

Volume 17, Number 3

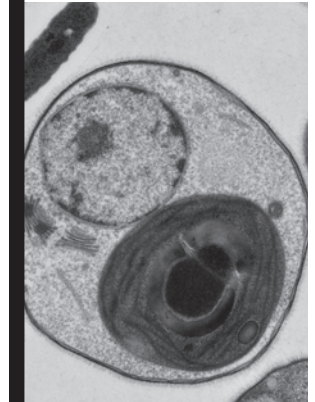
June 2011

Microscopy AND Microanalysis



CAMBRIDGE
UNIVERSITY PRESS

ISSN 1431-9276



Your image starts

HERE

Join the
Perfect 10⁻⁹ Group today.
[leica-microsystems.com/
yourimage](http://leica-microsystems.com/yourimage)

A perfect 10⁻⁹

... is only possible with perfect EM
sample preparation.

No matter what type of imaging instrument you use; TEM, SEM, LM, Confocal or AFM, the ultimate quality of the image comes from high-quality sample preparation. Leica Microsystems has a full range of innovative instrumentation to deliver perfect preparation for all sample materials.

- Sectioning
- Processing
- Staining
- Planing
- Target Polishing
- Ion Milling
- Contrasting
- High Pressure Freezing
- Cryoprocessing and Transfer
- Coating and Drying

A **perfect 10⁻⁹**! See the difference Leica Microsystems quality can make for you.

Visit www.leica-microsystems.com/yourimage

Living up to Life

Leica

MICROSYSTEMS

Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

THE OFFICIAL JOURNAL OF

MICROSCOPY SOCIETY OF AMERICA
MICROBEAM ANALYSIS SOCIETY
MICROSCOPICAL SOCIETY OF CANADA /
SOCIÉTÉ DE MICROSCOPIE DU CANADA
MEXICAN MICROSCOPY SOCIETY
BRAZILIAN SOCIETY FOR MICROSCOPY AND MICROANALYSIS
VENEZUELAN SOCIETY OF ELECTRON MICROSCOPY
EUROPEAN MICROBEAM ANALYSIS SOCIETY
AUSTRALIAN MICROSCOPY AND MICROANALYSIS SOCIETY
PORTUGUESE SOCIETY FOR MICROSCOPY

PUBLISHED IN AFFILIATION WITH

ROYAL MICROSCOPICAL SOCIETY
GERMAN SOCIETY FOR ELECTRON MICROSCOPY
BELGIAN SOCIETY FOR MICROSCOPY
MICROSCOPY SOCIETY OF SOUTHERN AFRICA

Editor in Chief

Editor, Biological Applications

Robert L. Price
Cell and Developmental Biology and
Anatomy
University of South Carolina
Columbia, SC 29209
e-mail: Bob.Price@uscmed.sc.edu

Editor, Materials Applications

David J. Smith
Department of Physics
School of Materials
Arizona State University
Tempe, Arizona 85287-1504
e-mail: david.smith@asu.edu

Editor, Scanning Probe Microscopies

Phillip Russell
Physics and Astronomy
Appalachian State University
Boone, North Carolina 28608
e-mail: russllp@appstate.edu

Editor, Atom Probe

Thomas Kelly
Cameca Instruments, Inc.
A Business Unit of AMETEK, Inc.
Madison, WI 53711-4951
e-mail: Thomas.Kelly@ametek.com

Editor, Light and Fluorescence Microscopies

Brian Herman
Cellular and Structural Biology
University of Texas at San Antonio
San Antonio, Texas 78284-7762
e-mail: hermanb@uthscsa.edu

Editor, Biological Applications

Heide Schatten
Veterinary Pathobiology
University of Missouri-Columbia
Columbia, Missouri 65211-5030
e-mail: schattenh@missouri.edu

Editor, Microanalysis

John Mansfield
Electron Microbeam Analysis Lab
North Campus, 417 SRB
University of Michigan
Ann Arbor, MI 48109-2143
e-mail: jfmjfm@umich.edu

Editor, Correlative and Emerging Microscopy Applications

Vinayak P. Dravid
Materials Science and Engineering
Northwestern University
Evanston, Illinois 60208-3105
e-mail: v-dravid@northwestern.edu

Special Issues and Reviews Editor

Jay Jerome
Vanderbilt University Medical Center
Nashville, TN 37232
e-mail: jay.jerome@vanderbilt.edu

Book Review Editor

Cynthia S. Goldsmith
Centers for Disease Control
Atlanta, GA 30333
e-mail: csg1@cdc.gov

Calendar Editor

Nan Yao
Princeton University
Princeton, NJ 08540
e-mail: nyao@Princeton.edu

Expo Editor

Richard E. Edelmans
Miami University
Oxford, OH 45056
e-mail: edelmare@muohio.edu

