

Volume 15, Number 3

June 2009

Microscopy AND Microanalysis

OFFICIAL JOURNAL of

Microscopy Society of America

Microbeam Analysis Society

Microscopical Society of 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

CAMBRIDGE
UNIVERSITY PRESS

ISSN 1431-9276

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
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
Phone: (803) 733-3392
Fax: (803) 733-3212
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
Phone: (480) 965-4540
Fax: (480) 965-9004
e-mail: david.smith@asu.edu

Editor, Materials Applications

Elizabeth Dickey
Materials Science and Engineering
Pennsylvania State University
223 MRL Building
University Park, PA 16802-7003
Phone: (814) 865-9067
Fax: (814) 863-8561
e-mail: ecd10@psu.edu

Editor, Light and Scanning Probe Microscopies

Brian Herman
Cellular and Structural Biology
University of Texas at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7762
Phone: (210) 567-3800
Fax: (210) 567-3803
e-mail: hermanb@uthscsa.edu

Editor, Biological Applications

Heide Schatten
Veterinary Pathobiology
University of Missouri-Columbia
1600 E. Rollins Street
Columbia, Missouri 65211-5030
Phone: (573) 882-2396
Fax: (573) 884-5414
e-mail: schattenh@missouri.edu

Editor, Microanalysis

John Mansfield
Electron Microbeam Analysis Lab
North Campus, 417 SRB
University of Michigan
2455 Hayward
Ann Arbor, MI 48109-2143
Phone: (734) 936-3352
Fax: (734) 763-2282
e-mail: jfmjfm@umich.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: jshields@cb.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>
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>
Phillip Russell	<i>Appalachian State University, Boone, North Carolina</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.

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 \$920.00 in the USA, Canada, and Mexico; UK £555.00 + VAT elsewhere. Institutions online only: US \$760.00 in the USA, Canada, and Mexico; UK £460.00 + VAT elsewhere. Institutions print only: US \$830.00 in the USA, Canada, and Mexico; UK £500.00 + VAT elsewhere. Individuals print and online: US \$345.00 in the USA, Canada, and Mexico; UK £210.00 + 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) 733-3392; 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.

© 2009 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.

Microscopy AND Microanalysis

An International Journal for the Biological and Physical Sciences

Volume 15, Number 3

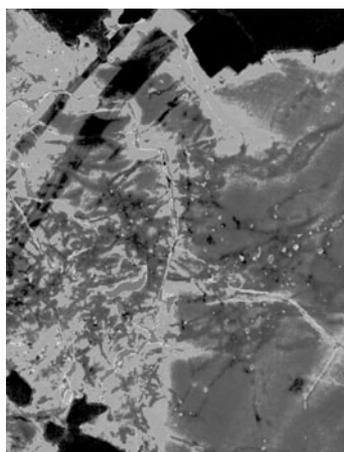
June 2009

BIOLOGICAL APPLICATIONS

- Nanogold as a Specific Marker for Electron Cryotomography 183
Yongning He, Grant J. Jensen, and Pamela J. Bjorkman
- A Comparison of Macroscopic and Microscopic Hair Color Measurements and a Quantification of the Relationship between Hair Color and Thickness 189
Michelle R. Vaughn, Elizabeth Brooks, Roland A.H. van Oorschot, and Swati Baidur-Hudson
- A Unique Vascular Configuration among the Efferent Branchial Arteries and Splanchnic Arteries in the Yellow Stingray, *Urobatis jamaicensis* 194
Bethany L. Basten, Robin L. Sherman, Alois Lametschwandtner, and Richard E. Spieler
- Optimizing Electron Backscatter Diffraction of Carbonate Biominerals—Resin Type and Carbon Coating 197
Alberto Pérez-Huerta and Maggie Cusack

MATERIALS APPLICATIONS

- The Applications of *In Situ* Electron Energy Loss Spectroscopy to the Study of Electron Beam Nanofabrication 204
Shiahn J. Chen, David G. Howitt, Brian C. Gierhart, Rosemary L. Smith, and Scott D. Collins
- Mn Valency at $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{SrTiO}_3$ (001) Thin Film Interfaces 213
Thomas Riedl, Thomas Gemming, Kathrin Dörr, Martina Luysberg, and Klaus Wetzig
- Quantitative Cathodoluminescence Mapping with Application to a Kalgoorlie Scheelite 222
Colin M. MacRae, Nicholas C. Wilson, and Joel Brugger
- Evaluation of Controlled-Drift Detectors in X-Ray Spectroscopic Imaging Applications 231
Andrea Castoldi, Chiara Guazzoni, Cigdem Ozkan, Giorgio Vedani, Robert Hartmann, and Aniouar Bjeoumikhov
- The Effect of Oxide Overlayers on Secondary Electron Dopant Mapping 237
Maurizio Dapor, Mark A.E. Jepsen, Beverley J. Inkson, and Cornelia Rodenburg
- Three-Dimensional Measurement of Line Edge Roughness in Copper Wires Using Electron Tomography 244
Peter Ercius, Lynne M. Gignac, C.-K. Hu, and David A. Muller
- High-Angle Annular Dark Field Scanning Transmission Electron Microscopy on Carbon-Based Functional Polymer Systems 251
Erwan Sourty, Svetlana van Bavel, Kangbo Lu, Ralph Guerra, Georg Bar, and Joachim Loos



