

Volume 26, Number 4 August 2020

# Microscopy AND Microanalysis



Includes manuscripts developed from the 15th  
Biennial Symposium of the Australian Microbeam  
Analysis Society, Brighton, Victoria, Australia,  
13-15 February 2019

Guest Editor: Dr. Colin MacRae

CAMBRIDGE  
UNIVERSITY PRESS

ISSN 1431-9276





looking for ways to  
**move forward**  
during these challenging times?

### Remote Product Demonstrations

Our knowledgeable specialists are ready to give you that trade show experience without the trade show inconvenience, right from your own home or lab. We're ready to show you whatever products you want to see and answer your questions via teleconference with a variety of options available.

### Remote Equipment Installations

Why wait for things to get back to normal? Take advantage of technology. Schedule an installation of your new equipment with a remote service call! Our technicians can walk you through installation via teleconference with a variety of options available.

### EMS Microscopy Academy

Small Class Size + Clean Facility = a really great way to grow your knowledge and stay healthy while you are doing it! At EMS Microscopy Academy you can take advantage of a classroom environment that is just right for the new normal. See our website for a full class listing.

Please contact us to start moving forward!

**Electron  
Microscopy  
Sciences**

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

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

Tel: (215) 412-8400 • Fax: (215) 412-8450  
email: [info@emsdiasum.com](mailto:info@emsdiasum.com)  
or [stacie@ems-secure.com](mailto:stacie@ems-secure.com)



---

# Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

---

THE OFFICIAL JOURNAL OF

MICROSCOPY SOCIETY OF AMERICA  
MICROANALYSIS 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  
ELECTRON MICROSCOPY SOCIETY OF INDIA

PUBLISHED IN AFFILIATION WITH

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

---

**Editor-in-Chief**

John Mansfield  
4304 Spring Lake Blvd.  
Ann Arbor, MI 48108-9657  
e-mail: thejfmjfm@me.com

**Administrative Editor**

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

**Biological Sciences Applications Editors**

W. Gray (Jay) Jerome  
Department of Pathology, Microbiology and  
Immunology  
U-2206 MCN  
Vanderbilt University  
Nashville, TN 37232-2561  
e-mail: jay.jerome@vanderbilt.edu

Elizabeth Wright  
Department of Biochemistry  
College of Agricultural and Life Sciences  
University of Wisconsin  
Madison, WI 53706-1544  
e-mail: erwright2@wisc.edu

Deborah Kelly  
Department of Biomedical Engineering  
College of Engineering  
Pennsylvania State University  
University Park, PA 16802-4400  
e-mail: debkelly@psu.edu

**Cultural Heritage Applications Editor**

Edward P. Vicenzi  
Smithsonian Institution, Museum  
Conservation Institute  
4210 Silver Hill Rd., Suitland, MD 20746  
e-mail: VicenziE@si.edu

**Materials Sciences Applications Editors**

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

Georg E. Fantner  
Interfaculty Institute for Bioengineering  
École Polytechnique Fédérale de Lausanne  
Lausanne 1015, Switzerland  
e-mail: georg.fantner@epfl.ch

David J. Larson  
CAMECA  
5500 Nobel Drive  
Madison, WI 53711  
e-mail: david.larson@ametec.com

Ian MacLaren  
Materials and Condensed Matter Physics  
School of Physics and Astronomy  
University of Glasgow  
Glasgow G12 8QQ, UK  
e-mail: Ian.MacLaren@glasgow.ac.uk

Ross Marceau  
Institute for Frontier Materials  
Deakin University  
Geelong, VIC 3216, Australia  
e-mail: r.marceau@deakin.edu.au

Joseph Michael  
Sandia National Laboratories  
P.O. Box 5800, Albuquerque, NM 87185  
e-mail: jrmicha@sandia.gov

Stephen R. Niezgoda  
Materials Science and Engineering  
Mechanical and Aerospace Engineering  
The Ohio State University  
Smith Laboratory  
Columbus, OH 43210  
e-mail: niezgoda.6@osu.edu

