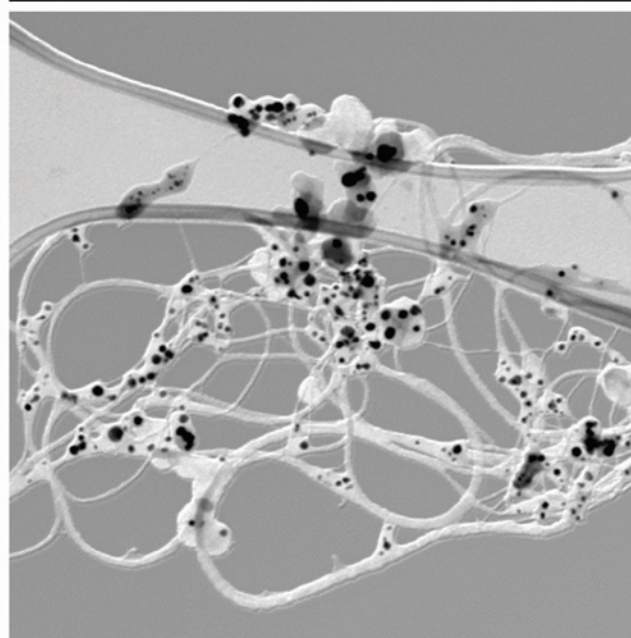
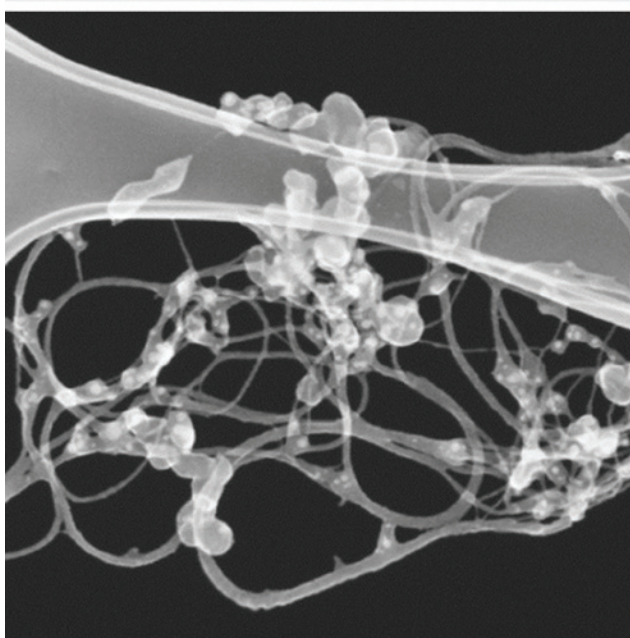
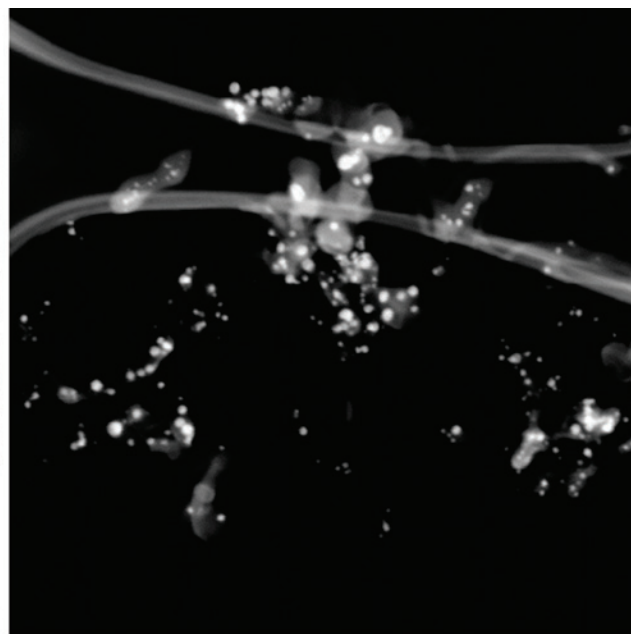
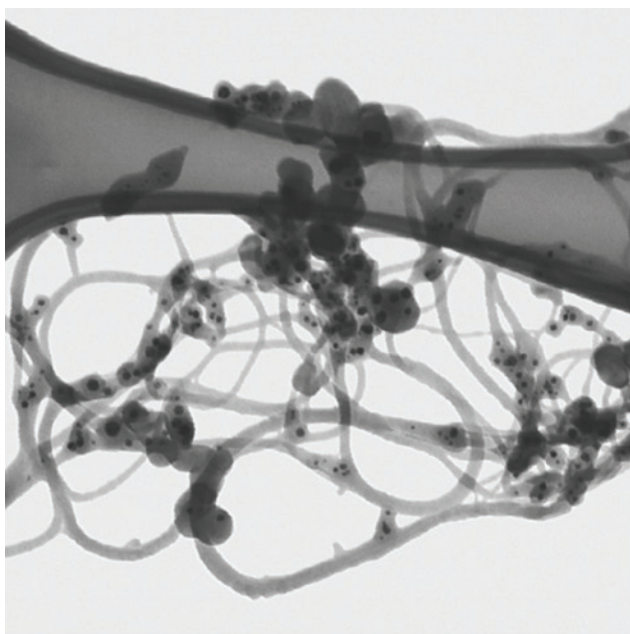