Proceedings Editor

John Shields
University of Georgia
Athens, GA 30602
e-mail: jpshield@uga.edu

Editorial Board

Ralph Albrecht	<i>University of Wisconsin, Madison, Wisconsin</i>
Barry Carter	<i>University of Connecticut, Storrs, Connecticut</i>
Wah Chiu	<i>Baylor College of Medicine, Houston, Texas</i>
Niels de Jonge	<i>Vanderbilt University School of Medicine</i>
Elizabeth Dickey	<i>Pennsylvania State University, University Park, Pennsylvania</i>
Alwyn Eades	<i>Lehigh University, Bethlehem, Pennsylvania</i>
Mark Ellisman	<i>University of California at San Diego, San Diego, California</i>
Pratibha Gai	<i>University of York, United Kingdom</i>
Marija Gajdardziska-Josifovska	<i>University of Wisconsin-Milwaukee, Milwaukee, Wisconsin</i>
Dale Johnson	<i>University of South Florida, Tampa, Florida</i>
Paul Kotula	<i>Sandia National Labs, Albuquerque, New Mexico</i>
William Landis	<i>Northeastern Ohio Universities College of Medicine, Rootstown, Ohio</i>
Eric Lifshin	<i>SUNY at Albany, Albany, New York</i>
Charles Lyman	<i>Lehigh University, Bethlehem, Pennsylvania</i>
Dale Newbury	<i>National Institute of Standards and Technology, Gaithersburg, Maryland</i>
Jean-Paul Revel	<i>California Institute of Technology, Pasadena, California</i>
Conly Rieder	<i>Wadsworth Center, Albany, New York</i>
John Silcox	<i>Cornell University, Ithaca, New York</i>
Nestor Zaluzec	<i>Argonne National Laboratory, Argonne, Illinois</i>

Editorial Board Representatives from Affiliated Societies

Ian Anderson	<i>NIST, Gaithersburg, Maryland (MAS)</i>
Gema Gonzalez	<i>Venezuelan Institute for Scientific Investigation (Venezuela)</i>
Michael Robertson	<i>Acadia University, Wolfville, Nova Scotia (Canada)</i>
Brendan Griffin	<i>University of Western Australia (AMMS)</i>
Guillermo Solorzano	<i>Pontificia Universidade Catolica, Rio de Janeiro (Brazil)</i>
Clive Walker	<i>Institute for Transuranium Elements, Karlsruhe (EMAS)</i>
Miguel Yacaman	<i>Mexico Institute for Nuclear Research (Mexico)</i>
Henrique Almeida	<i>Universidade do Porto (Portugal)</i>

Founding Editor

Jean-Paul Revel	<i>California Institute of Technology, Pasadena, California</i>
-----------------	---

Previous Editors-in-Chief

Dale Johnson	<i>University of South Florida, Tampa, Florida</i>
Charles Lyman	<i>Lehigh University, Bethlehem, Pennsylvania</i>

This journal is part of the **Cambridge Journals Online** service. Access to online tables of contents and article abstracts is available to all researchers at no cost. Access to full-text articles online is provided to those with online subscription. Online subscriptions must be activated. Once your subscription is activated, free access to past, present, and forthcoming articles is available at:

Microscopy and Microanalysis website: journals.cambridge.org/MAM.

Instructions for authors submitting manuscripts may be found at journals.cambridge.org/MAM. Select "Further Information" then select "Instructions for Contributors." An abbreviated version of these instructions will be published in the first issue (February) of each volume.



Cooling Stages

Recirculating Heaters
and Chillers

Film Thickness Monitors

Sputter Coaters

SEM/TEM Carbon Coaters

Vacuum Evaporators

Glow Discharge Systems

RF Plasma Etchers/
Plasma Reactors

Critical Point Dryers

Freeze Dryers

Cryo-SEM Preparation
Systems

Vacuum Pumps & Accessories

Evaporation Supplies

well equipped...

EMS is committed to providing the highest quality products along with competitive pricing, prompt delivery and outstanding customer service.

not just products...

Electron Microscopy Sciences is pleased to announce that a new brochure for electron microscope specimen preparation equipment is available, including 20 pages of articles reviewing electron microscope preparation techniques. These are:

- Sputter Coating Techniques and Applications
- Silver as a Removable Coating for Scanning Electron Microscopy
- Carbon Coating Techniques and Applications
- Plasma Etching and Ashing Techniques and Applications
- A summary of the Critical Point Drying Method
- Freeze Drying Principles
- Cryo-SEM — the Advantages



The new brochure as well as the EMS printed catalog and CD-ROM eBook can be ordered on line.

For more information, please visit our website at www.emsdiasum.com



**Electron
Microscopy
Sciences**

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 • www.emsdiasum.com

Microscopy and Microanalysis publishes original research papers dealing with a broad range of topics in microscopy and microanalysis. These include articles describing new techniques or instrumentation and their applications, as well as papers in which established methods of microscopy or microanalysis are applied to important problems in the fields of biology or materials science. Microscopy and microanalysis are defined here in a broad sense, and include all current and developing approaches to the imaging and analysis of microstructure. The criteria for acceptance of manuscripts are the originality and significance of the research, the quality of the microscopy or microanalysis involved, and the interest for our readership.

