

# Go from this... ..to THIS



**BEFORE CHROMACAL™**



**AFTER CHROMACAL™**

TIFF file color-calibrated by Datacolor ChromaCal™, cal. slide #1000103, 12/6/2013, 2:15:41 PM

THE LATEST EMERGING TECHNOLOGY...

## EMS has it.

### Datacolor CHROMACAL™ Color Calibration System for Optical Microscopy

**datacolor**  An innovative new solution that enables researchers, scientists and technicians to establish and preserve the color integrity of their digital transmitted, brightfield microscopy images.

Datacolor CHROMACAL integrates 3 components:

- Color calibration microscope slide
- Proprietary software
- Computer monitor calibration sensor

Together, the Datacolor CHROMACAL system establishes a color profile for your microscopy system and applies that profile to your specimen images to ensure consistent and reliable color representation. The outcome is improved comparability of images and enhanced communication and collaboration for better decision making.



PLEASE CONTACT US FOR MORE INFORMATION...

**Electron  
Microscopy  
Sciences**

P.O. Box 550 • 1560 Industry Rd. • Hatfield, Pa 19440  
Tel: (215) 412-8400 • Fax: (215) 412-8450  
email: [sgkcck@aol.com](mailto:sgkcck@aol.com) or [stacie@ems-secure.com](mailto:stacie@ems-secure.com)

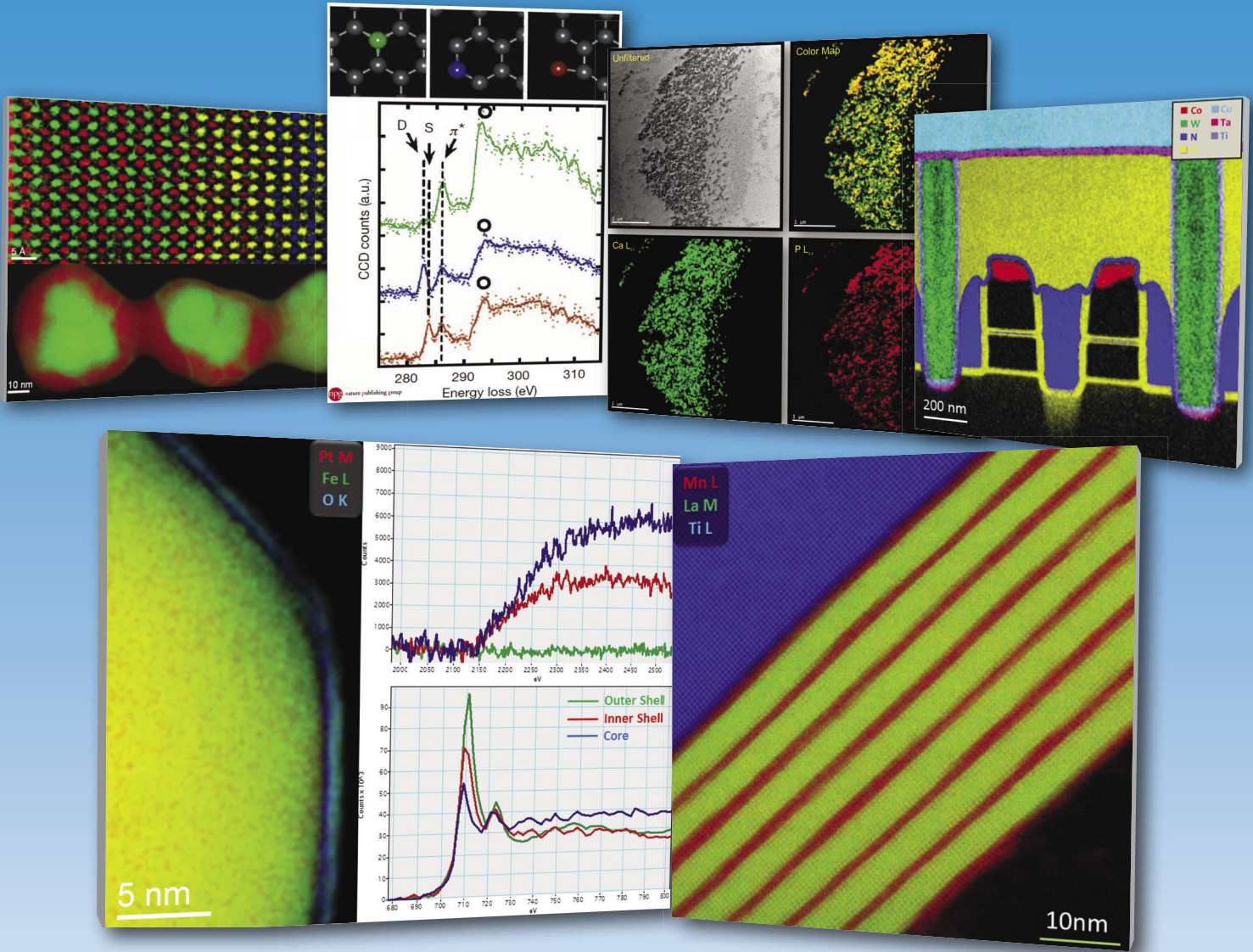
[www.emsdiasum.com](http://www.emsdiasum.com)

**THE NEW EMS  
FULL LINE CATALOG  
IS COMING SOON.  
RESERVE YOUR COPY TODAY!**

# Get More, Get EELS

## Go beyond simple composition

- True Chemical State Mapping
- Quantitative Surface Plasmon Mapping
- Exceptional Detection Efficiency
- Artefact-Free Elemental Detection



Top Images, left to right:

- (Top) Colored elemental map showing Sr  $L_{2,3}$ -edges (green), Ti  $L_{2,3}$ -edges (red), La  $M_{2,3}$ -edges (yellow), and Mn  $L_{2,3}$ -edges (blue). Data captured using a Gatan Enfrim™ER. Sample courtesy of Prof. David Smith, Arizona State University.
- (Bottom) RGB composite EELS SI image of Au/Pd nanoparticle; Au  $M_{2,3}$ -edges at 2206 eV in green and Pd  $L_{2,3}$ -edges at 3173 eV in red. Data captured using a Gatan GIF Quantum™ER. Sample courtesy Dr. Jianfang Wang of The Chinese University of Hong Kong.
- ELNES of individual atoms in graphene. Different states of atomic coordination are illustrated at top. ELNES of carbon K (1s) spectra shown on bottom. Green, blue and red spectra correspond to the normal  $sp^2$  carbon atom, a double-coordinated atom and a single coordinated atom, respectively. Data captured using a Gatan Quantum™ER Low-Voltage Special. Data courtesy of K. Suenaga and M. Koshino (AIST, Tsukuba, Japan). Figure 1 from: K. Suenaga et al. "Atom-by-Atom spectroscopy analysis at graphene edge"; Nature 468, 1088 (2010). Permission to use Figure 1 granted by K. Suenaga and Nature Publishing Group. Copyright © 2010, rights managed by Nature Publishing Group.
- Unfiltered, conventional TEM image and elemental maps of a capillary blood vessel captured using a Gatan GIF Quantum™ER. The Ca and P elemental maps were extracted from an EFTEM-SI dataset acquired using Gatan's DigitalMicrograph™ software. EFTEM-SI is capable of revealing relative concentrations below 1% as shown in the P elemental map. Sample courtesy of Dr. Wenlang Lin, Mayo Clinic.
- Color composite EELS composition map from data acquired using a GIF Quantum™ERS system on a 300 kV probe corrected STEM with 1.0 nA beam current. The EELS data was acquired at 4.1 ms/pixel with a 20 mR convergence angle and 42 mR collection angle. The 200 x 200 pixel map took under 3 minutes to acquire (164 s). The black areas are Si, which has been omitted for clarity. TEM facilities courtesy FELMI and TU Graz, Austria.

Bottom Images, left to right:

- (Left) Colored elemental map based on Pt  $M$ -edge (red), Fe  $L$ -edge (green), and O  $K$ -edge (blue) intensities. Data captured using a Gatan GIF Quantum™ERS and 300 kV probe corrected STEM with 180 pA beam and 5 ms exposure.
- (Right) Extracted Pt  $M_{2,3}$  edges (upper) and Fe  $L_{2,3}$  edges (lower) from the thin outer shell (green), low density inner shell (red) and core (blue). Despite the sub-nm proximity of the outer shell to the core, no Pt is detected. The Fe- $L_{2,3}$  ratio and peak position vary significantly with the Fe chemistry of the layer. Sample and TEM facilities courtesy McMaster University, Canada.
- Colored 1k x 1k elemental map of  $LaMnO_3 / SrMnO_3$  superlattices grown on  $SrTiO_3$  (Mn - Red, La-green, Ti L-blue). Data was acquired on an Enfrim™ (UHV special) coupled to a 100 kV NION UltraSTEM. Image courtesy Mundy, Adamo, Schlom & Muller, Cornell University. (Results published in Monkman & Adamo, et al, Nature Materials, vol 11, 2012).



www.gatan.com

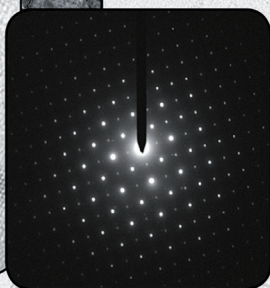
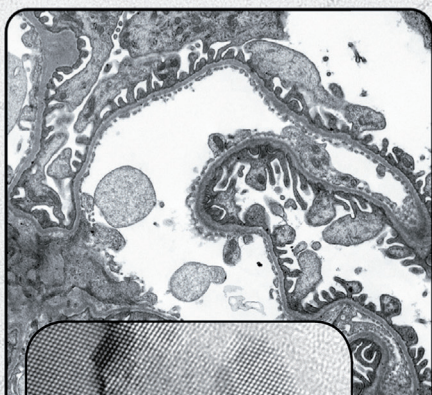
## Get More, Get EELS

Gatan Analytical TEM

Enhancing Electron Microscopy

# SIA

**1 TO 50 MEGAPIXELS** live and slow scan  
**MAGNIFICATION FACTOR OF 1** on bottom mounted cameras  
**DIFFRACTION BEAM STOP** on side mounted cameras



*Affordable* TEM camera systems for research, education, healthcare, and industry since 2001

**Scientific Instruments and Applications**  
2773 Heath Lane • Duluth, GA 30096  
(770) 232 7785 • [www.sia-cam.com](http://www.sia-cam.com)