Microscopy TODAY

Volume 25 Number 2 2017 March

0026-9071/10:1017/51551929516001176 Published online by Cambridge University Press



Environment on Demand

Redefining Boundaries with the Hitachi AFM5300E Environmental-Control Atomic Force Microscope

Analysis under High-Vacuum Conditions

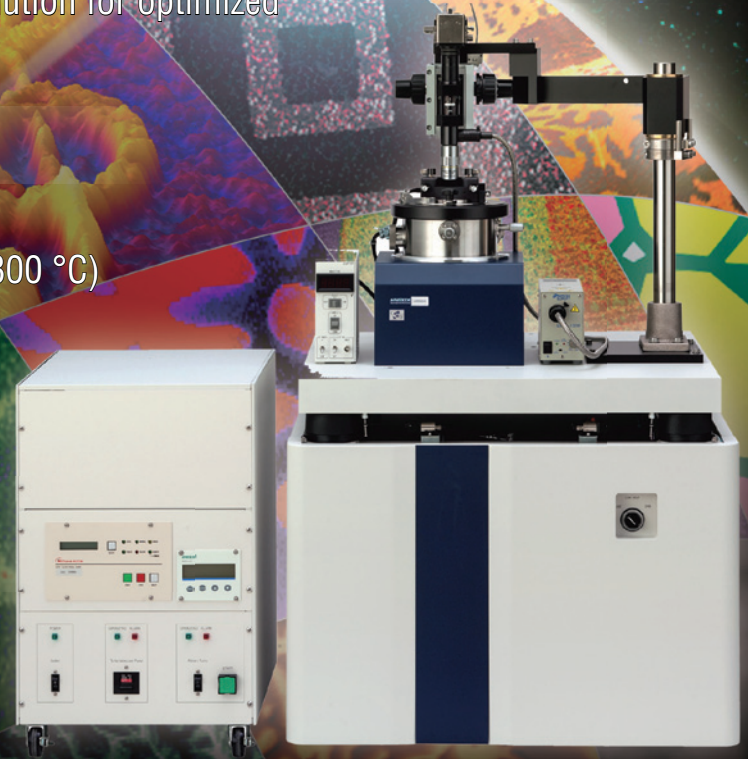
- Elimination of water layer and undesired oxidation at the sample interface
- Exceptional accuracy, sensitivity, and resolution for optimized electromagnetic property measurements

Complete Environmental Control

- Imaging in air, liquid, and vacuum
- Superior temperature regulation (-120 to 800 °C)
- Humidity and gas injection control
- Correlative AFM-SEM-IM *in vacuo* for environmentally sensitive materials