Four types of communications are published in the Journal. **Regular Articles** are of substantial length and describe the findings of an original research project that satisfies the aims and scope of the Journal, described above. **Review Articles** summarize the current status of an important area within the aims and scope of the Journal. **Letters to the Editor** usually contain comments on recent articles that have appeared in the Journal. **Book Reviews** are also published, but these are solicited only through the Book Review Editor.

Instructions for Contributors

Instructions for authors contributing manuscripts may be found at <http://mc.manuscriptcentral.com/mam> under "Resources: Instructions and Forms." Authors may also visit http://www.journals.cambridge.org/jid_MAM, select "Further Information," and then select "Instructions for Contributors." An abbreviated version of these instructions will be published in the first issue (February) of each volume.

Copyright Information

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the Microscopy Society of America; that the manuscript will not be published elsewhere in any language without the consent of the copyright holders; and that written permission of the copyright holder is obtained by the authors for material used from other copyrighted sources.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names lack protection by the relevant laws and regulation.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Cambridge University Press, provided that the appropriate fee is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA (Tel: (508) 750-8400), stating the ISSN (1431-9276), the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Disclaimer

The Microscopy Society of America, the other societies stated, and Cambridge University Press cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal. The appearance of scientific reports and/or workshops, or any other material in *Microscopy and Microanalysis* does not constitute an endorsement or approval by The Microscopy Society of America of the findings, data, conclusions, recommendations, procedures, results, or any other aspect of the content of such articles. The appearance of advertising in *Microscopy and Microanalysis* does not constitute an endorsement or approval by The Microscopy Society of America of the quality or value of the products advertised or any of

the claims, data, conclusions, recommendations, procedures, results, or any other information included in the advertisements.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made.

Subscription Information

Microscopy and Microanalysis is published bimonthly in February, April, June, August, October, and December by Cambridge University Press. Two supplements (*Expo* and *Proceedings*) are published in June and August.

Society Rates: Members of the Microscopy Society of America should contact the MSA Business Office for all subscription inquiries: Microscopy Society of America, Hachero Hill, Inc., 11260 Roger Bacon Drive, Suite 402, Reston, VA 20190, Tel.: (703) 964-1240, Ext. 14, E-mail: nicoleguy@mindspring.com, URL: www.msa.microscopy.org. Members of other affiliated societies should contact their respective society business offices for all subscription inquiries.

Subscription Rates: Institutions print and electronic: US \$957.00 in the USA, Canada, and Mexico; UK £577.00 + VAT elsewhere. Institutions online only: US \$790.00 in the USA, Canada, and Mexico; UK £478.00 + VAT elsewhere. Institutions print only: US \$863.00 in the USA, Canada, and Mexico; UK £520.00 + VAT elsewhere. Individuals print and online: US \$359.00 in the USA, Canada, and Mexico; UK £218.00 + VAT elsewhere. Prices include postage and insurance.

USA, Canada, and Mexico: Subscribers in the USA, Canada, and Mexico should send their orders, with payment in US dollars or the equivalent value in Canadian dollars, to: Cambridge University Press, Customer Services Department (Journals), 100 Brook Hill Drive, West Nyack, NY 10994-2133, USA. Tel: (845) 353-7500. Fax: (845) 353-4141. Orders may be phoned direct (toll free): (800) 872-7423. E-mail: journals_subscriptions@cup.org.

Outside North America: Subscribers elsewhere should send their orders, with payment in sterling, to: Customer Services Department (Journals), Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge, CB2 8RU, UK. Tel: +44 (0)1223 326070. Fax: +44 (0)1223 325150. E-mail: journals@cambridge.org

Change of address: Allow six weeks for all changes to become effective. All communications should include both old and new addresses (with postal codes) and should be accompanied by a mailing label from a recent issue. Society members should contact their respective society business offices to inform them of address changes.

Microform editions are available from: University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106, USA.

Editorial Office

Robert L. Price, Editor in Chief, Department of Cell and Developmental Biology and Anatomy, School of Medicine, University of South Carolina, 6439 Garner's Ferry Road, Bldg. 1 B-60, Columbia, SC 29209, USA; Tel: (803) 216-3824; Fax: (803) 733-3212; E-mail: Bob.Price@uscmed.sc.edu.

Office of Publication

Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473, USA; Tel: (212) 337-5000; Fax: (212) 337-5959.

Advertising Sales & Production

M.J. Mrvica Associates, Inc., 2 West Taunton Avenue, Berlin, NJ 08009, USA; Tel: (856) 768-9360; Fax: (856) 753-0064.

© 2011 by Microscopy Society of America. Printed in the United States on acid-free paper. Periodicals postage paid at New York, NY, and additional mailing offices. Return postage guaranteed. Postmaster: Send address changes in the U.S.A. and Canada to *Microscopy and Microanalysis*, Subscription Department, Cambridge University Press, 100 Brook Hill Drive, West Nyack, NY 10994-2133.