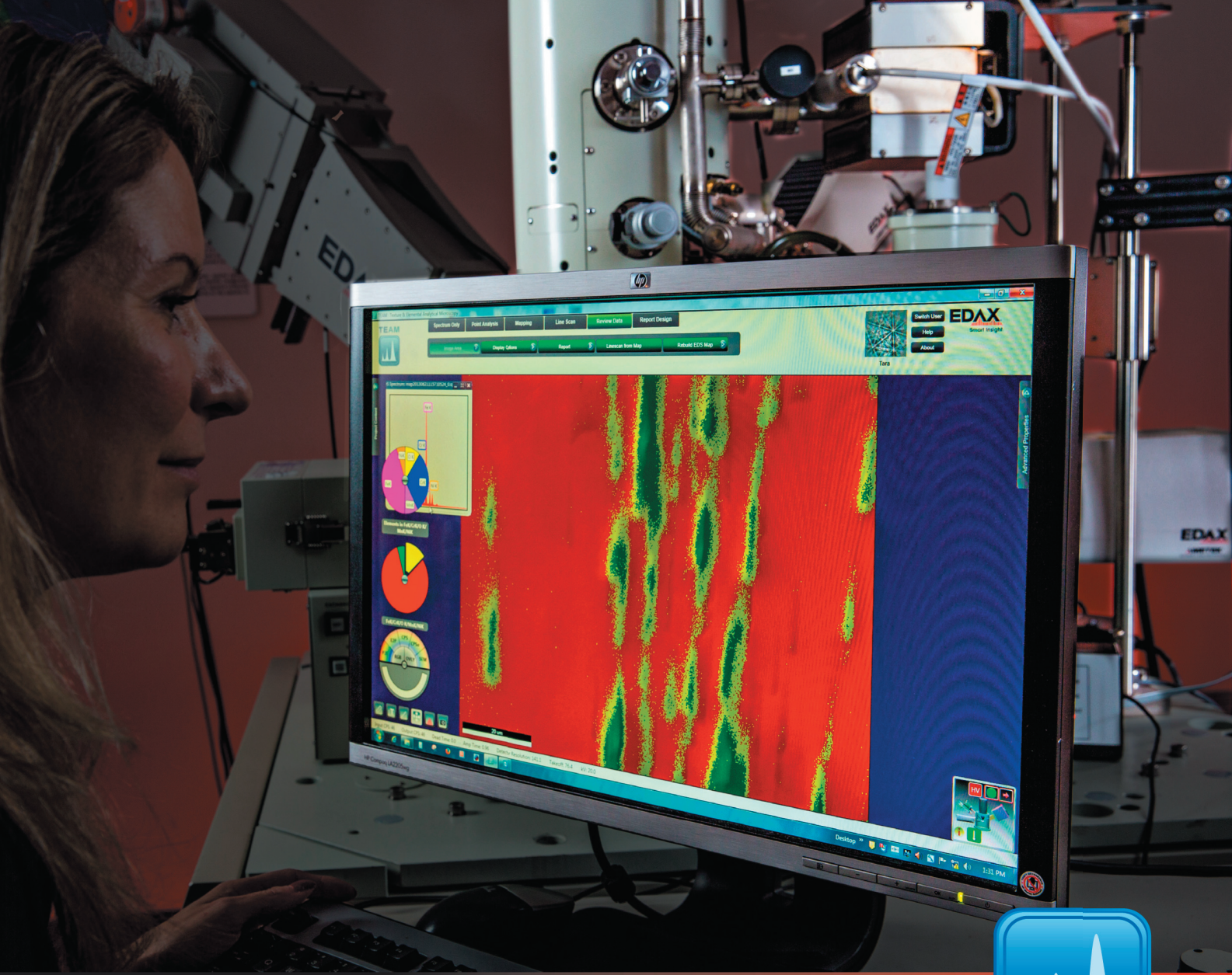
---

## INDEX TO ADVERTISERS

---

Advanced Microscopy Techniques, AMT	A10, A31
Bruker MicroCT	A20, A21
Bruker Nano GmbH	A11, A29
Carl Zeiss Microscopy, LLC	A17, A25
Diatome	Cover 2, A32
Denton Vacuum	A13, A28
EAG, Evans Analytical Group	A24
EDAX, Inc.	A12, A33
Electron Microscopy Sciences, EMS	A19, A21
Gatan	A3, Cover 3
JEOL	A6, A16, A26, Cover 4
IBSS Group	A13
International Centre Diffraction Data, ICDD	A24
SIA Scientific Instruments & Applications	A19, A34
MSA Ads	A29, A30
SPI Supplies	A15, A22
Ted Pella	A5, A18, A23, A30

---



## Best resolution and highest throughput when results matter.

- Octane series SDDs with advanced electronics providing three times the throughput of a typical SDD
- Best resolution EDS data at previously unmatched speeds
- Intuitive and easy to use TEAM™ interface
- Fast data collection with high quality results
- Now available for both SEM and TEM



Power your next insight with EDAX.  
[edax.com/TEAM-EDS](http://edax.com/TEAM-EDS)

**AMETEK**<sup>®</sup>  
 MATERIALS ANALYSIS DIVISION

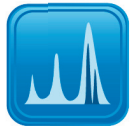
TEAM™  
 EDS



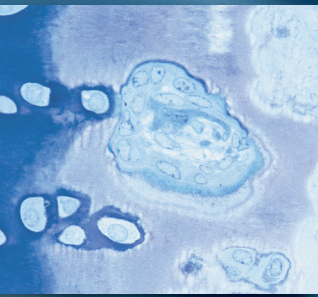
TEAM™  
 EBSD



TEAM™  
 WDS

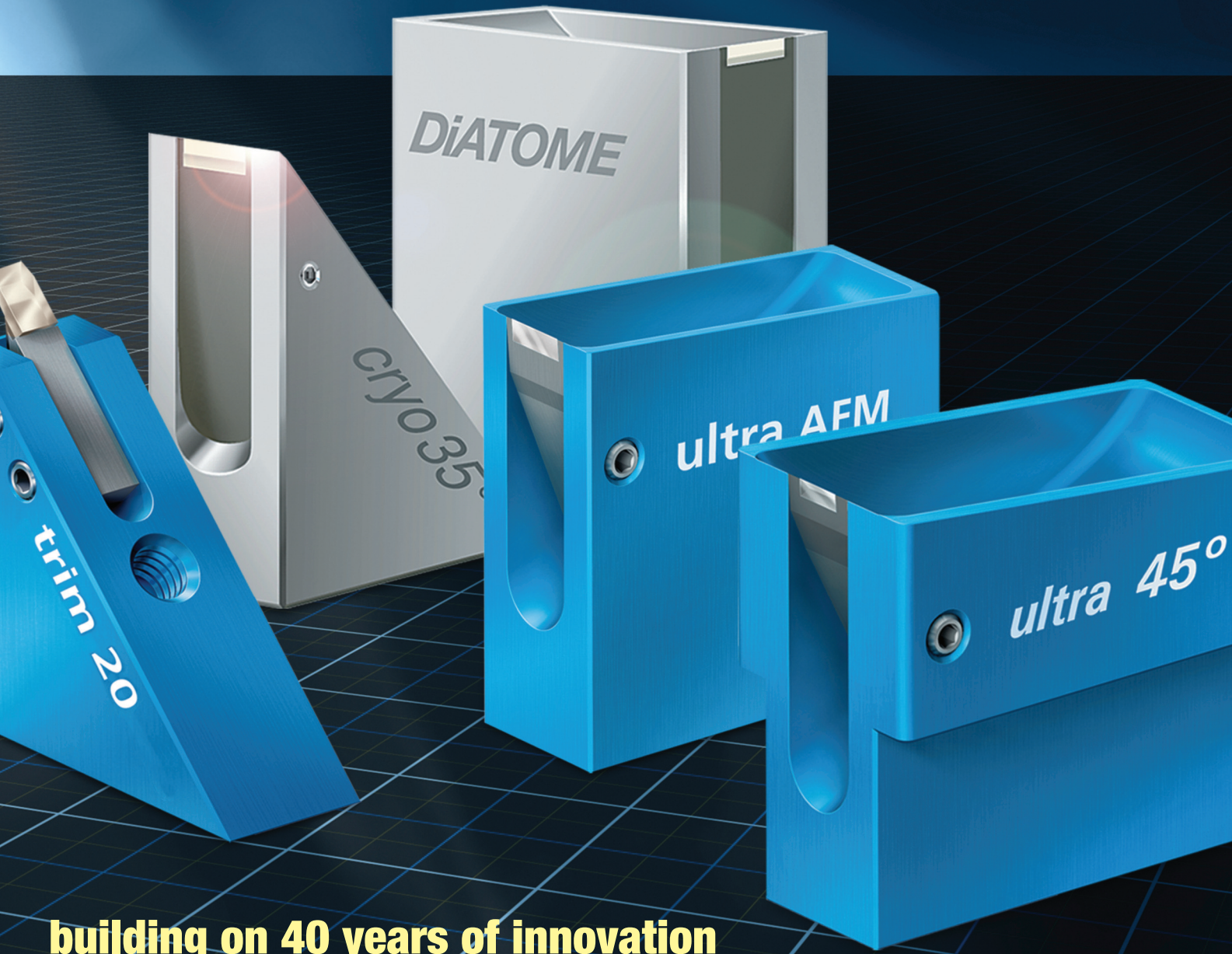
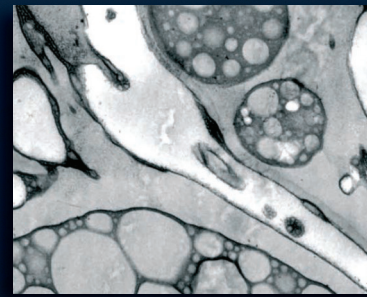
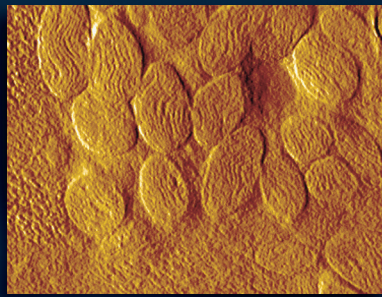