Innovative 2D Dopant Profiling Technology

- Hitachi-proprietary Scanning Nonlinear Dielectric Microscopy (SNDM) mode
- Ultra-high sensitivity for detecting low carrier densities
- High-resolution characterization for semiconductor devices



Visit Hitachi at 2017 MRS Spring
April 18-19, 2017 | Phoenix, AZ

Think Outside the Lab

Don't miss
special anniversary
programming in honor of



and



as well as
the 50th
anniversary of
the atom probe



M&M 2017
**MICROSCOPY &
MICROANALYSIS**
August 6-10, 2017 • St. Louis, MO

<http://www.microscopy.org/MandM/2017>

Listen to extraordinary plenary talks from Eric Betzig, Janelia Farm, and Keith Riles, University of Michigan

Attend one of FOUR stellar Pre-Meeting Congresses

Deep dive into specific topics in traditional day-long Sunday Short Courses

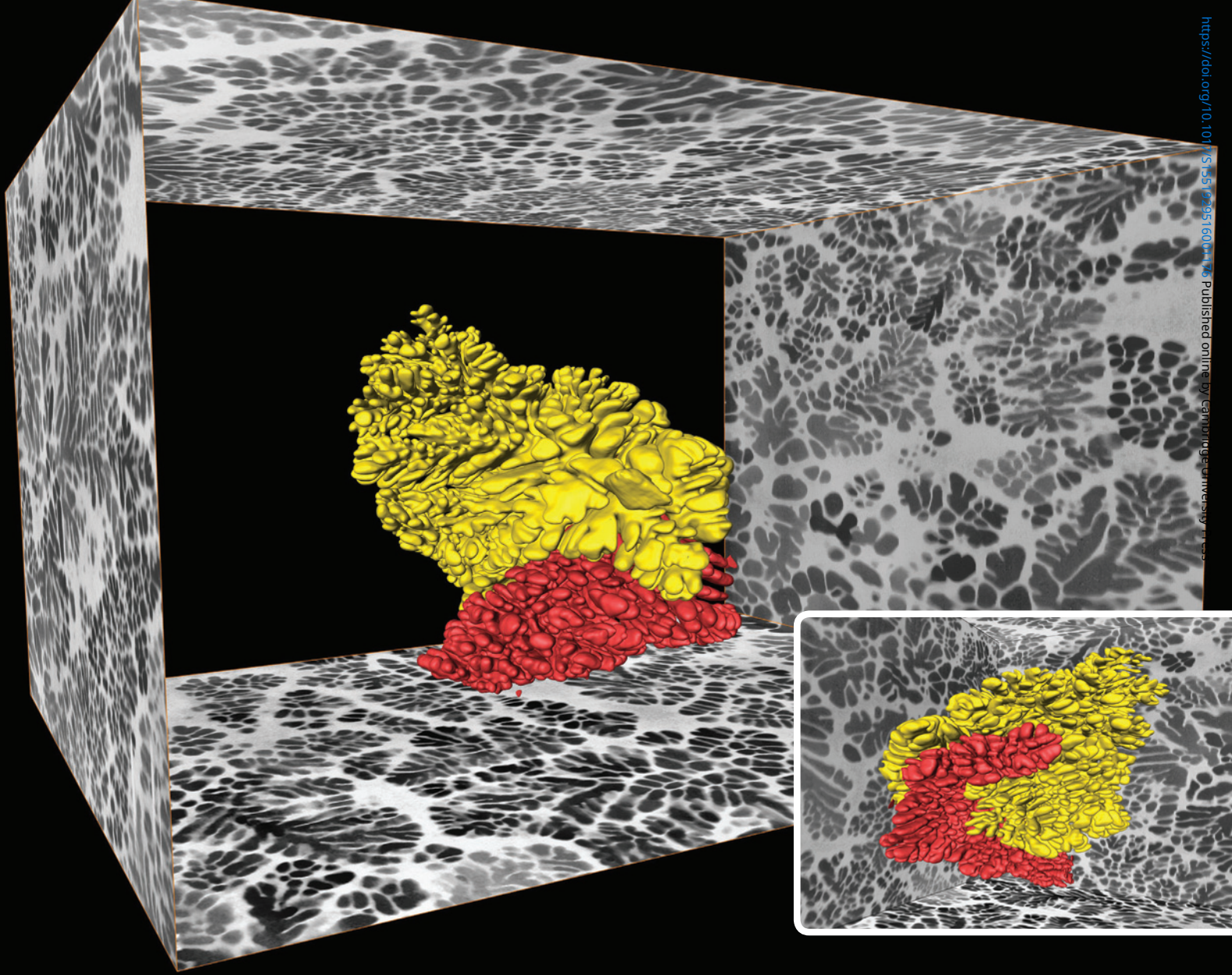
Experience hands-on demos for the latest microscopy products during Vendor Tutorials