Yousuf N. Picard  
Materials Science & Engineering  
Carnegie Mellon University  
Pittsburgh, PA 15213  
e-mail: ypicard@cmu.edu

Daniel Ruscitto  
GE Research  
Niskayuna NY 12309  
e-mail: dan.ruscitto@gmail.com

Masashi Watanabe  
Dept. of Mater. Sci. & Eng.  
Lehigh University, Bethlehem, PA 18015  
e-mail: masashi.watanabe@lehigh.edu

**Special Issues and Reviews Editor**

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

**Book Review Editor**

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

**M&M Program Guide Editor**

Richard L. Martens  
1013 Bevell Building  
Box 870164, Tuscaloosa, AL 35487-0164  
e-mail: rmartens@caf.ua.edu

**Proceedings Editor**

Gail Celio  
University of Minnesota, St. Paul, MN 55108  
e-mail: celio001@umn.edu

---

## Editorial Board

Ralph Albrecht	<i>University of Wisconsin, Madison, Wisconsin</i>
Ilke Arslan	<i>Argonne National Laboratory, Lemont, Illinois</i>
Mary Grace Burke	<i>University of Manchester, Manchester, UK</i>
Barry Carter	<i>University of Connecticut, Storrs, Connecticut</i>
Wah Chiu	<i>Baylor College of Medicine, Houston, Texas</i>
Marc De Graef	<i>Carnegie Mellon University, Pittsburgh, Pennsylvania</i>
Niels de Jonge	<i>INM Institute for New Materials, Saarbrücken, Germany</i>
Elizabeth Dickey	<i>North Carolina State University, Raleigh</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>
Paul Kotula	<i>Sandia National Labs, Albuquerque, New Mexico</i>
William Landis	<i>University of Akron, Akron, Ohio</i>
Charles Lyman	<i>Lehigh University, Bethlehem, Pennsylvania</i>
Dale Newbury	<i>National Institute of Standards and Technology, Gaithersburg, Maryland</i>
Robert Price	<i>University of South Carolina, Columbia, South Carolina</i>
Jean-Paul Revel	<i>California Institute of Technology, Pasadena, California</i>
David Smith	<i>Arizona State University, Tempe, Arizona</i>
Nan Yao	<i>Princeton University, Princeton, New Jersey</i>
Nestor Zaluzec	<i>Argonne National Laboratory, Argonne, Illinois</i>

## Editorial Board Representatives from Affiliated Societies

Donovan Leonard	<i>Oak Ridge National Laboratory (MAS)</i>
Gautam Kumar Dey	<i>Bhabha Atomic Research Centre (EMSI)</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>
Mike Matthews	<i>Atomic Weapons Establishment, Reading, Great Britain (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>
Robert L. Price	<i>University of South Carolina, Columbia, South Carolina</i>

This journal is part of the **Cambridge** Core 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: [cambridge.org/MAM](http://cambridge.org/MAM).**

Instructions for authors submitting manuscripts may be found at [cambridge.org/MAM](http://cambridge.org/MAM). Select "Further Information" then select "Instructions for Contributors."



*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 [cambridge.org/mam](http://cambridge.org/mam), select "Information," and then select "Instructions for Contributors."

### 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 (1 Liberty Plaza, New York, NY 10006). Three supplements (*Meeting Guide*, *Program Guide*, 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, 11130 Sunrise Valley Dr, Suite 350, Reston, VA 20191, Tel.: (703) 234-4115, Email: [associationmanagement@microscopy.org](mailto:associationmanagement@microscopy.org), URL: [www.microscopy.org](http://www.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 \$2465.00 in the USA, Canada, and Mexico; UK £1483.00+VAT elsewhere. Institutions online only: US \$1599.00 in the USA, Canada, and Mexico; UK £968.00 + VAT elsewhere. Individuals print plus online: US \$721.00 in the USA, Canada, and Mexico; UK £438.00+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), 1 Liberty Plaza, New York, NY 10006, 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](mailto: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, University Printing House, Shaftesbury Road, Cambridge CB2 8BS, UK. Tel: +44 (0)1223 326070. Fax: 44 (0) 1223 325150. E-mail: [journals@cambridge.org](mailto: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.

