Hillsboro, OR
Imaging Considerations to Enhance Data Post-Processing
- 4:30 PM Kyle Yakal-Kremski¹, **Nabil Bassim**¹, Keana Scott², Rhonda Stroud¹
¹U.S. Naval Research Laboratory, ²NIST
Contour-based Segmentation of 3D Tomographic FIB-SEM Data from Multiphase, Porous Microstructures
- 4:45 PM **Mike Marsh**, Nicolas Piche, Eric Fournier, Normand Mongeau
Object Research Systems, Montreal, Canada
Using Python to Balance User-friendliness and Flexibility for FIB-SEM Data Processing
- 5:00 PM Wrap-up
- 5:15 PM **Happy Hour at the Kossiakoff Center, APL**