**EDAX**<sup>®</sup>  
 Smart Insight



# **DiATOME** *diamond knives*

**the highest quality...  
the most precise sectioning...  
incomparable durability**



**building on 40 years of innovation**

*ultra 45° • cryo • histo • ultra 35°  
histo jumbo • STATIC LINE II • cryo immuno  
ultra sonic • ultra AFM & cryo AFM*

**NEW!... trimtool 20 and trimtool 45**  
*Finally, one trimming tool for all of your trimming  
needs, be it at room or cryo temperatures.*

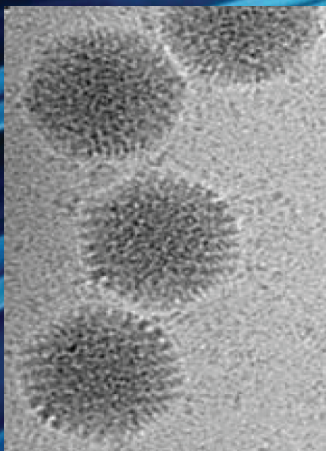
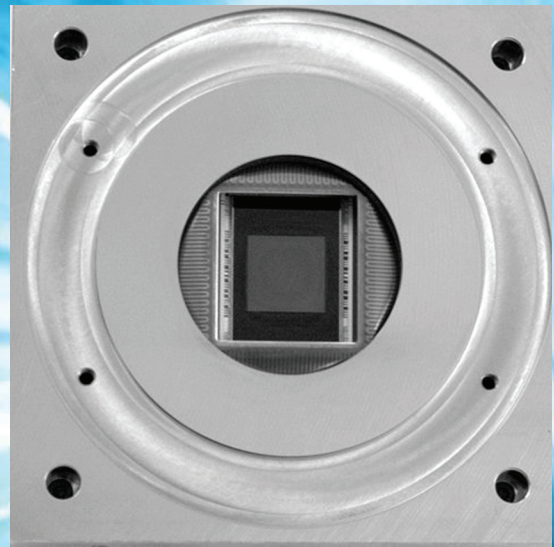
## **DiATOME U.S.**

P.O. Box 550 • 1560 Industry Rd. • Hatfield, Pa 19440  
Tel: (215) 412-8390 • Fax: (215) 412-8450  
email: [sgkock@aol.com](mailto:sgkock@aol.com) • [stacie@ems-secure.com](mailto:stacie@ems-secure.com)  
[www.emsdiasum.com](http://www.emsdiasum.com)



# A Leap in Sensitivity and Speed with the XR401 sCMOS Camera

- Cryo TEM
- Low Dose TEM
- Diffraction
- In-Situ TEM
- Extraordinary speed
- Non-Blooming Sensor
- $< 2$  e/pixel noise

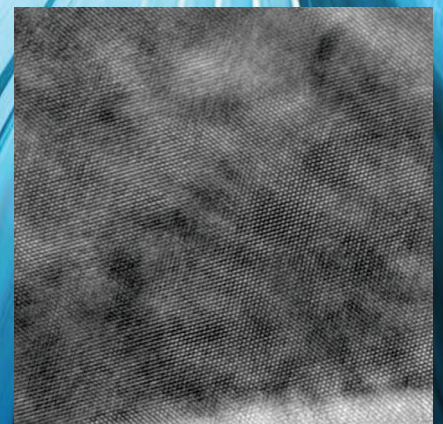


Adenovirus

Dr. Cameron Ackerley  
The Hospital for Sick Children



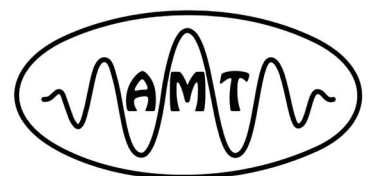
Diffraction

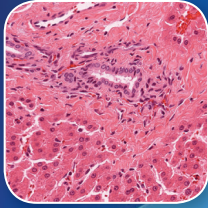


Lattice

Dr. Pengfei Hu at the Shanghai University

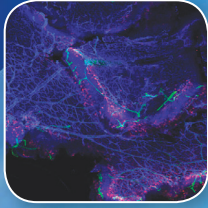
242 West Cummings Park, Woburn, MA 01801  
Phone: 978.774.5550 [www.amtimaging.com](http://www.amtimaging.com)



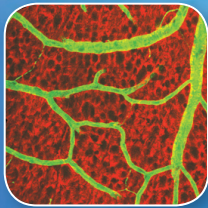


# PELCO BioWave® Pro

Fast, Low Temperature  
Microwave Tissue Processing



- Rapid specimen turnaround
- Low temperature environment
- Programmable processing
- Consistent quality results



*Application kits for paraffin processing, decalcification, confocal, light and electron microscopy available.*



**TED PELLA, INC.**  
Microscopy Products for Science and Industry

www.tedpella.com   sales@tedpella.com   800.237.3526

## Save the Date!

AUGUST 3–7, 2014 • M&M 2014 & IUMAS-6



August 2–7, 2014  
Hartford, CT USA

held in conjunction with



AUGUST 3–7 • HARTFORD, CT

**5-in-1 fantasy: Giralope.**



**5-on-1 reality: Bruker's range of analytical tools for SEM.**



EDS, EBSD, WDS, Micro-XRF and Micro-CT – **Bruker is the world's only manufacturer to offer five analysis methods for SEM.** Plus, our new ESPRIT 2.0 software not only controls our QUANTAX EDS and QUANTAX CrystAlign EBSD but also, via its functional interface, our innovative new XSense WD spectrometer and XTrace micro-spot X-ray source. And because we know what you expect of us, we are already thinking about our next innovation. **Someone has to be first.**



[www.bruker-5on1.com](http://www.bruker-5on1.com)

Innovation with Integrity

Nano-Analysis



# THE NEW DESK V THE GOLD STANDARD IN SAMPLE PREPARATION



Now upgraded with storage for up to ten recipes and a color touch screen display, the Desk V HP delivers breakthrough electron microscopy sample preparation.

