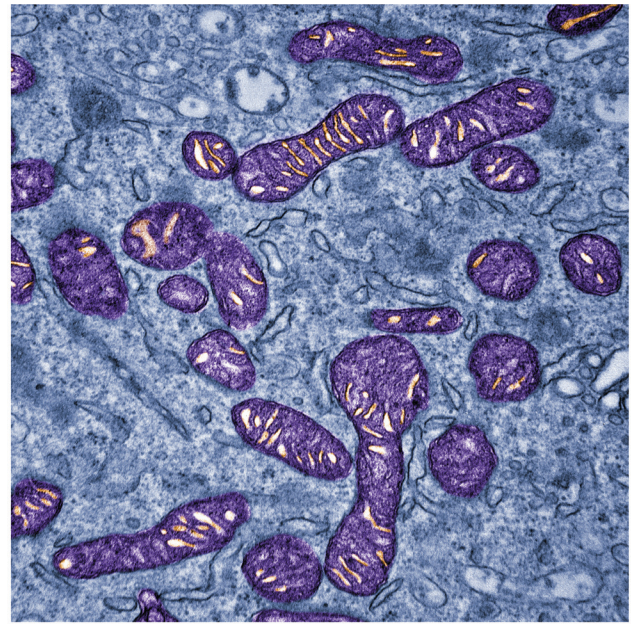
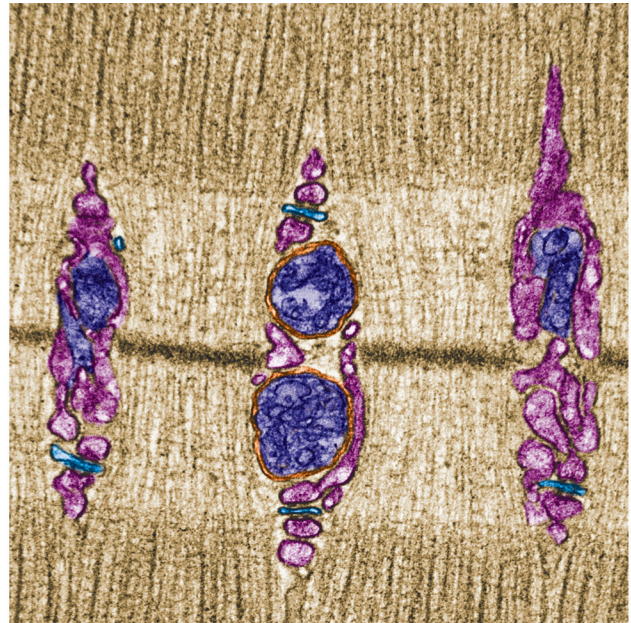
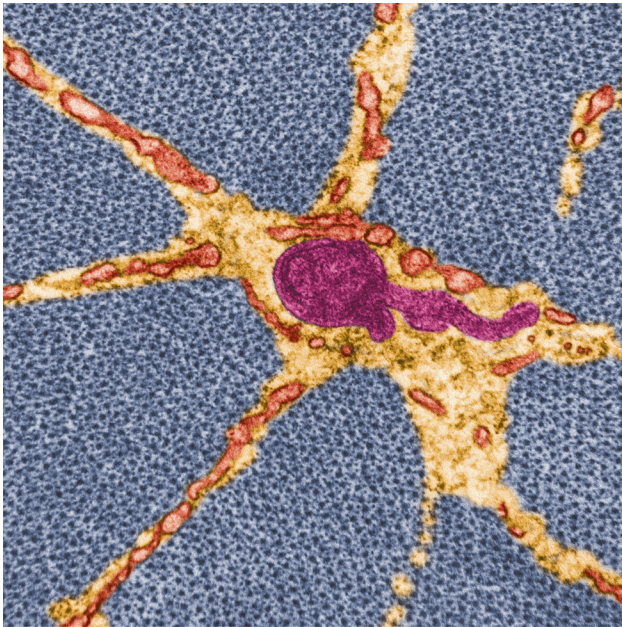