Preparation Equipment and Microscopy Supplies

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



- Vacuum Coating Systems
- Calibration Standards
- PELCO® easiGlow™ Glow Discharge Unit
- SEM Sample Holders and Mounts
- Silicon Nitride TEM Membranes
- PELCO BioWave Pro® Tissue Processor
- TEM Support Films



- AFM Supplies
- Quality Laboratory Tweezers
- Vacuum Pick-up Systems
- Digital Stereo Microscopes
- Conductive Adhesives
- FIB Supplies



Complete line of compact Cressington EM Sample Coaters.

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

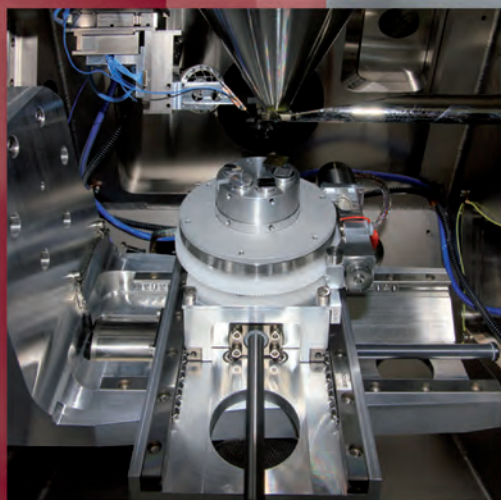
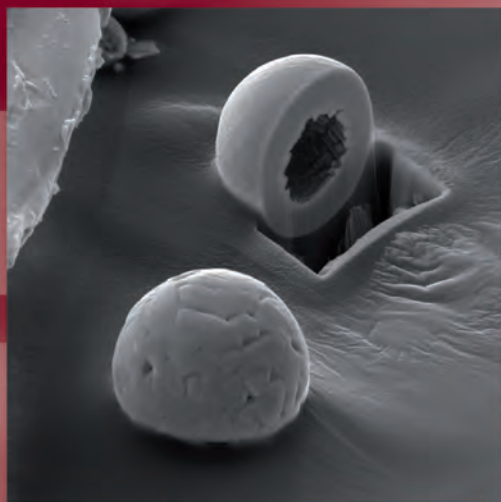
sales@tedpella.com

800-237-3526

www.tedpella.com

LYRA3

High Resolution Scanning Electron Microscope
with Focused Ion Beam for nano-scale imaging, analysis,
manipulation and surface modification



www.tescan.com

 **TESCAN**
PERFORMANCE IN NANOSPACE

TESCAN USA, 508 Thomson Park Drive, Cranberry Twp., PA 16066, Tel: 724-772-7433, Email: info@tescan-usa.com

Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

Volume 17, Number 3

June 2011

ELECTRON BACKSCATTER DIFFRACTION SPECIAL SECTION

Introduction

Introduction to a Special Issue on Electron Backscatter Diffraction 315

Andrew Deal

Review Article

A Review of Strain Analysis Using Electron Backscatter Diffraction 316

Stuart I. Wright, Matthew M. Nowell, and David P. Field

Pattern Center Determination in Electron Backscatter Diffraction Microscopy 330

Jay Basinger, David Fullwood, Josh Kacher, and Brent Adams

Cover Article

Influence of Crystallographic Texture on Young's Modulus of Various Alloy 82H Welds 341

Steven R. Claves and William J. Mills

The Microstructure and Creep Behavior of Cold Rolled Udimet 188 Sheet 350

C.J. Boehlert and S.C. Longanbach

Strain-Induced Selective Growth in 1.5% Temper-Rolled Fe~1%Si 362

Tricia A. Bennett, Peter N. Kalu, and Anthony D. Rollett

Application of Electron Backscatter Diffraction Techniques to Quenched and Partitioned Steels 368

Grant Thomas, John Speer, David Matlock, and Joseph Michael

An Open-Source Engine for the Processing of Electron Backscatter Patterns: EBSD-Image 374

Philippe T. Pinard, Marin Lagacé, Pierre Hovington, Denis Thibault, and Raynald Gauvin

MATERIALS APPLICATIONS

Focused Ion Beam Induced Microstructural Alterations: Texture Development, Grain Growth, and Intermetallic Formation 386

Joseph R. Michael

Dynamical Diffraction Simulations in FePt—I 398

Karen L. Torres, Richard R. Vanfleet, and Gregory B. Thompson

Comparison of Simulated and Experimental Order Parameters in FePt—II 403

Karen L. Torres, Richard R. Vanfleet, and Gregory B. Thompson



On the Cover: Grain map of a hot wire annealed cross section surface displaying the orientation of grains. For details see Claves and Mills, pages 341–349.