## DENTON VACUUM

BARRIERS BECOME BREAKTHROUGHS

Visit us at:  
[www.dentonvacuum.com/mt](http://www.dentonvacuum.com/mt)



# Expand your Knowledge of Microscopy with MSA Membership!

**Whether your primary focus is in optical, electron or scanning probe microscopy, the biological or the physical sciences, MSA takes your knowledge to the next level!**

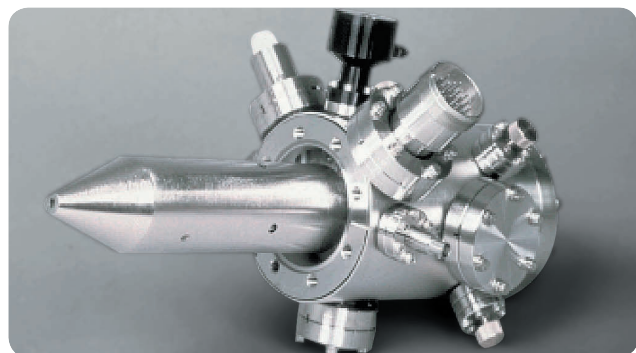
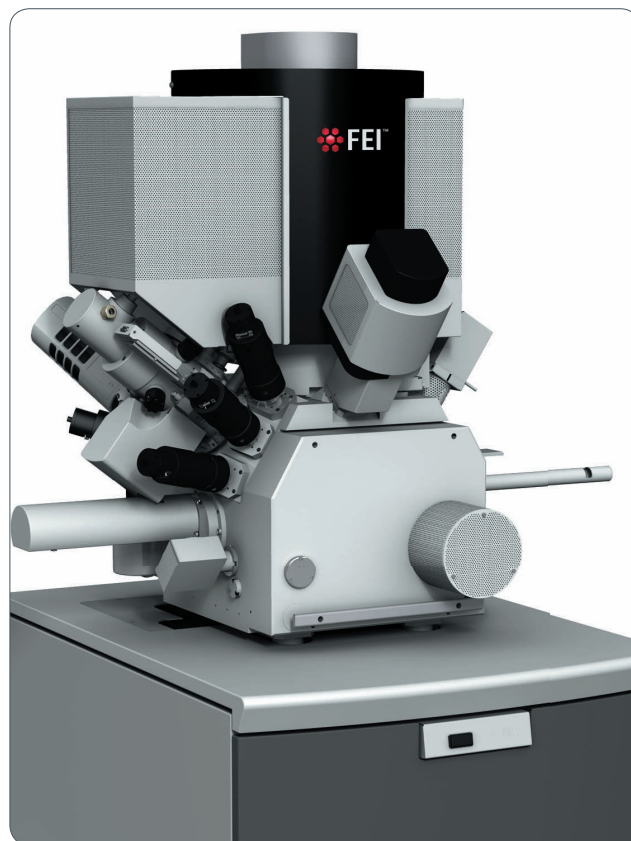
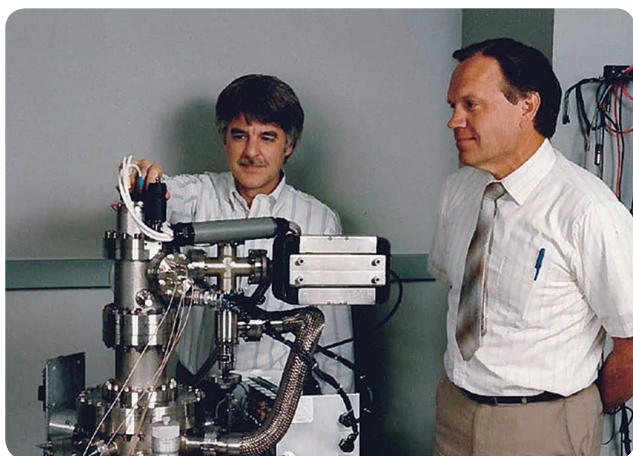
**Members Receive:**

- A personal subscription to MSA's official journal, *Microscopy and Microanalysis*, and MSA's popular bi-monthly magazine, *Microscopy Today*.
- Peer Networking through the Society's Focused Interest Groups and Local Affiliated Societies.
- Plus discounts on books, journals and other educational materials.
- MSA Awards Programs, Scholarships, Speaker Opportunities, and much more!



**Join MSA Today!**

For more information: visit [www.microscopy.org](http://www.microscopy.org) or call 1-800-538-3672



**(Top left)** Dave Tuggle and FEI founder Lyn Swanson working on an early edition FIB column. **(Bottom left)** A two-lens Schottky column. **(Right)** Helios NanoLab 660.

## Pioneering DualBeam Technology

Lynwood Swanson, the founder of FEI, was selected to receive the 2014 Pittcon Heritage Award. A pioneer in commercial electron microscopy, Swanson has enabled researchers around the world to explore the unseen.



**Thank you Mr. Swanson.**

[FEI.com/DualBeam](http://FEI.com/DualBeam) | Explore. Discover. Resolve.



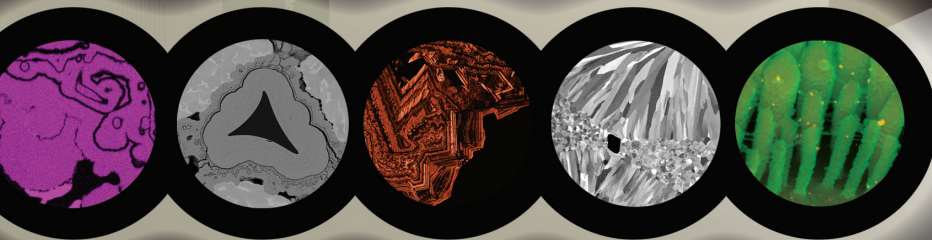
# FE SEM

## 7000 SERIES

**CHOOSE THE PERFECT FE SEM FOR ALL YOU DO**

- outstanding low kV/low vacuum performance
- high resolution imaging and nanoanalysis of structures, surface details, and magnetic samples
- high stable current with double condenser lens and aperture angle control lens
- multi-port chamber for in situ nanolab utility

*Budget-conscious labs and leading-edge research centers will find the ultra versatility, performance, and support to be the perfect fit.*