On the Cover: Cathodoluminescence speciation map of Eu^{3+} (2.00 eV) collected on a scheelite (CaWO_4) grain from Kalgoorlie, Western Australia. The map is generated by fitting a series of Gaussians associated with rare earth elements and then calibrating the fitted peaks. For more information see the article by MacRae et al. on p. 222.

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

ATOMIC FORCE MICROSCOPY

- Modeling Rectangular Cantilevers during Torsion and Deflection for Application to Frictional Force Microscopy 259
Victor C. Hayden and Luc Y. Beaulieu

BOOK REVIEW

- Polymer Microscopy*, Third Edition, by L.C. Sawyer, D.T. Grubb, and G.F. Meyers 265
Yuhong Wu

- CALENDAR OF MEETINGS AND COURSES** 266

Microscopy and Microanalysis is published bimonthly and contains papers that report original research from the entire interdisciplinary range of microscopy and microanalysis: new microscopy methods and instrumentation and their applications to biological or materials microstructures for determination of structure or chemistry. Four categories of communications are published in the Journal.

Regular articles contain reports of new instrumentation and new methods and their applications to microstructural analysis in biology and materials science. **Reviews** have broader technical content than regular articles. Authors contemplating review articles are encouraged to discuss their plans with the appropriate editor. Articles are accepted for publication with the understanding that they, or their substantive contents, have not been and will not be submitted to any other publication.

Readers may send **Letters to the Editor** for publication in the Journal. These must address a specific technical point or points in a published article and must be clearly written and concise. The corresponding author of the paper commented upon will be invited to reply. The author of the Letter to the Editor will not be sent the reply prior to publication. Both the Letter to the Editor and the Reply will be published together. No subsequent letters or replies by the same persons concerning that particular paper will be considered for publication. The Editor-in-Chief will make any necessary decisions concerning suitability for publication of particular Letters to the Editor or Replies. **Book Reviews** are also published, but these are solicited only through the Book Review Editor.

Manuscript Submission and Review

All manuscript submissions to *Microscopy and Microanalysis* must be made electronically via Manuscript Central, at the following website address:

<http://mc.manuscriptcentral.com/mam>

Complete instructions are provided on this website. Please follow the instructions on the website to avoid delays. The instructions will prompt the author to provide all necessary information, including the corresponding author's contact information, which includes complete mailing address, phone and fax numbers, and an e-mail address. The website also requests suggested reviewers.

The website will automatically acknowledge receipt of the manuscript and provide a manuscript reference number. The Editor-in-Chief will assign the manuscript to an Editor who will choose at least two other reviewers. Every effort will be made to provide the author with a rapid review. If the Editor requests that revisions be made to the manuscript before publication, a maximum of 3 months will be allowed for preparation of the revision.

Manuscript Preparation

General information. Manuscripts should be formatted in Word. However, if there is a considerable amount of math, LaTeX can be used, but a PDF version of the manuscript must be supplied as well. Manuscripts **must** be submitted in English. Authors should follow generally accepted rules of grammar and punctuation. Because articles on microscopy attract broad ranges of readers with diverse backgrounds, jargon should not be used; acronyms and abbreviations **must** be clearly defined the first time they are used and then used consistently thereafter throughout the manuscript.

Format. All manuscripts **must** be typed double-spaced, including title page, abstract, text, references, tables, and figure legends, in 12 point type. Pages should have margins of about 1 inch (about 2.5 cm). Pages should be numbered at the bottom center.

All manuscript title pages **must** contain:

- A complete title.
- A brief title to be used as a running head.
- Authors' names listed by full given and last names.
- Primary institutions where the research was performed.
- Other institutions involved for each author.
- Permanent or new addresses of all authors. Note: Institutional addresses **must** include the full institutional and department/center name, city, state, postal code, and country.
- A complete corresponding (mailing) address for the author to whom all correspondence should be sent.
- Corresponding author's telephone number, fax number, and e-mail address.