### Editorial Office

John Mansfield, Editor in Chief, 4304 Spring Lake Blvd., Ann Arbor, MI 48108-9657, USA; Tel: (734) 994-3096; Fax: (734) 763-2282; E-mail: [thefjmfj@me.com](mailto:thefjmfj@me.com).

### Office of Publication

Cambridge University Press, 1 Liberty Plaza, New York, NY 10006, USA; Tel: (212) 337-5000; Fax: (212) 337-5959.

### Advertising Sales & Production

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

© 2020 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, 1 Liberty Plaza, New York, NY 10006.



# Nano-Positioning for Microscopy & Imaging



**Piezo stages & positioners** are essential tools for high-resolution microscopy, such as Super Resolution Microscopy or AFM. Their sub-atomic resolution and extremely fast response allow researchers to create higher-quality images faster. PI provides a large variety of fast positioning stages and piezo objective nano-positioners for 3D imaging (Z-stack acquisition), fast-focusing applications, and light sheet microscopy.



*PIFOC® nano-focusing drive*



*6-axis closed loop piezo stage for AFM:  
highly linear, < .1nm resolution*



*Affordable XY & XYZ Piezo Stages  
for SR Microscopy: P-545 PInano®*

Based on 40+ years of experience with electromagnetic and piezo-ceramic motors, PI can quickly provide a solution for your precision positioning and automation projects. Design centers are located in the USA, Europe, and Asia with global support of 1300+ employees in 13 countries.

## PI

Physik Instrumente  
[www.pi-usa.us](http://www.pi-usa.us)  
508-832-3456  
AskPI@pi-usa.us



**PRECISION | SPEED | STABILITY - MOTION CONTROL & POSITIONING SOLUTIONS**

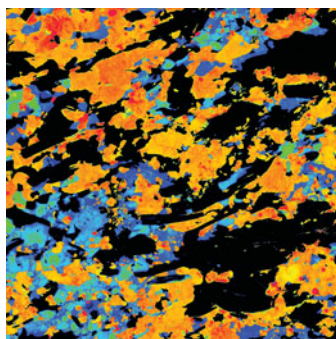


# Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

Volume 26, Number 4

August 2020



**On the Cover:** The front cover shows a panchromatic cathodoluminescence (CL) image, generated from a hyperspectral CL map collected on a Tanzanian graphite ore. Quartz grains, orange-red hue, are visible intergrown with a k-feldspar, blue hue. Variable growth histories are evident in the quartz grains accompanied by overgrowths and smaller grains having been fused together. Red circles and rings visible in the quartz are radiation-damage halos and measurements of their diameter can be matched with stopping distances of alpha particles in quartz and show they are from the decay of the  $^{238}\text{U}$  series. For more details see “Soft X-Ray and Cathodoluminescence examination of Tanzanian graphite deposit.”

## SOFTWARE AND INSTRUMENTATION

Atomic Resolution Imaging of Light Elements in a Crystalline Environment using Dynamic Hollow-Cone Illumination Transmission Electron Microscopy  
*Hamish G. Brown and Jim Ciston* 623

Comparison of Orientation Mapping in SEM and TEM  
*Joshua D. Sugar, Joseph T. McKeown, Dhego Banga and Joseph R. Michael* 630

Digital Image Correlation of Forescatter Detector Images for Simultaneous Strain and Orientation Mapping  
*Derrick Adams, Shamoon Irfan, Jeff Cramer, Michael P. Miles, Eric R. Homer, Tyson Brown, Raj K. Mishra and David T. Fullwood* 641

Fast Pixelated Detectors in Scanning Transmission Electron Microscopy. Part I: Data Acquisition, Live Processing, and Storage  
*Magnus Nord, Robert W. H. Webster, Kirsty A. Paton, Stephen McVitie, Damien McGrouther, Ian MacLaren and Gary W. Paterson* 653