EDS

Backscatter

CL

Backscatter

Mixed SEBSE\*



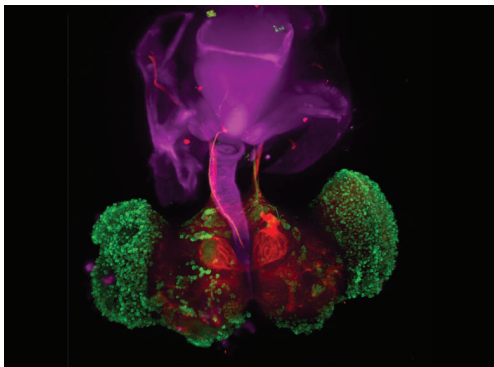
www.jeolusa.com  
salesinfo@jeol.com • 978-535-5900

[www.jeolusa.com/FESEM](http://www.jeolusa.com/FESEM)

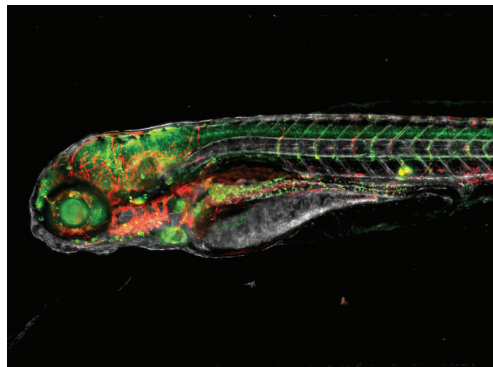


\* Courtesy of Dr. Artur Indzhukhian, Harvard Medical School

The moment your sample is visualized with perfect clarity.  
**This is the moment we work for.**



*Drosophila melanogaster, Adult Brain*  
Image courtesy of Ali Asgar Bohra and Prof. K. Vijay Raghavan, National Center for Biological Sciences / NCBS, Bangalore, India



*Zebrafish embryo*  
Image courtesy of Dr. Lingfei Luo, School of Life Science, Southwest University, China

Lightsheet Z.1 from ZEISS, a light sheet fluorescence microscope (LSFM), records the development of large, living samples and gently images them to deliver exceptionally high information content. Create multiview data sets of whole organisms at sub-cellular resolution with remarkable speed.

[www.zeiss.com/lightsheet](http://www.zeiss.com/lightsheet)



We make it visible.

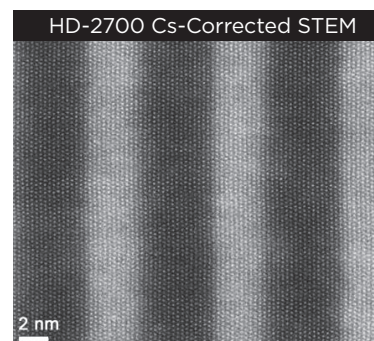
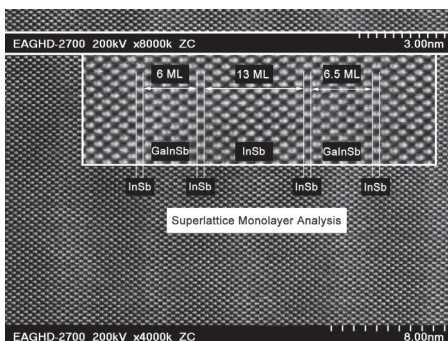
# AC-STEM Aberration Corrected Scanning Transmission Electron Microscopy

next generation of imaging tools capable of providing information at the Angstrom scale

The improvement in resolution and sensitivity that AC-STEM provides is universally applicable for investigations of nanometer scale materials.

We specialize in studies involving:

- ultrathin films
- nanoparticles
- complex interfaces
- multiphase materials
- interlayer mixing
- grain boundary engineering
- surface phenomena



We look forward to tackling your toughest materials problems!

Contact us today at [microscopy@eag.com](mailto:microscopy@eag.com) to learn more about our full suite of Materials Characterization techniques. Other microscopy tools available: SEM, EDS, Dual Beam, EBSD, EELS and more...



## International Centre for Diffraction Data



Make the **SMART** move to PDF-4+

- S**tandardized data
- M**ore coverage
- A**ll data sets are evaluated for quality
- R**eviewed, edited and corrected prior to publication
- T**argeted for material identification and characterization

**ELECTRON DIFFRACTION SIMULATIONS ON OVER 305,000 ENTRIES**

- Electron Diffraction Powder Pattern
- Interactive spot pattern display
- Electron diffraction backscatter pattern

**OVER 239,000 ENTRIES WITH ATOMIC COORDINATES**

ICDD databases are the only crystallographic databases in the world with quality marks and quality review process that are ISO certified.



Visit us at M&M Booth 1302



ICDD, the ICDD logo and PDF are registered in the U.S. Patent and Trademark Office. Powder Diffraction File is a trademark of JCPDS—International Centre for Diffraction Data.

[www.icdd.com](http://www.icdd.com) | [marketing@icdd.com](mailto:marketing@icdd.com)