# Microscopy TODAY

Volume 29 Number 1 2021 January

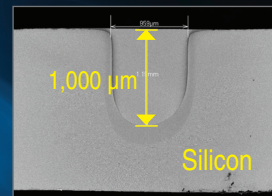
https://doi.org/10.1017/S155192920001650 Published online by Cambridge University Press



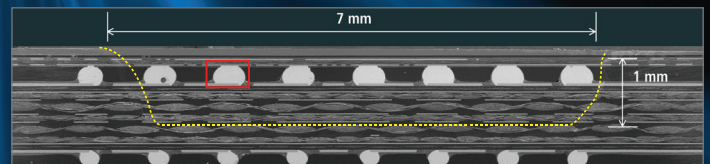
# The Hitachi ArBlade 5000 Advanced Ion-Milling System

The Hitachi ArBlade 5000 Ion-Milling System is a highly advanced broad ion-beam system. The ArBlade 5000 equipped with a fast-milling Ar ion gun will increase your throughput and put your lab on the cutting edge.

**PUT YOUR LAB  
ON THE CUTTING EDGE**



- 1** *New-generation hybrid instrument with cross-section milling and Flatmilling™*
- 2** *≥ 1,000 μm per hour cross-section milling on Si—Cut your milling time in half!*
- 3** *Cross-section widths up to 8 mm—Mill out massive areas with the new cross-section holder*



For more information: [microscopy@hitachi-hta.com](mailto:microscopy@hitachi-hta.com)

## Innovation ♦ Synergy ♦ Solutions

# 2021 Call for Submissions

Deadline:

**February 18, 2021**

Micrographs, top to bottom:

*Rat endothelial cells* by Damon Strom, WITec GmbH, Ulm, Germany

*Native vanadium dendrites* by Sarah Gain, Centre for Microscopy, Characterisation and Analysis, University of Western Australia, Perth, Australia

*Aloe vera leaf copy* by Jose Martinez-Lopez, Química Tech Microscopy and Microanalysis, Juarez, Mexico

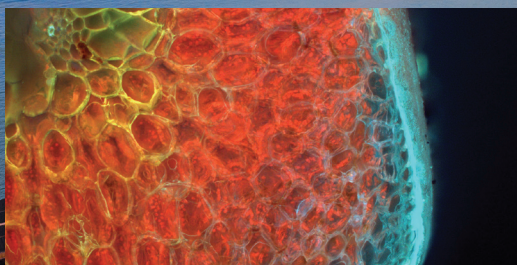
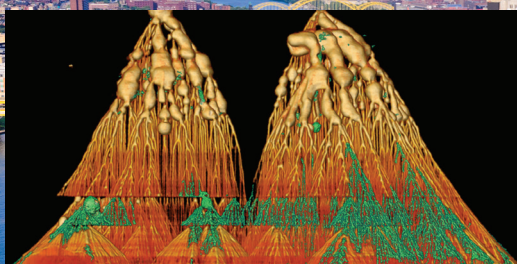
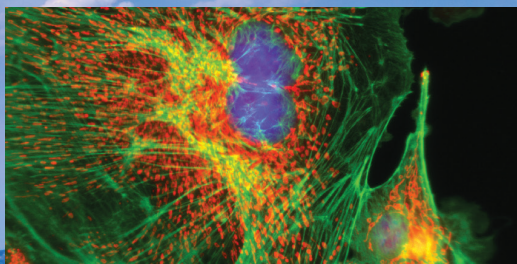