Microscopy and Microanalysis website: <http://www.journals.cambridge.org/MAM>
Indexed in Chemical Abstracts, Current Contents, BIOSIS, and MEDLINE (PubMed)

- Bridging the Micro-to-Macro Gap: A New Application for Micro X-Ray Fluorescence 410
Jeffrey M. Davis, Dale E. Newbury, Albert Fahey, Nicholas W.M. Ritchie, Edward Vicenzi, and Dale Bentz

- Atomic-Scale Phase Composition through Multivariate Statistical Analysis of Atom Probe Tomography Data 418
Michael R. Keenan, Vincent S. Smentkowski, Robert M. Ulfing, Edward Oltman, David J. Larson, and Thomas F. Kelly

BIOLOGICAL APPLICATIONS

- Ndc80 Regulates Meiotic Spindle Organization, Chromosome Alignment, and Cell Cycle Progression in Mouse Oocytes 431
Shao-Chen Sun, Ding-Xiao Zhang, Seung-Eun Lee, Yong-Nan Xu, and Nam-Hyung Kim

- Staining of Mitochondria with Cy5-Labeled Oligonucleotides for Long-Term Microscopy Studies 440
Steffen Lorenz, Stephanie Tomcin, and Volker Mailänder

- Analysis of Roughness and Surface Hardness of a Dental Composite Using Atomic Force Microscopy and Microhardness Testing 446
Marcos Aurélio Bomfim da Silva, Aline Barbirato Fardin, Renata Carvalho Cabral de Vasconcellos, Lucineide de Melo Santos, Josealdo Tonholo, José Ginaldo da Silva Júnior, and José Ivo Limeira dos Reis

- Analysis of Elemental Composition of the Eggshell before and after Incubation in the Loggerhead Turtle (*Caretta caretta*) in Oman 452
S.N. Al-Bahry, I.Y. Mahmoud, K. Melghit, and I. Al-Amri

- Morphology of Foliar Trichomes of the Chinese Cork Oak *Quercus variabilis* by Electron Microscopy and Three-Dimensional Surface Profiling 461
Ki Woo Kim, Do-Hyun Cho, and Pan-Gi Kim