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



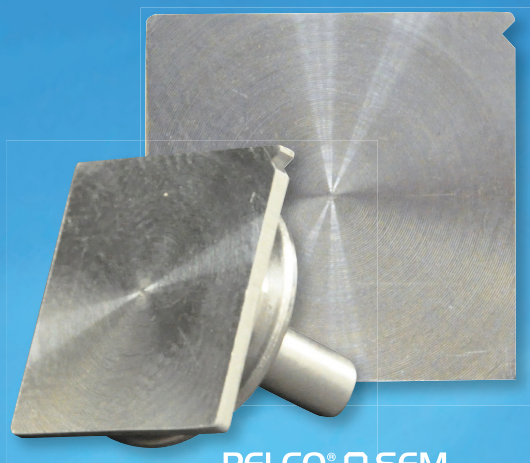
EM Coating Systems



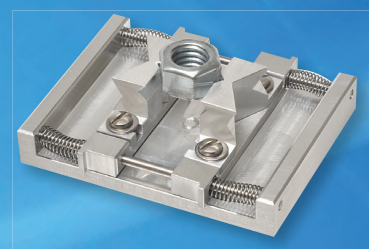
PELCO BioWave® Pro  
Tissue Processor



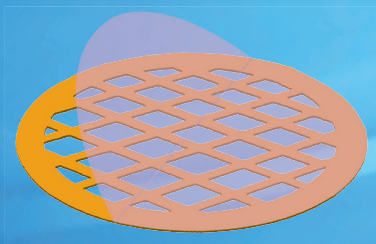
FIB Supplies



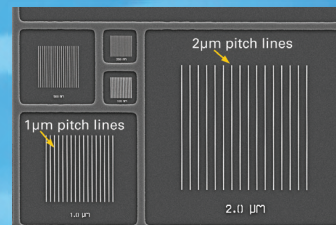
PELCO® Q SEM  
Correlative Pin Stubs



SEM Supplies



TEM Supplies

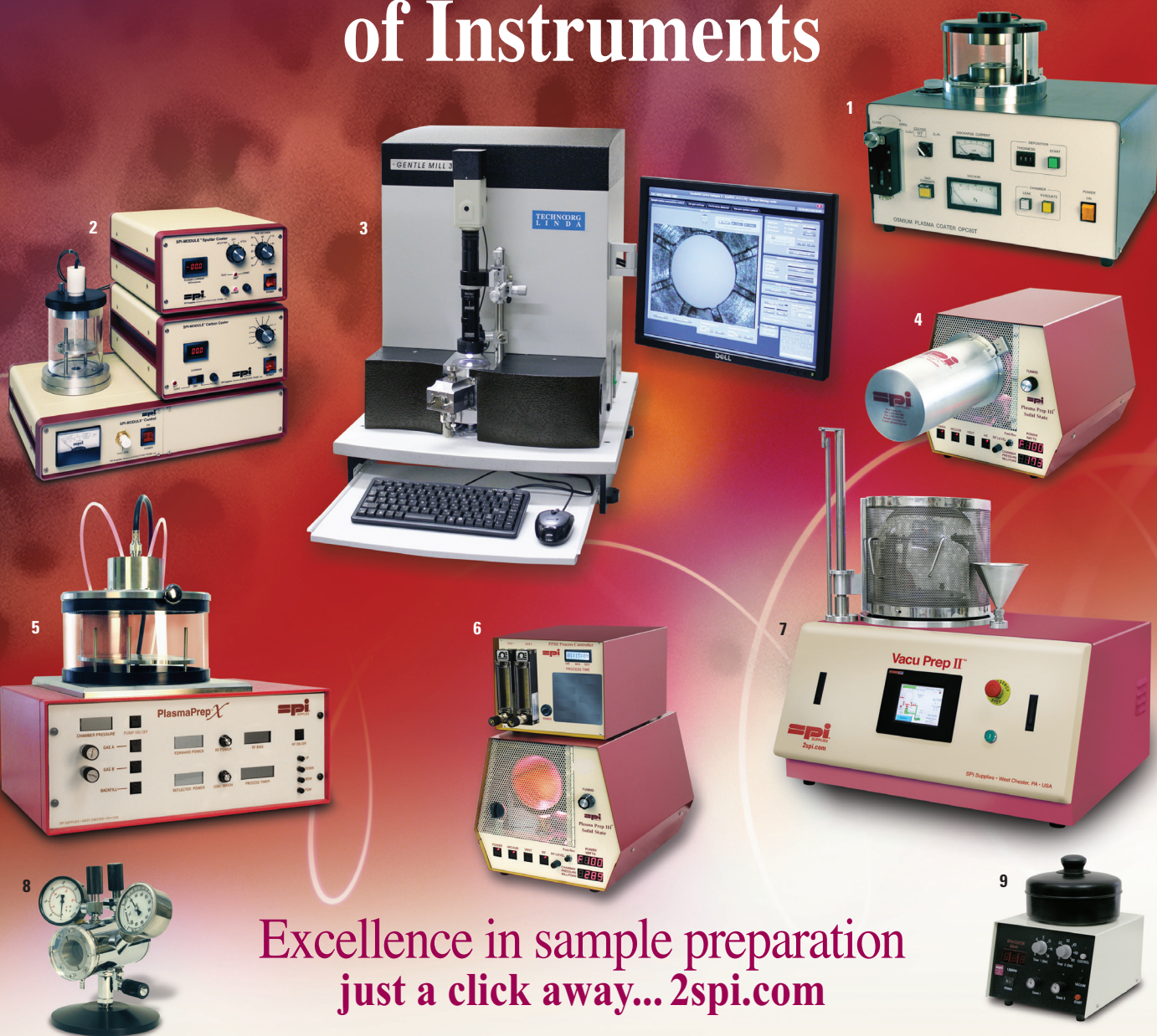


Microscope Calibration

**TED PELLA, INC.**  
Microscopy Products for Science and Industry

[www.tedpella.com](http://www.tedpella.com) [sales@tedpella.com](mailto:sales@tedpella.com) 800.237.3526

# The SPI Supplies Family of Instruments



Excellence in sample preparation  
just a click away... [2spi.com](http://2spi.com)

Your results will never be better than your sample preparation. See how SPI Supplies can help you deliver the highest quality results for all your SEM/EDS, TEM and FESEM applications.

1. **Osmium Plasma Coaters**  
for FESEM Applications
2. **SPI-MODULE™**  
Sputter/Carbon Coater Module
3. **Gentle Mill™**  
Ion Milling System
4. **Plasma Prep™ III Solid State**  
Plasma Cleaner for cleaning TEM holders