## MICROSCOPY & MICROANALYSIS

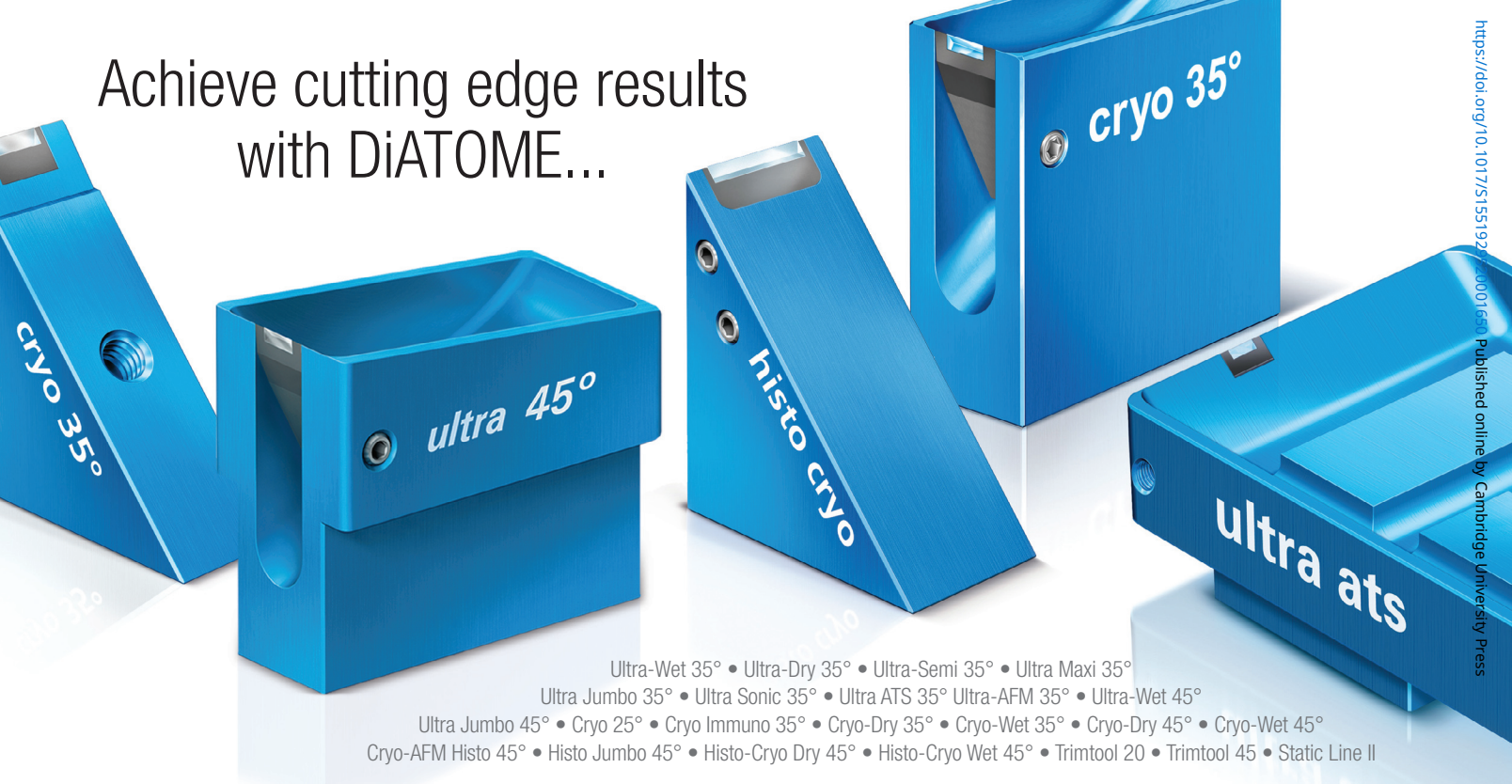
August 1-5, 2021 • Pittsburgh, PA



Go to [www.microscopy.org/MandM/2021](http://www.microscopy.org/MandM/2021)  
for portal access and up-to-date meeting information



Achieve cutting edge results with DiATOME...



# Innovation, using DiATOME Diamond Knives...

## Micro-Optical Sectioning Tomography to Obtain a High-Resolution Atlas of the Mouse Brain

Existing imaging tools have limitations for brainwide mapping of neural circuits at a mesoscale level. In collaboration with DiATOME, researchers developed a Micro-Optical Sectioning Tomography (MOST) system utilizing a DiATOME Diamond Knife that can provide micron tomography of a centimeter-sized whole mouse brain.