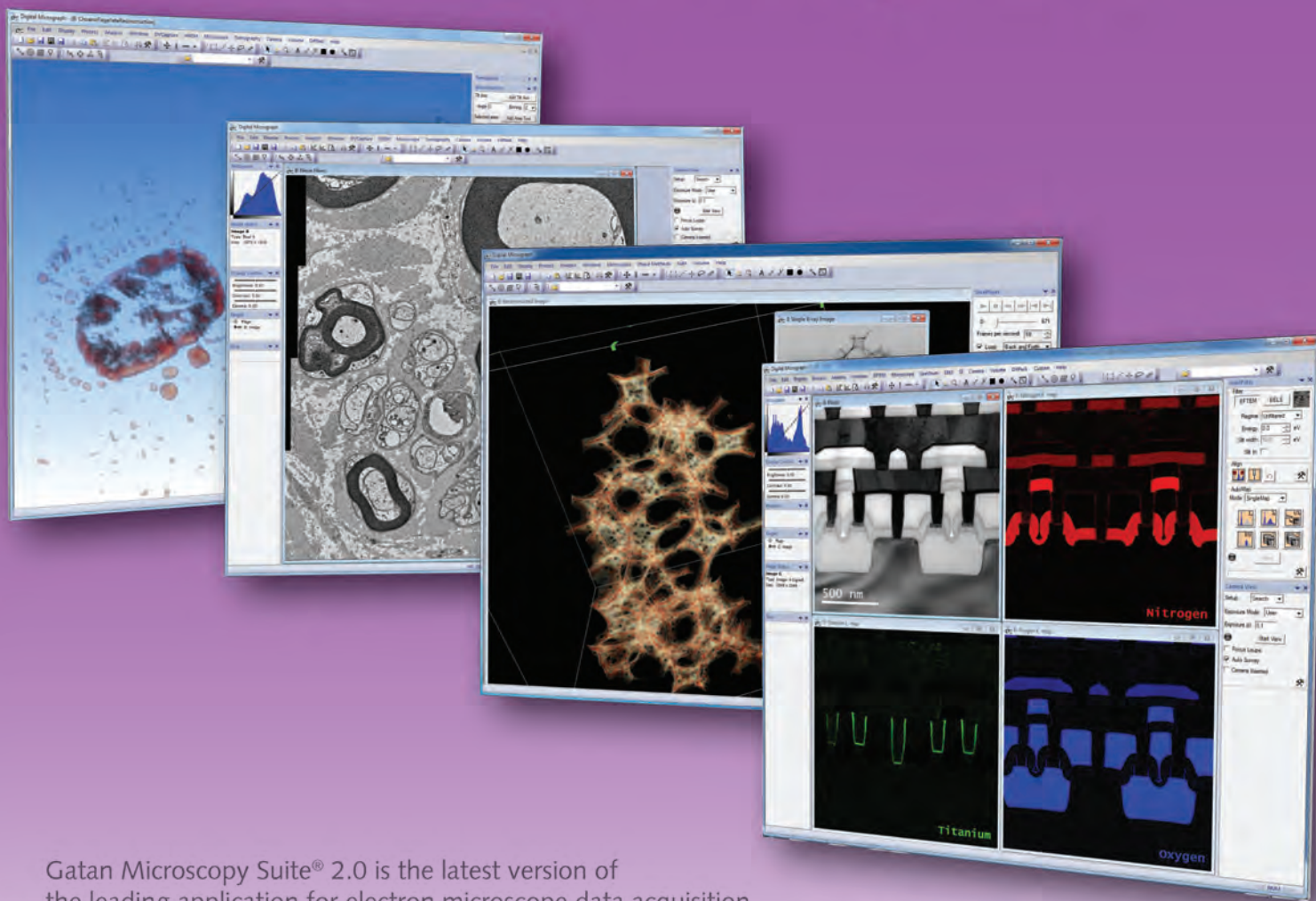
BOOK REVIEW

- Scanning Force Microscopy of Polymers*, by Holger Schönherr and G. Julius Vancso 469
Paolo Samorì

- CALENDAR OF MEETINGS AND COURSES** 470

GMS 2.0

Freedom to Explore



Gatan Microscopy Suite® 2.0 is the latest version of the leading application for electron microscope data acquisition and analysis. This new version of the Gatan Microscopy Suite® (GMS) supports the Windows 7 operating system and comes in both 32-bit and 64-bit versions. GMS 2.0 has a modern look and feel and includes completely updated software for EELS/EFTEM acquisition, microscope tuning, and calibration support. The 64-bit version can handle large data sets with ease giving you more freedom to explore and enhancing your research capabilities.

GMS 2.0



www.gatan.com

ANALYTICAL TEM
DIGITAL IMAGING
SPECIMEN PREPARATION
TEM SPECIMEN HOLDERS
SEM PRODUCTS
SOFTWARE
X-RAY MICROSCOPY

SPI Supplies. Vacu Prep II™

- Clean
- Fast
- Easy
- Reliable
- Turbo molecular pump



just a click away.

2spi.com/vacuprep2

The SPI Supplies Vacu Prep II™ is a fast, clean, high vacuum, bench top evaporator with simple automated operation for evaporation or sputtering. It utilizes solid state electronics to control the pumpdown, evaporation and venting sequences. A turbo molecular pump is the heart of the system, but it still fits on the bench top.

Safe, reliable, and easy to maintain, the Vacu Prep II can be used for routine carbon coating or the evaporation of various metals and materials.

With quick pump down times, the system can quickly achieve an ultimate base vacuum in the 10^{-7} torr range. The Vacu Prep II features a large baseplate that accommodates more feed-throughs, more fixturing, and more applications.

Short Pump Down Cycles

The compound turbo molecular pump operates at a speed of 65 liters/second to achieve excellent base vacuum levels and gas load handling.

Powerful Control System

A touch screen interface provides full control for the following modes: service, manual, and semi-automatic. Standard software makes it easy to support and avoid costly customization fees. The safety interlock will mitigate damage to the operator and equipment.

Typical Applications

- Electron Microscopy Sample Preparation
- High-Vacuum Carbon Coating for TEM and X-Ray Analysis
- Resistance Evaporation of Metallic Compounds
- Carbon Support Films
- Carbon Platinum Replicas
- Rotary Shadowing
- Aperture Cleaning
- Asbestos Analysis
- Failure Analysis

The Vacu Prep II has a size of 31" w (78.7 cm) x 28" d (71.1 cm) x 30" h (76.2 cm) and weighs 250 lb (113.4 kg). Large chamber up to 12" diameter (30.5 cm) x 18" h (45.7 cm) provides ample space for evaporation and sputtering applications.

It is available in 110V (12200-AB) and 220V models.



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 • E-mail: sales@2spi.com



Flash & Go™

ARM200F TEM with Cold FEG

GaN [211] HAADF at 200 kV

ABF, HAADF and EELS
 $\text{Ca}_3\text{Co}_4\text{O}_9$ (110)

Data courtesy of Dr. Robert Klie,
University of Illinois at Chicago

Visualization of hydrogen atomic columns in YH_2
by ABF imaging (Y = red, H = green) Data courtesy
of Ryo Ishikawa and Dr. Eiji Abe (The University of Tokyo)

Unrivalled flash speed
Unrivalled raw data

Visit www.jeolusa.com/FlashandGo

Atomic Resolution S/TEM



JEOL

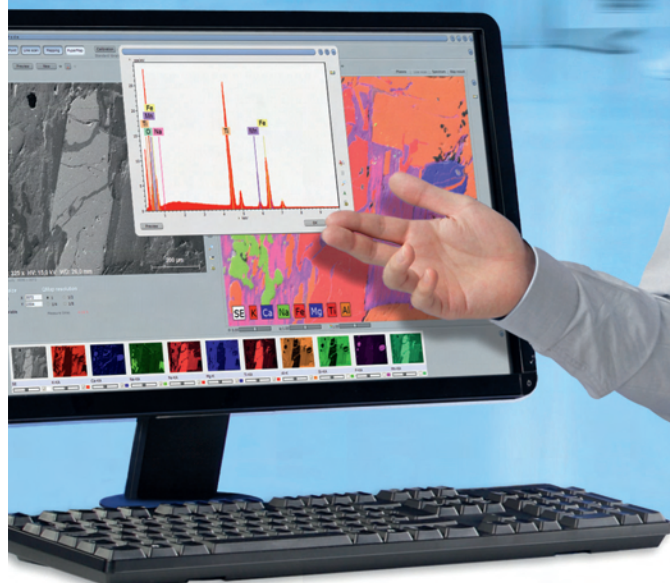
Another
Extreme Imaging
Solution

Global Solutions Provider for Advanced Technology
www.jeolusa.com • salesinfo@jeol.com
978-535-5900