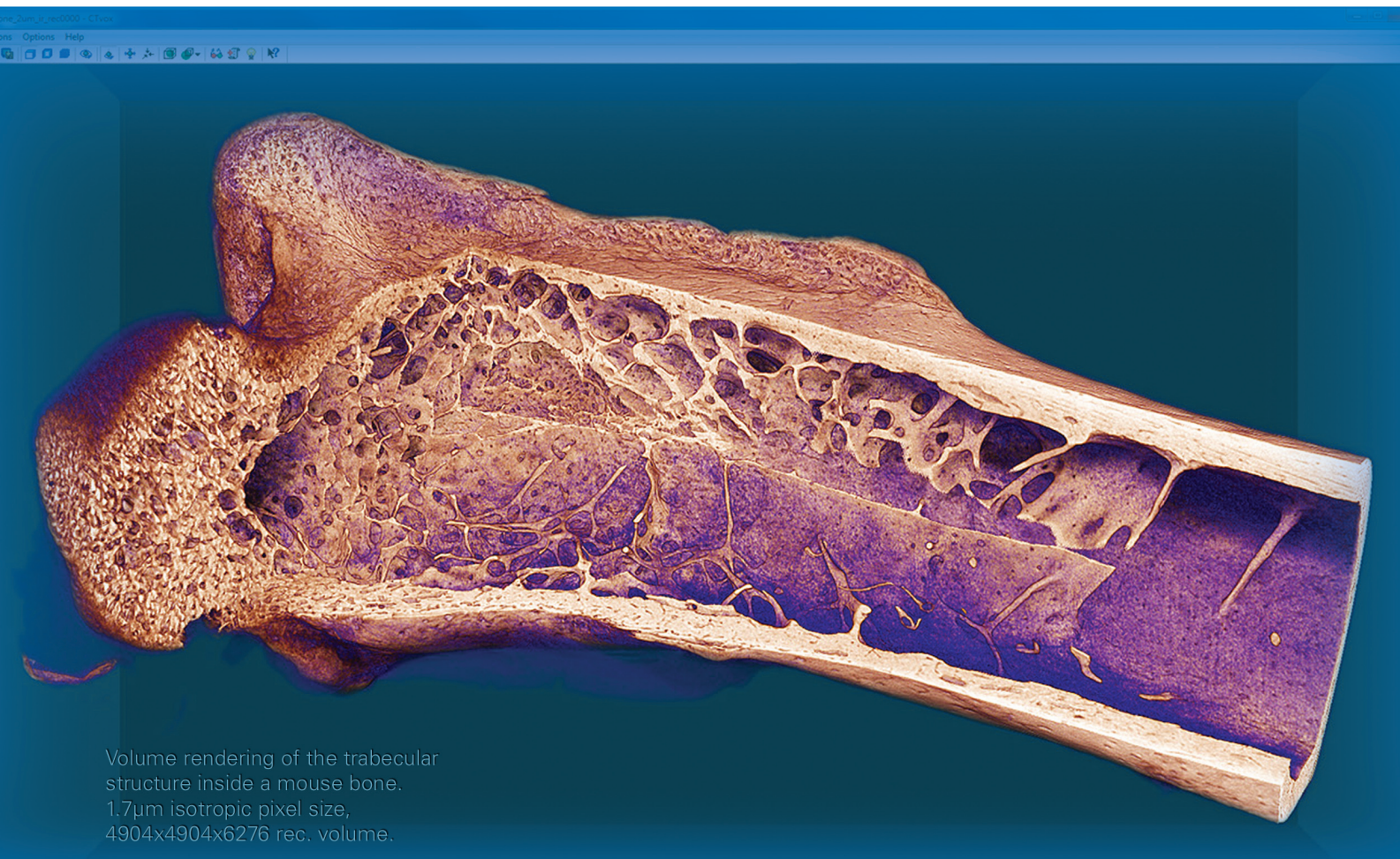
5. **Plasma Prep™ X**  
Parallel Plate Plasma Etcher
6. **Plasma Prep™ III Plasma Etcher**  
with PPIII Process Controller
7. **Vacu Prep™ II**  
Turbo Pump Evaporation System
8. **SPI-DRY™**  
Critical Point Dryer
9. **Precision Spin Coater**  
Spin coater



SPI Supplies Division of **STRUCTURE PROBE, Inc.**

P.O. Box 656 • West Chester, PA 19381-0656 USA  
Phone: 1-610-436-5400 • 1-800-2424-SPI (USA and Canada) • Fax: 1-610-436-5755 • [2spi.com](http://2spi.com) • E-mail: [sales@2spi.com](mailto:sales@2spi.com)

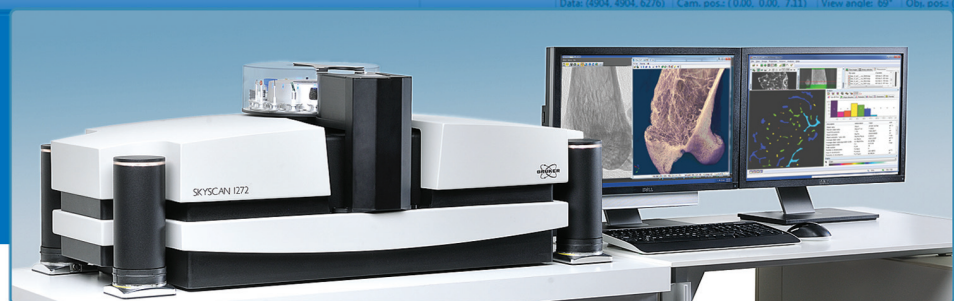




Volume rendering of the trabecular structure inside a mouse bone.  
1.7 $\mu$ m isotropic pixel size,  
4904x4904x6276 rec. volume.

## SKYSCAN 1272

Performance Beyond  
Researchers' Imaginations



free QR-reader app  
is available on the AppStore

- More than 200 Megapixel (14450 x 14450 pixels) in every virtual slice through objects,
- More than 2600 such slices can be reconstructed after a single scan,
- Due to phase-contrast enhancement, object details down to 0.4 $\mu$ m can be detected,
- 20-100kV maintenance-free X-ray source, 6-position automatic filter changer,
- Multithreaded GPU-accelerated 3D reconstruction for single computer or cluster,
- Maximum scanning diameter - 75mm, integrated micropositioning stage,
- 2D/3D image analysis, bone micromorphometry and volume rendering,
- 16-position sample changer with auto adjustment of magnification and scanning protocol,
- At the end of the scan the system can send you e-mail with a link to the results,
- The results can be exported to iPhone / iPad / Androids for 3D rendering by supplied software.

bruker-microct.com  
microtomography

Innovation with Integrity



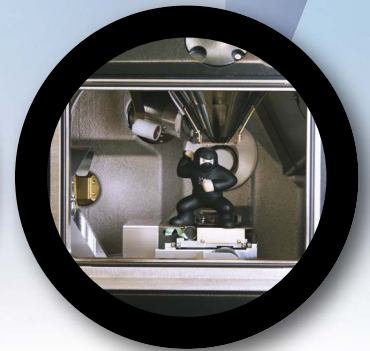
# EXPERIENCE THE LATEST INTOUCHSCOPE RESEARCH GRADE SEM

## IT300LV

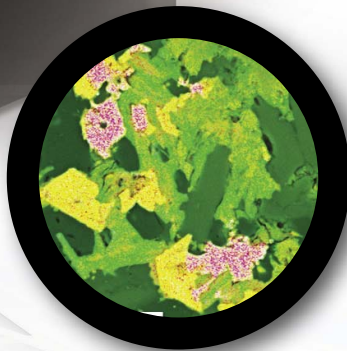
- Multi-touch interface
- High throughput microanalysis
- High vacuum to extended pressure
- Intuitive operation



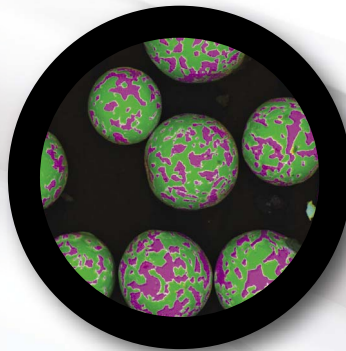
Smart analytical port geometries



Unique in-chamber stage



Geological thin section, elemental overlay  
1 frame, 9.8 seconds



Dual EDS, lead/tin  
wave solder powder



Silica beads,  
low kV SE image



www.jeolusa.com  
salesinfo@jeol.com • 978-535-5900