

Volume 27, Number 4 August 2021

Microscopy AND Microanalysis



CAMBRIDGE
UNIVERSITY PRESS

ISSN 1431-9276

ELECTRON MICROSCOPY SCIENCES...

for the coolest selection of cryo supplies & equipment.

CryoClear[®] Cryogenic Vials

With internal or external threads.



Please visit our website to view or download our new **Cryo Supplies & Accessories Catalog.**



Cooling Chambers

Choose from a wide variety of specialty chambers, trays, and workstations.



Cryo Pucks

Organized storage and transport for Cryo-EM specimen grids under cryogenic conditions.



Cryo Racks and Freezer Boxes

All sizes and materials from polycarbonate to cardboard to stainless steel.

Cryo-Protection[®] Safety Kits

Including visor, gloves, and apron.



PinTAG[™] Cryogenic Labels

Simultaneously identify the side and bottom of automated storage tubes.



Cryo Grid Storage

Metallic or no-metallic...tools as well!

EMS has it!

OUR MAIN INTERACTIVE WEBSITE:

www.emsdiasum.com

**Electron
Microscopy
Sciences**

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

Tel: (215) 412-8400 • Fax: (215) 412-8450

email: info@emsdiasum.com

or 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

Micrographia Editor

Jay Potts
Department of Cell Biology and Anatomy
School of Medicine
University of South Carolina
Columbia, SC 29209
e-mail: jay.potts@uscmed.sc.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>
Louise Cole	<i>The University of Technology, Sydney, 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.**

Instructions for authors submitting manuscripts may be found at 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, 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, URL: 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.

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

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: thefmjfm@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.

© 2021 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.

i-PRO

The Power of Truth



WHEN PRECISION AND ACCURACY MATTER MOST

Panasonic i-PRO Sensing Solutions imaging devices deliver the extreme accuracy only available with ultra-HD technology. Our products feature high-resolution imaging, high-color reproduction, high sensitivity and are compact sized. Our micro-head cameras are used in the most sophisticated scopes and diagnostic devices with consistent results and reliability.



Visit our website to learn more:
medicalimaging.i-pro.com

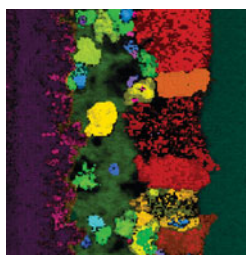
Panasonic

An Imaging Solution Provider

Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

Volume 27, Number 4
August 2021



On the Cover: Structural phase map of an irradiated and annealed $\text{Gd}_2\text{Ti}_2\text{O}_7$ sample from a 4D-STEM experiment. This sample exhibits complex structural features, including (left) single crystal structure of the pyrochlore parent grain recrystallized into fluorite at the interface, (center) a mixture of amorphous and newly nucleated polycrystalline grains, and (right) a fully amorphous structure. Image adapted from figures 1 and 10 in the manuscript by Savitzky et al. on pages 714 and 726.

MATERIALS SCIENCE APPLICATIONS

Direct Visualization of the Earliest Stages of Crystallization
Manish Kumar Singh, Chanchal Ghosh, Benjamin Miller and C. Barry Carter 659

Molybdenum in Gunshot Residue: Experimental Evidences and Detection Challenges in the Presence of Lead and Sulfur
Felice Nunziata, Francesco Saverio Romolo, Bryan Burnett, Luigi Manna, Stefano Orsenigo and Matteo Donghi 666

Quantitative 3D Characterization of Nanoporous Gold Nanoparticles by Transmission Electron Microscopy
Christoph Mahr, Alexandra Dworzak, Marco Schowalter, Mehtap Oezaslan and Andreas Rosenauer 678

Behavior of the $\epsilon\text{-Ga}_2\text{O}_3\text{:Sn}$ Evaporation During Laser-Assisted Atom Probe Tomography
Florian Chabanais, Enrico Di Russo, Alexander Karg, Martin Eickhoff, Williams Lefebvre and Lorenzo Rigutti 687