Ultra-Fast Electron Microscopic Imaging of Single Molecules With a Direct Electron Detection Camera and Noise Reduction  
*Joshua Stuckner, Toshiaki Shimizu, Koji Harano, Eiichi Nakamura and Mitsuhiro Murayama* 667

Multiscale Tomographic Analysis for Micron-Sized Particulate Samples  
*Ralf Ditscherlein, Orkun Furat, Mathieu de Langlard, Juliana Martins de Souza e Silva, Johanna Sygusch, Martin Rudolph, Thomas Leißner, Volker Schmidt and Urs A. Peuker* 676

Preferential Evaporation in Atom Probe Tomography: An Analytical Approach  
*Constantinos Hatzoglou, Solène Rouland, Bertrand Radiguet, Auriane Etienne, Gérald Da Costa, Xavier Sauvage, Philippe Pareige and François Vurpillot* 689

## BIOLOGICAL APPLICATIONS

Immunohistomorphometric and Hormonal Analysis of the Pituitary Gonadotropic Cells After Application of the Nandrolone Decanoate and Swimming Training in Adult Male Rats  
*Jasmina Sretenovic, Vladimir Zivkovic, Ivan Srejavic, Vladimir Ajdzanovic, Natasa Ristic, Mirosljub Trifunovic, Suzana Pantovic, Slavoljub Jovic, Vladimir Jakovljevic, Sergey Bolevich, Zoran Milosavljevic and Verica Milosevic* 699

An Insight into the Potential Parasitological Effect of *Schistosoma mansoni* Antigens in Infected Mice: Prophylactic Role of Cercarial Antigen  
*Sara S. Abdel-Hakeem, Mahmoud A. Abdel-Samiee and Gamal H. Abed* 708

The Fractal and GLCM Textural Parameters of Chromatin May Be Potential Biomarkers of Papillary Thyroid Carcinoma in Hashimoto's Thyroiditis Specimens  
*Marko Dinčić, Jasna Todorović, Jelena Nešović Ostojić, Sanjin Kovačević, Duško Dunderović, Srđan Lopičić, Svetolik Spasić, Sanja Radojević-Škodrić, Dejana Stanisavljević and Anđelija Ž. Ilić* 717



Simultaneous Three-Dimensional Vascular and Tubular Imaging of Whole Mouse Kidneys With X-ray $\mu$ CT <i>Willy Kuo, Ngoc An Le, Bernhard Spingler, Roland H. Wenger, Anja Kipar, Udo Hetzel, Georg Schulz, Bert Müller and Vartan Kurtcuoglu</i>	731
--	-----

## AUSTRALIAN MICROBEAM ANALYSIS SOCIETY SPECIAL SECTION AMAS XV 2019

Includes manuscripts developed from the 15<sup>th</sup> Biennial Symposium of the Australian Microbeam Analysis Society, Brighton, Victoria, Australia, 13–15 February 2019  
Guest Editor: Dr. Colin MacRae