Discuss recent work in depth with over 500 poster presenters

Visit the largest microscopy exhibit hall in the world with over 120 companies

Hear about cutting-edge scientific work in over 30 symposia in Physical, Biological, and Analytical Sciences

Network with colleagues and friends during happy hours and social events



FEI Avizo® 3D visualization of two large adjacent crystalline dendrites of a bulk-metallic-glass matrix composite ($Zr_{58.5}Ti_{14.3}Nb_{5.2}Cu_{6.1}Ni_{4.9}Be_{1.0}$). Data was obtained by large volume serial sectioning tomography using the Helios PFIB DualBeam. The sectioned block is about $90 \times 80 \times 70 \mu m^3$. Sample from The University of Tennessee, USA. Images courtesy of The University of Manchester.

Large 3D volumes with unprecedented surface resolution

Until recently, available technologies have limited the volumes and depths of materials that can be analyzed at high resolution, ultimately restricting the insight into structural, crystallographic, and chemical properties. This is no longer the case. The Helios™ PFIB DualBeam™ offers unrivaled access to regions of interest deep below the surface—combining serial section tomography with statistically relevant data analysis.

Discover more at FEI.com/Helios-PFIB



Contents

Feature Article

12 Acceptance Angle Control for Improved Transmission Imaging in an SEM

Jason Holm and Robert R. Keller

X-ray Microanalysis

20 Ultra-Low kV EDS – A New Approach to Improved Spatial Resolution, Surface Sensitivity, and Light Element Compositional Imaging and Analysis in the SEM

Simon Burgess, James Sagar, James Holland, Xiaobing Li, and Frank Bauer

30 Advanced Chemical Analysis Using an Annular Four-Channel Silicon Drift Detector

Ralf Terborg, Andi Kaeppel, Baojun Yu, Max Patzschke, Tobias Salge, and Meiken Falke

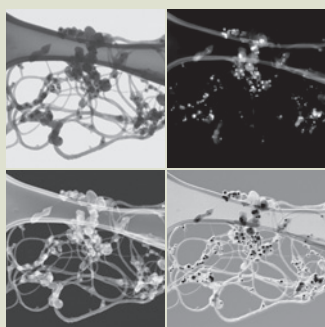
36 Large-Area Quantitative Phase Mapping in the Scanning Electron Microscope

Keith Thompson

46 Improvements in SDD Efficiency – From X-ray Counts to Data

Tara Nylese and Jens Rafaelsen

About the Cover



SEM images of single-wall carbon nanotube bundles with metal catalyst particles. Clockwise from upper left: brightfield STEM, high-angle annular darkfield STEM, marginal brightfield STEM, and secondary electron mode. Image width = 1 μm .