QUANTAX – Ultimate EDS for SEM and TEM



- Data collection at the highest speed and at the best resolution you can get – first class results no matter the circumstance
- Excellent light element performance with $\text{Mn K}\alpha \leq 123 \text{ eV}$ ($\text{F K}\alpha \leq 54 \text{ eV}$, $\text{C K}\alpha \leq 46 \text{ eV}$) even at 100,000 cps
- Best acquisition conditions for sensitive and rough samples through unique multi-detector systems and optimum geometry using VZ-Adapters
- Genuine standardless P/B-ZAF quantification for rough samples and VZ applications, Cliff-Lorimer quantification for TEM

www.bruker.com/microanalysis

Introducing AZtec[®]

A-Z technology for nanoanalysis



new
exciting

flexible
innovative

The most powerful,
most flexible materials
characterisation system
you'll ever see.

Visit the website,
see a demonstration,
watch a webinar.

email: AZtec@oxinst.com
www.oxford-instruments.com/AZtec

also find us at [facebook.com/oxinst](https://www.facebook.com/oxinst) • twitter.com/oxinst • [youtube.com/oxinst](https://www.youtube.com/oxinst)

OXFORD
INSTRUMENTS

The Business of Science[®]



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

Free customer service

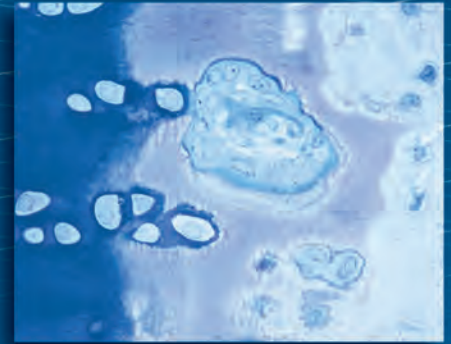
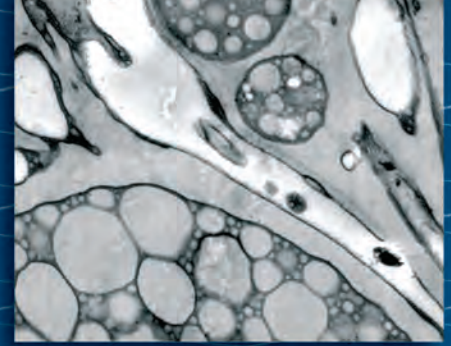
Sectioning tests with biological and material research specimens of all kinds. We send you the sections along with the surfaced sample, a report on the results obtained and a recommendation of a suitable knife. Complete discretion when working with proprietary samples.

Re-sharpening and reworking service

A re-sharpened Diatome diamond knife demonstrates the same high quality as a new knife. Even knives purchased in previous years can continue to be re-sharpened. The knives can be reworked into another type of knife for no extra charge, e.g. ultra to cryo or 45° to 35°.

Exchange service

Whenever you exchange a knife we offer you a new Diatome knife at an advantageous price.



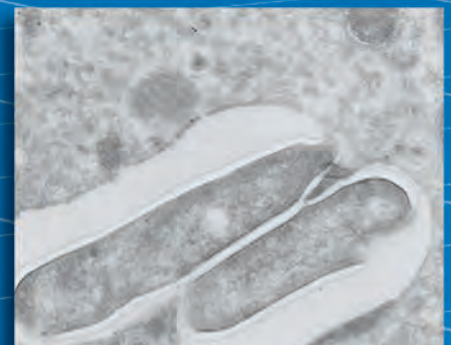
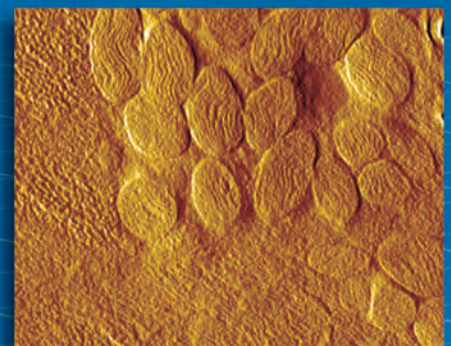
40 years of development,
manufacturing,
and customer service

DiATOME

diamond knives

Electron Microscopy Sciences
P.O. Box 550 • 1560 Industry Rd. • Hatfield, Pa 19440
Tel: (215) 412-8390 • Fax: (215) 412-8450
email: sgkck@aol.com • www.emsdiasum.com