The Impact of Chemical Bonding on Mass Absorption Coefficients of Soft X-rays <i>Samantha Rudinsky, Nicholas C. Wilson, Colin M. MacRae, Yu Yuan, Hendrix Demers, Mark A. Gibson and Raynald Gauvin</i>	741
Novel Applications of FIB-SEM-Based ToF-SIMS in Atom Probe Tomography Workflows <i>William D.A. Rickard, Steven M. Reddy, David W. Saxey, Denis Fougerouse, Nicholas E. Timms, Luke Daly, Emily Peterman, Aaron J. Cavosie and Fred Jourdan</i>	750
Investigation of the Image Contrast in an Ultra-Low Voltage Scanning Electron Microscope Using an Auger Electron Spectrometer <i>Yusuke Sakuda, Shunsuke Asahina, Takanari Togashi, Osamu Terasaki and Masato Kurihara</i>	758
Deciphering the Complex Mineralogy of River Sand Deposits through Clustering and Quantification of Hyperspectral X-Ray Maps <i>Aaron Torpy, Nicholas C. Wilson, Colin M. MacRae, Mark I. Pownceby, Pradip K. Biswas, Md Aminur Rahman and Mohammad N. Zaman</i>	768
Investigation of the Internal Structure of a Modern Seafloor Hydrothermal Chimney With a Combination of EBSD, EPMA, and XRD <i>Matthew Glenn, Siyu Hu, Stephen Barnes, Aaron Torpy, Anthony E. Hughes, Colin M. MacRae, Nathan A.S. Webster, Nicholas C. Wilson, Joanna Parr and Ray Binns</i>	793
Mapping Local Surface Plasmon Modes in a Nanoplasmonic Trimer Using Cathodoluminescence in the Scanning Electron Microscope <i>Amelia C. Y. Liu, Julian Lloyd, Toon Coenen and Daniel E. Gómez</i>	808
Soft X-Ray and Cathodoluminescence Examination of a Tanzanian Graphite Deposit <i>Colin M. MacRae, Mark A. Pearce, Nicholas C. Wilson, Aaron Torpy, Matthew A. Glenn and Salvy P. Russo</i>	814
Observations on the Early Stages of Corrosion on AA2099-T83 <i>A. Matthew Glenn, Anthony E. Hughes, Colin M. MacRae, Nicholas C. Wilson, Aaron Torpy and Xiaorong Zhou</i>	821

## MICROGRAPHIA

Optimization of FIB-SEM Tomography and Reconstruction for Soft, Porous, and Poorly Conducting Materials <i>Cecilia Fager, Magnus Röding, Anna Olsson, Niklas Lorén, Christian von Corswant, Aila Särkkä and Eva Olsson</i>	837
Involvement of the Salivary Glands in the Suicidal Defensive Behavior of Workers in <i>Neocapritermes opacus</i> (Blattaria, Isoptera, Termitidae) <i>Ana Maria Costa-Leonardo, Vanelize Janei, Amanda Marcelino Ribeiro dos Santos and Iago Bueno da Silva</i>	846



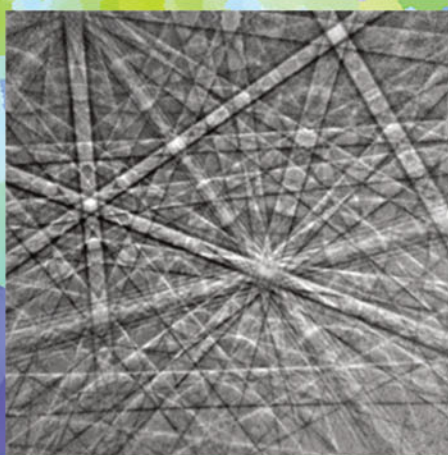
# Seeing the future with clarity



## Introducing the Clarity EBSD Analysis System

Clarity™ - the world's first Electron Backscatter Diffraction (EBSD) specific detector based on Direct Detection technology. This revolutionary approach provides unparalleled pattern quality, ultimate sensitivity, and distortion-free imaging, opening new doors to the evolution of EBSD pattern analysis.

- Direct electron detection of EBSD patterns
- Zero distortion for ultimate sharpness and maximum details
- No read noise for high sensitivity
- Single-electron detection
- True quantitative intensity measurements
- Ideal for beam-sensitive materials and HR-EBSD



*For more information about the Clarity EBSD Analysis System please visit [edax.com/clarity](http://edax.com/clarity)*