Quantification of Trace-Level Silicon Doping in $\text{Al}_x\text{Ga}_{1-x}\text{N}$ Films Using Wavelength-Dispersive X-Ray Microanalysis
Lucia Spasevski, Ben Buse, Paul R. Edwards, Daniel A. Hunter, Johannes Enslin, Humberto M. Foronda, Tim Wernicke, Frank Mehnke, Peter J. Parbrook, Michael Kneissl and Robert W. Martin 696

Evaluation of Dihedral Angle Twin Boundaries in Cu10 wt%Zn Alloy Using Atomic Force Microscopy
Nataliya Starostina, Ann McGuire and Richard Rowan 705

SOFTWARE AND INSTRUMENTATION

py4DSTEM: A Software Package for Four-Dimensional Scanning Transmission Electron Microscopy Data Analysis
Benjamin H. Savitzky, Steven E. Zeltmann, Lauren A. Hughes, Hamish G. Brown, Shiteng Zhao, Philipp M. Pelz, Thomas C. Pekin, Edward S. Barnard, Jennifer Donohue, Luis Rangel DaCosta, Ellis Kennedy, Yujun Xie, Matthew T. Janish, Matthew M. Schneider, Patrick Herring, Chirranjeevi Gopal, Abraham Anapolsky, Rohan Dhall, Karen C. Bustillo, Peter Ercius, Mary C. Scott, Jim Ciston, Andrew M. Minor and Colin Ophus 712

Scattering Matrix Determination in Crystalline Materials from 4D Scanning Transmission Electron Microscopy at a Single Defocus Value
Scott D. Findlay, Hamish G. Brown, Philipp M. Pelz, Colin Ophus, Jim Ciston and Leslie J. Allen 744

Quantifying Real-Time Sample Temperature Under the Gas Environment in the Transmission Electron Microscope Using a Novel MEMS Heater
Meng Li, De-Gang Xie, Xi-Xiang Zhang, Judith C. Yang and Zhi-Wei Shan 758

Minimizing Crinkling of Soft Specimens Using Holey Gold Films on Molybdenum Grids for Cryogenic Electron Microscopy
Xi Jiang, Sunting Xuan, Ronald N. Zuckermann, Robert M. Glaeser, Kenneth H. Downing and Nitash P. Balsara 767

An Acquisition Parameter Study for Machine-Learning-Enabled Electron Backscatter Diffraction <i>Kevin Kaufmann and Kenneth S. Vecchio</i>	776
Fast Grain Mapping with Sub-Nanometer Resolution Using 4D-STEM with Grain Classification by Principal Component Analysis and Non-Negative Matrix Factorization <i>Frances I. Allen, Thomas C. Pekin, Arun Persaud, Steven J. Rozeveld, Gregory F. Meyers, Jim Ciston, Colin Ophus and Andrew M. Minor</i>	794
Deep Learning Segmentation of Complex Features in Atomic-Resolution Phase-Contrast Transmission Electron Microscopy Images <i>Robbie Sadre, Colin Ophus, Anastasiia Butko and Gunther H. Weber</i>	804
Preparation of Samples for Large-Scale Automated Electron Microscopy of Tissue and Cell Ultrastructure <i>Carsten Dittmayer, Hans-Hilmar Goebel, Frank L. Heppner, Werner Stenzel and Sebastian Bachmann</i>	815
Focused Ion Beam Sample Preparation for <i>In Situ</i> Thermal and Electrical Transmission Electron Microscopy <i>Dražen Radić, Martin Peterlechner and Hartmut Bracht</i>	828
A Fast Algorithm for Scanning Transmission Electron Microscopy Imaging and 4D-STEM Diffraction Simulations <i>Philipp M. Pelz, Alexander Rakowski, Luis Rangel DaCosta, Benjamin H. Savitzky, Mary C. Scott and Colin Ophus</i>	835