See article by Holm and Keller

Meeting Preview

54 Microscopy & Microanalysis 2017 in St. Louis, Missouri

Jay Potts, Program Chair

Pioneers

56 Pioneers in Optics: Georges de Buffon

Eric Clark

Departments

7 Editorial

8 Carmichael's Concise Review

58 Industry News

60 Product News

62 Microscopy and Microanalysis Highlights

64 NetNotes

69 Calendar of Meetings

73 Dear Abbe

74 Index of Advertisers

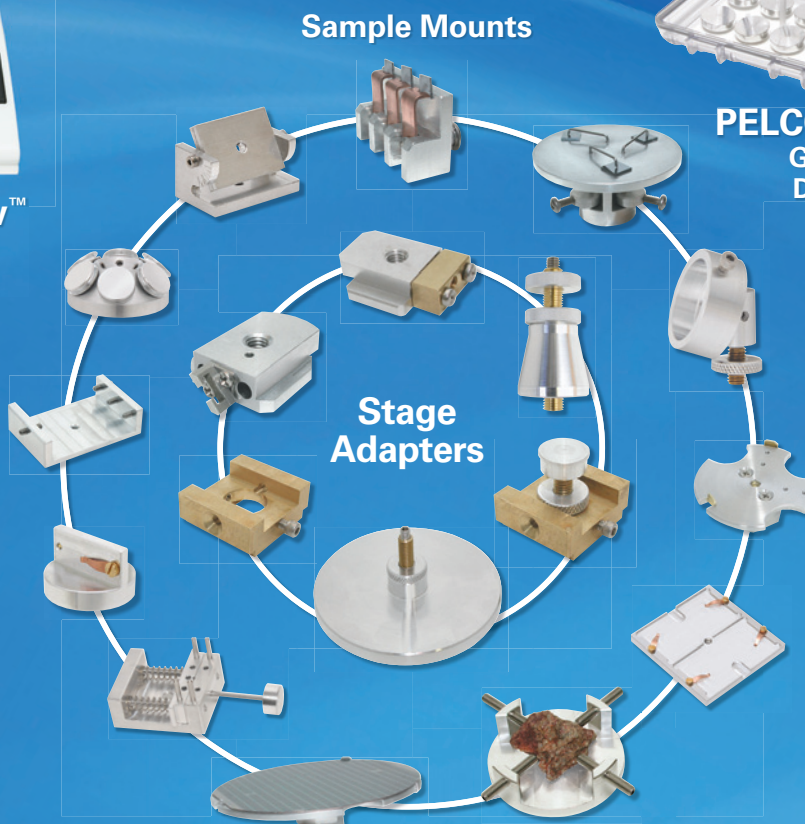
The single source for all your **microscopy supplies** and **specimen preparation equipment.**



PELCO easiGlow™
Glow Discharge
Cleaning System



PELCO® Storage Solutions
Grids - Mounts - Wafers
Dessicators - Gel-Paks®



Sample Mounts

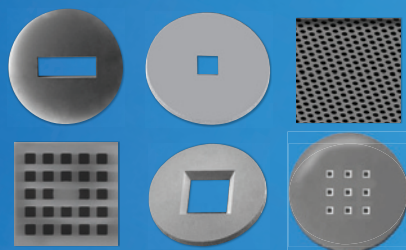
**Stage
Adapters**



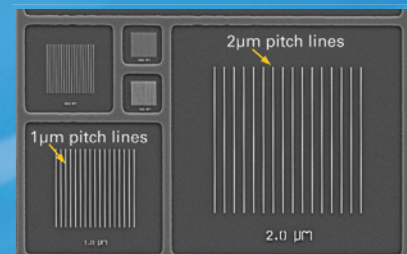
FIB Supplies
Lift Out Grids
Storage - Probes
FIB Mounts



PELCO easiShaper™
Carbon Rod Shaper



**PELCO® Modular SEM
Holders & Mounts**



Microscope Calibration
Magnification - Resolution
EDX - AFM - Astigmatism

PELCO® TEM Support Films
Silicon Nitride - Silicon Dioxide
Graphene - Carbon - Formvar