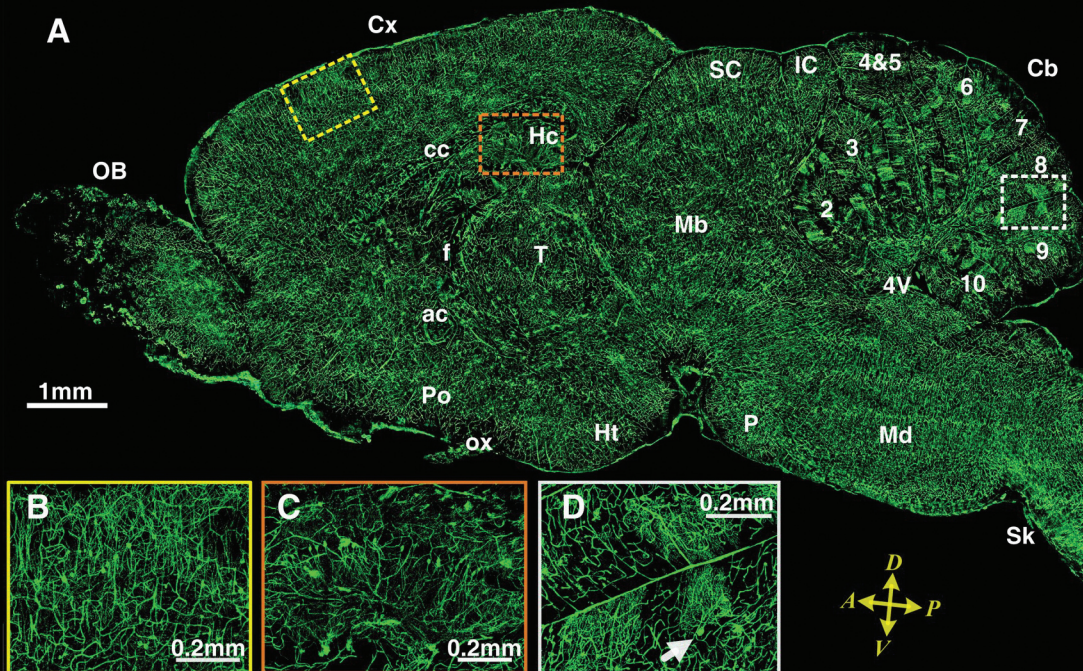
Slicing was performed by moving the specimen to generate ribbons, and each ribbon was simultaneously imaged. The illuminating beam passed through a beam splitter, mirror and objective to irradiate the ribbon. The imaging beam collected by the objective and passed through the mirror, beam splitter and tube lens was then recorded by a line-scan CCD.

A 3D structural dataset of a Golgi-stained whole mouse brain at the neurite level was obtained. The morphology and spatial locations of neurons and traces of neurites were clearly distinguished. Researchers found that neighboring Purkinje cells were sticking to each other.

### Acknowledgement

*Micro-Optical Sectioning Tomography to Obtain a High-Resolution Atlas of the Mouse Brain* Anan Li, Hui Gong, Bin Zhang, Qingdi Wang, Cheng Yan, Jingpeng Wu, Qian Liu, Shaqun Zeng, Qingming Luo

Britton Chance Center for Biomedical Photonics, Wuhan National Laboratory for Optoelectronics—Huazhong University of Science and Technology, Wuhan 430074, P. R. China.



## DiATOME U.S.

for more information, please visit our website at...

[www.emsdiasum.com](http://www.emsdiasum.com)

P.O. Box 550 • 1560 Industry Rd.  
Hatfield, PA 19440

Tel: (215) 412-8390

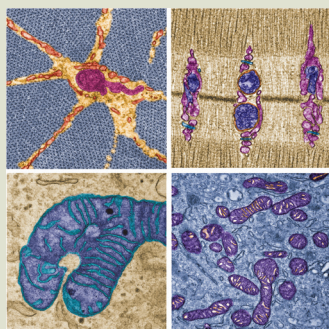
Fax: (215) 412-8450

email: [info@emsdiasum.com](mailto:info@emsdiasum.com)

or [stacie@ems-secure.com](mailto:stacie@ems-secure.com)

# Contents

## About the Cover



High-resolution images collected by the Microscopy Laboratory of Division of Advanced Research Technology at NYU Langone Health.