BIOLOGICAL APPLICATIONS

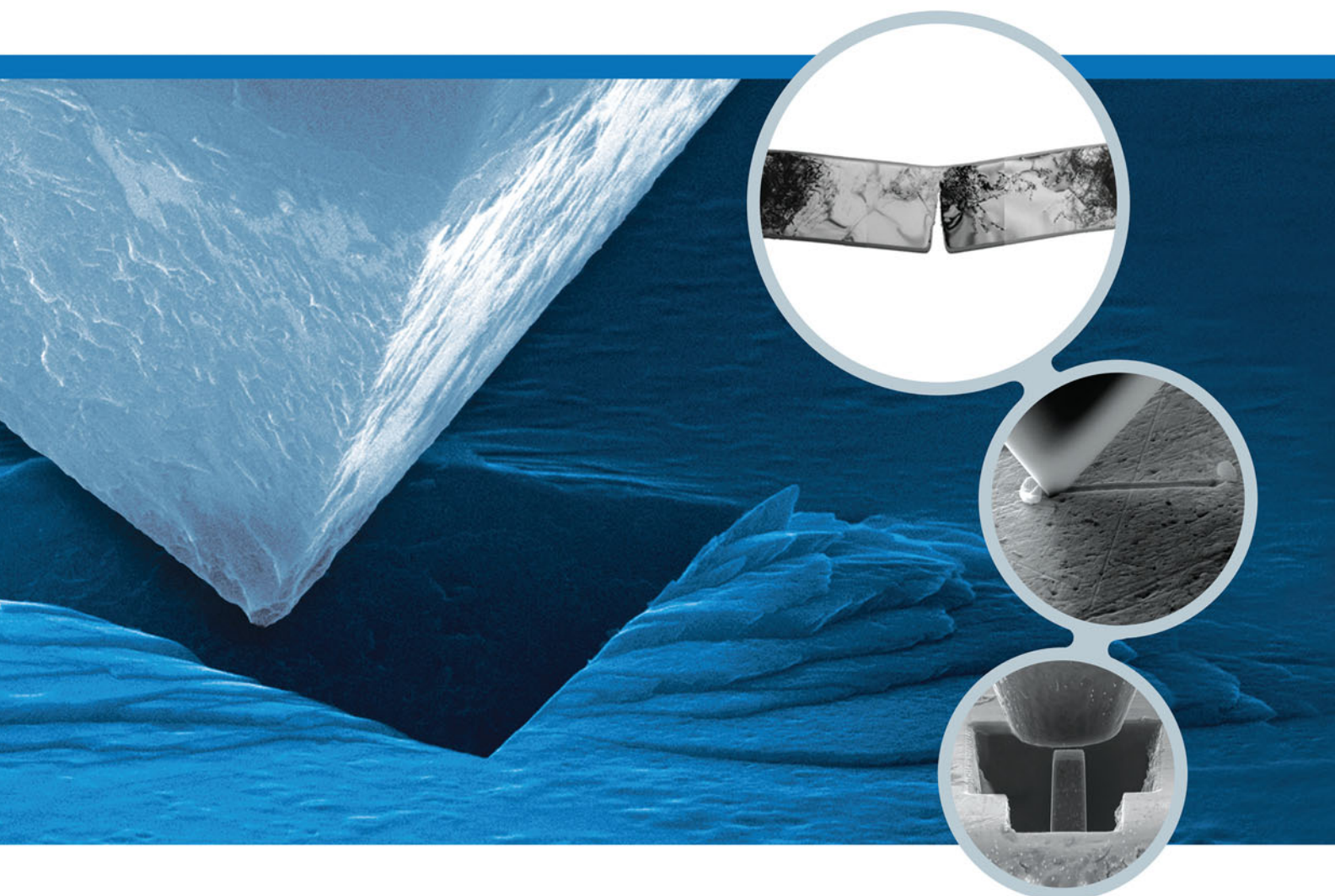
Immunofluorescence Image Feature Analysis and Phenotype Scoring Pipeline for Distinguishing Epithelial-Mesenchymal Transition <i>Shreyas U. Hirway, Nadiah T. Hassan, Michael Sofroniou, Christopher A. Lemmon and Seth H. Weinberg</i>	849
Mathematical Model and microCT-Based Kinematic Analysis of the Rostrum Mouthparts in <i>Cyrtotrachelus buqueti</i> Guer (Coleoptera: Curculionidae) <i>Longhai Li, Ce Guo, Shun Xu, Huafeng Guo, Ping Yu, Lei Liu and Jing Tian</i>	860
Early Upper Aerodigestive Tract Cancer Detection Using Electron Microscopy to Reveal Chromatin Packing Alterations in Buccal Mucosa Cells <i>Oisín Bugter, Yue Li, Anouk H.G. Wolters, Vasundhara Agrawal, Amil Dravid, Andrew Chang, Jose Hardillo, Ben N.G. Giepmans, Robert J. Baatenburg de Jong, Arjen Amelink, Vadim Backman and Dominic J. Robinson</i>	878
Effects of Iron Oxide Nanoparticles on Structural Organization of Hepatocyte Chromatin: Gray Level Co-occurrence Matrix Analysis <i>Jovana Paunovic, Danijela Vucevic, Tatjana Radosavljevic, Biserka Vukomanovic Djurdjevic, Sanja Stankovic and Igor Pantic</i>	889
Altered Renal Pathology in an Autoimmune Disease Mouse Model After Induction of Diabetes Mellitus <i>Shiori Hiramatsu, Osamu Ichii, Takashi Namba, Yuki Otani, Teppei Nakamura, Md. Abdul Masum, Yaser Hosny Ali Elewa and Yasuhiro Kon</i>	897
Pathological and Immunohistochemical Microscopy of Natural Cases of Canine and Feline Neoplastic Mammary Lesions <i>Maggie F. Tawfik, Samah S. Oda and Asmaa F. Khafaga</i>	910
Integrated Microscopy and Metabolomics to Test an Innovative Fluid Dynamic System for Skin Explants <i>In Vitro</i> <i>Enrica Cappellozza, Serena Zanzoni, Manuela Malatesta and Laura Calderan</i>	923