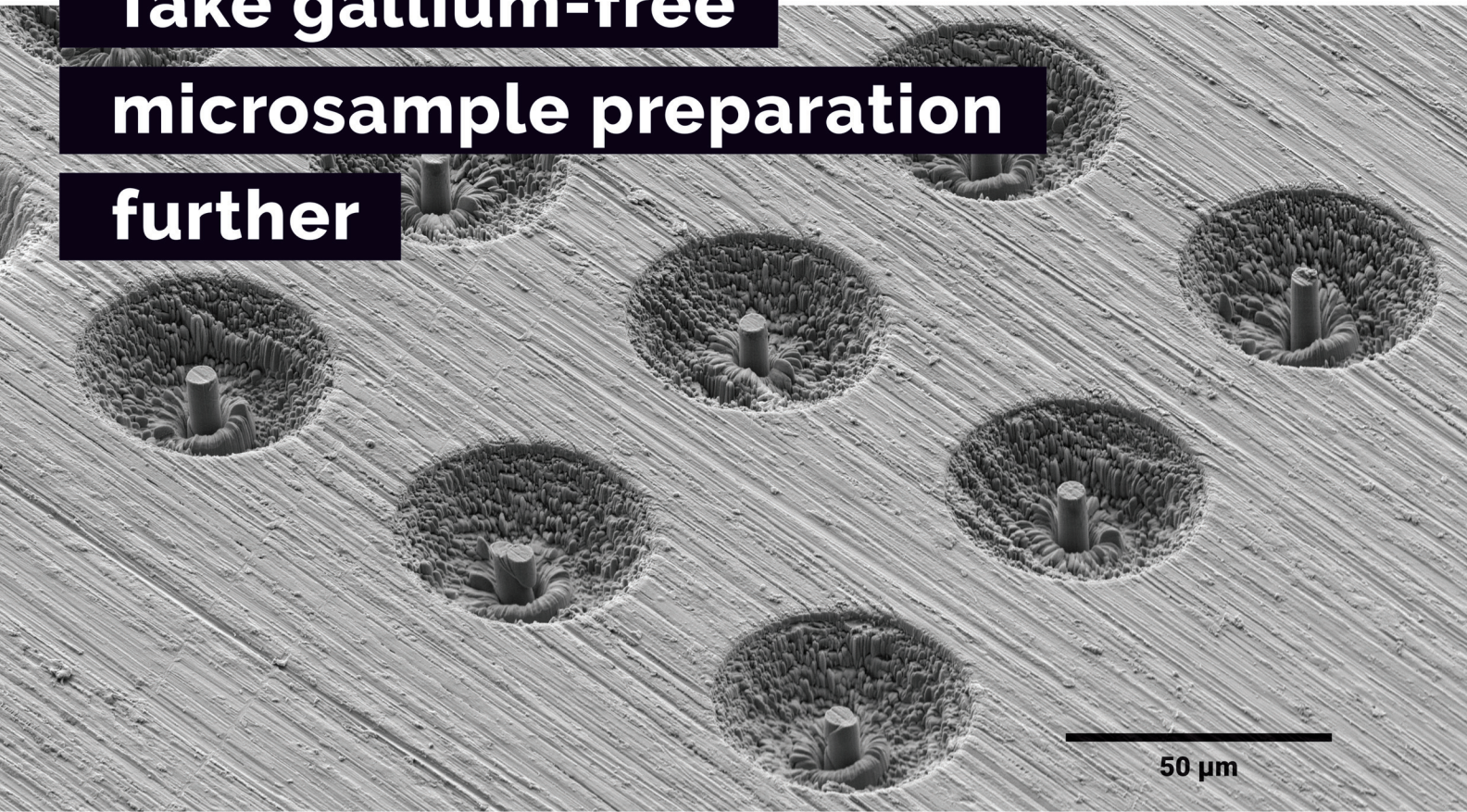
**EDAX**  
EDAX logo with a stylized bar chart below the text.

[edax.com](http://edax.com)

**AMETEK**  
AMETEK logo with a stylized bar chart below the text.



# Take gallium-free microsample preparation further



Array of micro-compression test pillars in UFG aluminium alloy

## TESCAN AMBER X

- ✓ High throughput, large area FIB milling up to 1 mm
- ✓ Ga-free microsample preparation
- ✓ Ultra-high resolution, field-free FE-SEM imaging and analysis
- ✓ In-column SE and BSE detection
- ✓ Spot optimization for high-throughput, multi-modal FIB-SEM tomography
- ✓ Superior field of view for easy navigation
- ✓ Essence™ easy-to-use, modular graphical user interface



For more information visit

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

TESCAN AMBER X is based on the S8000 platform.