See article by Liang et al.

## Meeting Summaries

- 12 Microscopy and Microanalysis 2020 Virtual**  
Huolin Xin, Program Chair
- 16 Microscopy and Microanalysis 2021 in Pittsburgh, PA**  
Elizabeth Wright, Program Chair

## Transmission Electron Microscopy Applications

- 18 Challenges Facing an EM Core Laboratory: Mitochondria Structural Preservation and 3DEM Data Presentation**  
Feng-Xia Liang, Chris Petzold, Kristen Dancel-Manning, Joseph Sall, Patrick H. Ren, and Chuxuan Zhou
- 24 cloudEMAPS: A Cloud Computing Environment for Electron Microscopy Application Simulations**  
J.M. Zuo, X.R. Zhu, Elaine Ang, and Rahul Shah
- 28 Exploring Coupled Extreme Environments via *In-situ* Transmission Electron Microscopy**  
Riley J. Parrish, Daniel C. Bufford, David M. Frazer, Caitlin A. Taylor, Jacob Gutierrez-Kolar, Daniel L. Buller, Brad L. Boyce, and Khalid Hattar

## STEM and SEM Applications

- 36 Isotope-Resolved Electron Energy Loss Spectroscopy in a Monochromated Scanning Transmission Electron Microscope**  
Jordan A. Hachtel, Jacob R. Jokisaari, Ondrej L. Krivanek, Juan Carlos Idrobo, and Robert F. Klie
- 42 Quantitative SEM-EDS Analysis of Semi-Transparent Samples**  
S.R. Boona

## Darkfield Microscopy

- 50 Enhanced Darkfield Optical Microscopy Opens New Nano-Scale Imaging Possibilities**  
Sam Lawrence

## Microscopy Pioneers

- 56 Mike Marko: Preserving the Past and Shaping the Future**  
Cameron Varano

## Highlights from *Microscopy and Microanalysis*

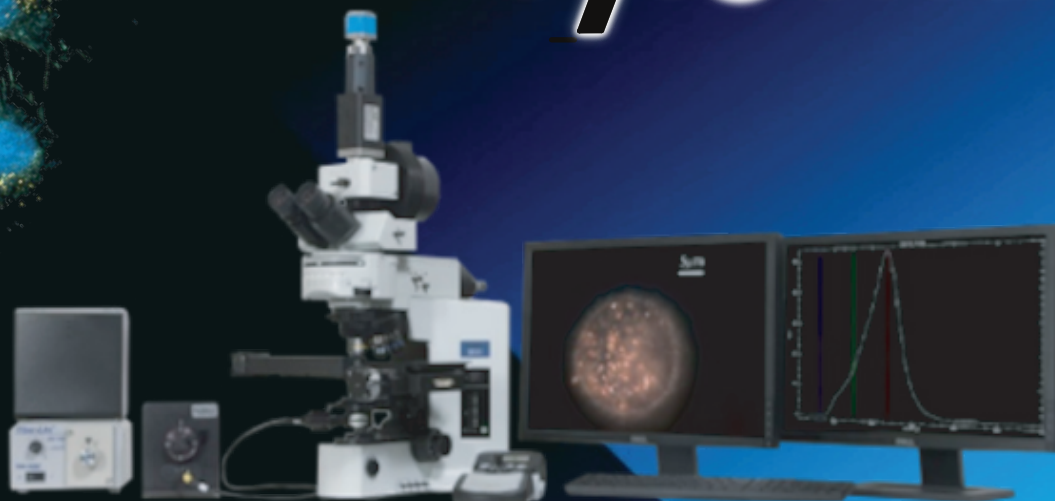
- 62 Plasma focused ion beam serial sectioning as a technique to characterize nonmetallic inclusions in superelastic Nitinol fine wires**
- 62 Inelastic Scattering in Electron Backscatter Diffraction and Electron Channeling Contrast Imaging**
- 63 FE-SEM characterization of  $\alpha$ -mannose density and surface mapping changes in human sperm head during *in vitro* capacitation**