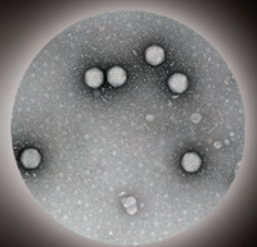
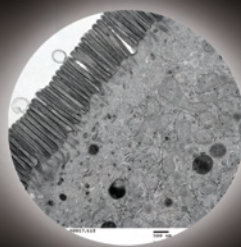
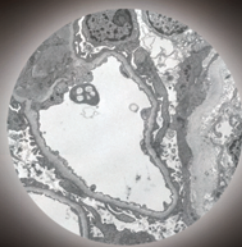
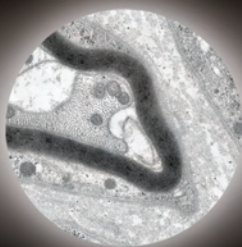
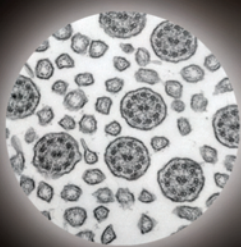
ultra 45° • cryo • histo • ultra 35° • STATIC LINE II
cryo-P • cryo immuno • ultra sonic • cryotrim 45 and 25
ultra AFM & cryo AFM • cryo 25°





High Definition Digital
TEM Cameras with
1 to 16 Megapixels

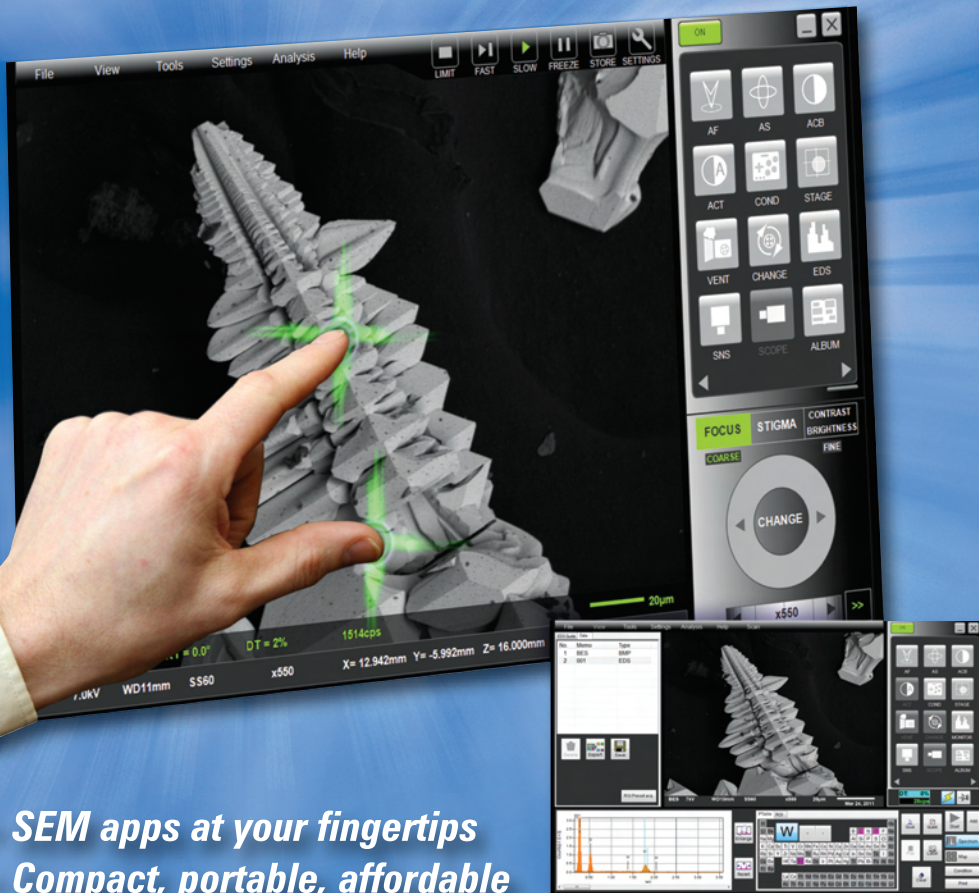
- AMT SOLUTIONS
- Life Science Cameras
- Material Science Cameras
- Easy To Use Software
- Reliability and Services
- TEM Integration
- Extensive Support



3 Electronics Avenue, Danvers, MA 01923 • Phone: 978.774.5550 • www.amtimaging.com

In TouchScope™

*Get in touch with
this new class of SEM*



- SEM apps at your fingertips
- Compact, portable, affordable
- Integrated EDS analysis
- Low vacuum – SE and BSE imaging
- Wireless tablet operation
- Award-winning service and support

High Performance
Multi-Touch SEM



JSM-6010LA

JEOL

Another
Extreme Imaging
Solution

Global Solutions Provider for Advanced Technology
www.jeolusa.com • salesinfo@jeol.com
978-535-5900

See it at
<http://www.jeolusa.com/intouch>