MICROGRAPHIA

Histological, Histochemical, and Ultrastructural Approach to the Ductus Deferens in Male Nile Monitor Lizard (<i>Varanus niloticus</i>) <i>Mahmoud Awad, Mohammed Alshehri and Ahmed Saad A. Hassaneen</i>	935
---	-----

Transform Your Electron Microscope

Into a Powerful, Nanoscale Mechanical Testing Chamber



Gain Insights Into Mechanical Performance at the Nanoscale

Bruker's comprehensive suite of in-situ nanomechanical instruments combines powerful electron microscopy with small-scale mechanical testing. Each system is capable of a wide variety of testing modes, enabling unprecedented insights into nanoscale material behavior across the research spectrum.

- Nanoindentation
- Microbeam Bending
- Pillar or Particle Compression
- Tensile Testing
- NanoTribology
- High Temperature
- Electrical
- Dynamic and Fatigue



www.bruker.com/picoindenters



Hysitron PI 89 SEM
PicoIndenter

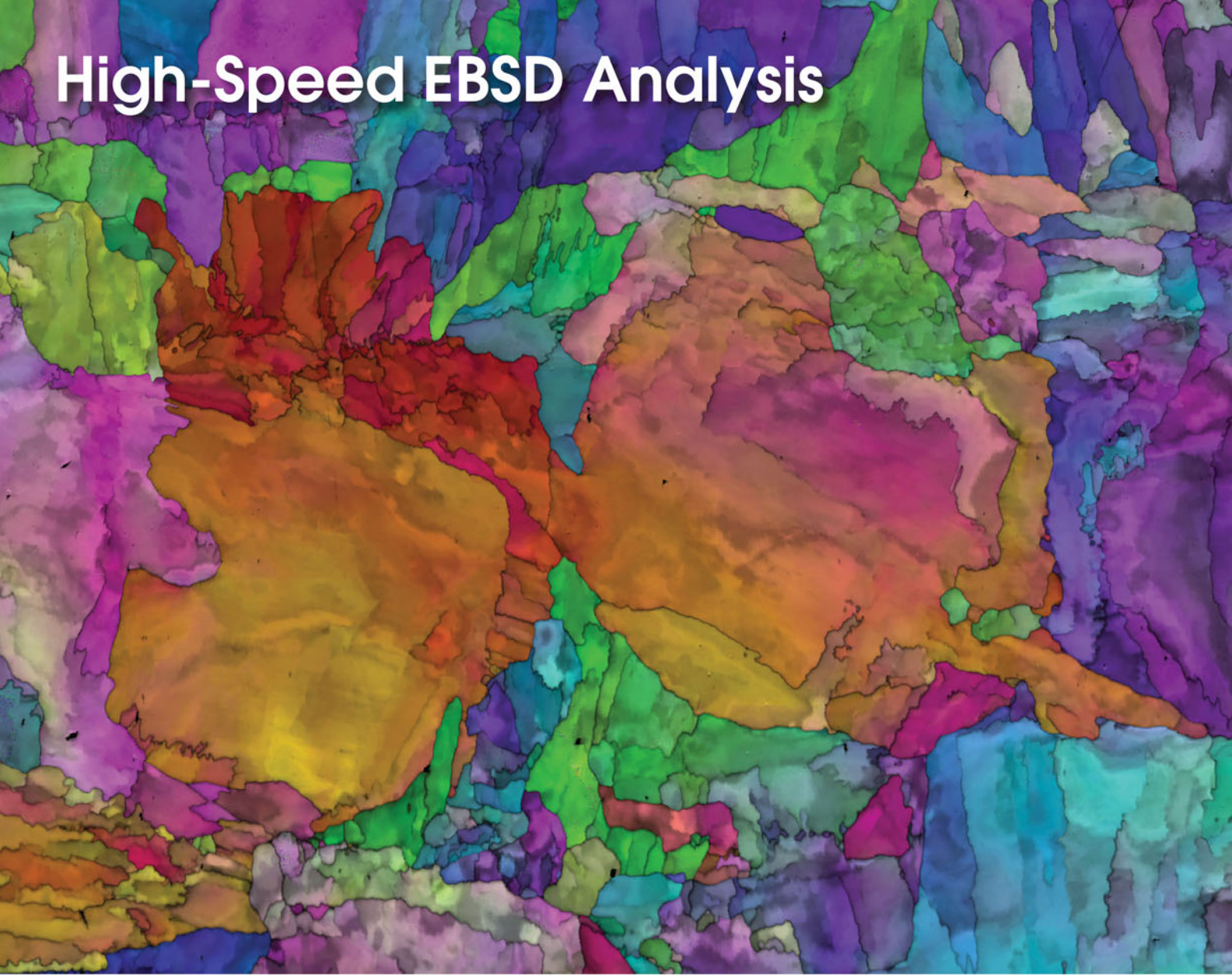


Hysitron PI 95 TEM
PicoIndenter

Innovation with Integrity

Nanomechanical Testing

High-Speed EBSD Analysis



Velocity EBSD Camera Series

Powered by a CMOS sensor, the EDAX Velocity™ EBSD Camera Series offers high-speed EBSD mapping with the highest indexing performance for all materials. The cameras combine fast acquisition with high-sensitivity and low-noise performance for optimal data collection and quality results.

- Available in three models with speeds up to 4,500 indexed points per second
- CMOS low-noise sensor
- High-speed simultaneous EDS-EBSD collection
- 120 x 120-pixel images at high speeds
- Accurate and precise data on real-world samples, including both deformed and lightweight materials

For more information about the Velocity EBSD Camera Series, visit [edax.com/velocity](https://www.edax.com/velocity).



www.edax.com