## Departments

- |                                      |                                |
|--------------------------------------|--------------------------------|
| <b>7</b> Editorial                   | <b>66</b> NetNotes             |
| <b>8</b> Carmichael's Concise Review | <b>74</b> Calendar of Meetings |
| <b>58</b> Industry News              | <b>76</b> Dear Abbe            |
| <b>60</b> Product News               | <b>78</b> Index of Advertisers |
| <b>64</b> Crossword Puzzle           |                                |

**NanoDrug  
Delivery**

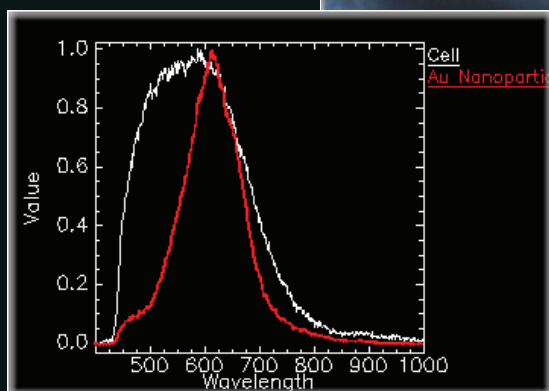
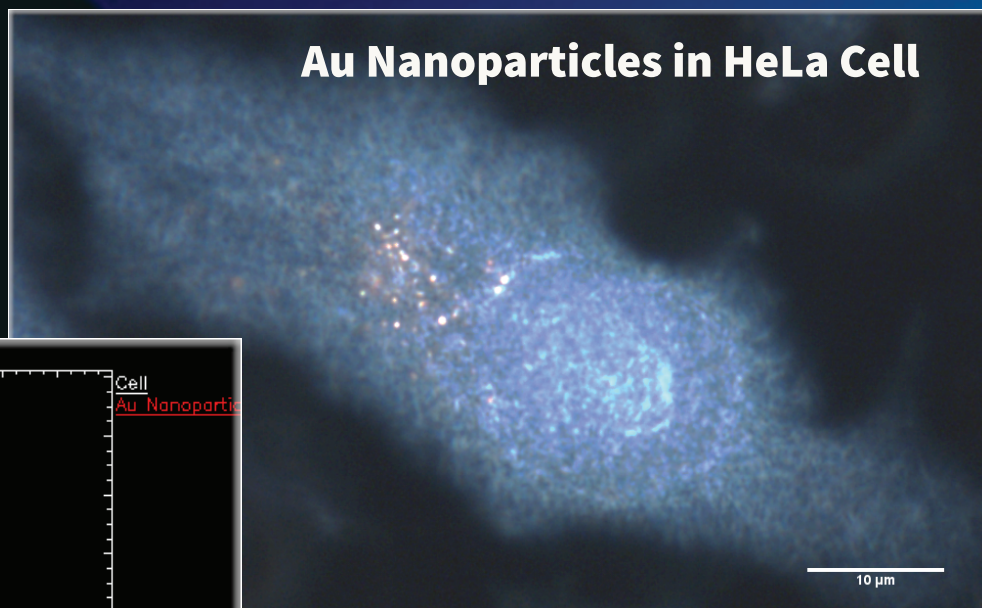
**CytoViva<sup>®</sup>**



## Enhanced Darkfield Hyperspectral Microscopy

- **Label-Free Optical Imaging of Nanomaterials in Cells and Tissue**
- **Optical Spectrum Captured In Every Nanoscale Image Pixel**
- **Spectral Mapping of Nanoscale Sample Elements**

### Au Nanoparticles in HeLa Cell



[www.cytoviva.com](http://www.cytoviva.com)