All manuscripts **must** include:

- An abstract not to exceed 200 words and 6 to 10 keywords for indexing.
- The following sections: Introduction, Materials and Methods, Results, Discussion, Conclusions, Acknowledgments, References, tables, figure legends, figures. Sections may be subdivided to increase clarity.

Chemical names and mathematical expressions. Chemical names and methods should be spelled out the first time they are used, followed by the abbreviation in parentheses. After first mention the abbreviation may be used alone. SI units should be used. Mathematical expressions need to be carefully presented, with all symbols defined. Use a type font that clearly differentiates between zero and capital letter O. Equations containing algebraic fractions should use numerator over denominator, separated by a horizontal line, and not typed on a single line separated by a slash. Indicate vector symbols; they will be printed in **bold**.

References. References **must** be inserted in the text at the place they are used, by the author's surname and year of publication. All references included in the reference list **must** be cited in the text. References to personal communications, unpublished data, and manuscripts either in preparation or submitted for publication are unacceptable. If essential, such material may be incorporated in the appropriate place in the text. For citations with more than two authors use the first author's surname followed by "et al." and if there is more than one reference in the same year by a single author(s), use *a, b*. **For example:** (Roberts, 1981); (Roberts & Johnson, 1983); (Jones et al., 1986); (Johnson, 1998*a*, 1998*b*).

All authors **must** be included in the reference list; "et al." is unacceptable here. The alphabetical list of references begins a new page and must be typed double-spaced. List works by different authors who are cited within the same parentheses in chronological order, beginning with the earlier work according to the *CBE Manual for Authors, Editors, and Publishers*. Abbreviate journal names according to the Chemical Abstracts Service Source Index (CASSI). Only published articles and articles in press should appear in this list. Responsibility for the accuracy of references cited lies with the authors. Brief examples:

Journal Articles

HOGAN, J. & PATTON, C. (1976). Variation in intramembrane components of *Trypanosoma brucei* from intact and X-radiated rats: A freeze-cleave study. *J Protozool* **23**, 205–215.

Entire Book

RAPPAPORT, R. (1996). *Cytokinesis in Animal Cells*. Cambridge, UK: Cambridge University Press.

Chapter in an Edited Book

GARDNER, R.L. & PAPAIOANNOU, V.E. (1975). Differentiation in trophoblast and inner cell mass. In *The Early Development of Mammals*, Balls, M. & Wild, A.E. (Eds.), pp. 107–132. Cambridge, UK: Cambridge University Press.

Proceedings Paper

WOOD, J.E., WILLIAMS, D.B. & GOLDSTEIN, J.I. (1981). Quantitative X-ray microanalysis in the analytical electron microscope. In *Quantitative Microanalysis with High Spatial Resolution*, Jacobs, M.H., Lorimer, G.W. & Doig, P. (Eds.), pp. 24–33. London: The Metals Society.

Tables. Tables **must** be uploaded individually at the website. Number tables consecutively using Arabic numbers and include concise titles and column headings. Type footnotes under the tables. All tables **must** be cited consecutively in the text.

Guidelines for Figure Preparation

Figures **must** be uploaded individually at the website. Figures should be professionally drawn and prepared according to the guidelines below. Symbols, letters, numbers, and scale bars should be of sufficient size to be clearly recognizable when the figure is reduced to publication size, usually one column width (84 mm). Figure captions must be double-spaced and appear on a separate page in the text document. All figures must be cited in the text. Photographs in which human subjects are identifiable must be accompanied by written permission for publication.

Note the following specifications:

- **Black and white figures:** Raster (scanned) images should be submitted in grayscale mode for continuous-tone images and as bitmaps for line art.

- **Color figures:** Color images should be submitted in CMYK color mode. Do not submit files in RGB color. Files should be free of color functions, including PostScript color management, transfer curves, halftone screen assignments, and black generation functions.
- **Digital resolution:** Raster (scanned) image files should be:
 - at least 300 dpi for continuous tone images (grayscale or color);
 - at least 900 dpi for monochrome (1-bit) line art.
- **Image size/crop:** Digital art files should be cropped to remove nonprinting borders. Lettering and axis labels for graphs should remain legible when reduced to an image width of 84 mm. Letters within a word should not touch at this reduction. The submitted image orientation should be the same as intended for print.
- **Lines:** Lines or rules should not be defined as hairline width. The recommended minimum line width is 1/4 point when the file is supplied at the same size as the final print; thicker lines must be used if the figure is to be reduced.
- **File format:** Rastered image files (continuous tone or line art) should be submitted only in “.tif”, “.eps”, or “.psd” format. For vector “.eps” or “.ai” files, fonts should be embedded or converted to outlines. Images should be flattened prior to submission; this means that files should not contain layers and/or transparent objects.
- **Submission:** Each figure must be uploaded separately from the text document of the manuscript.

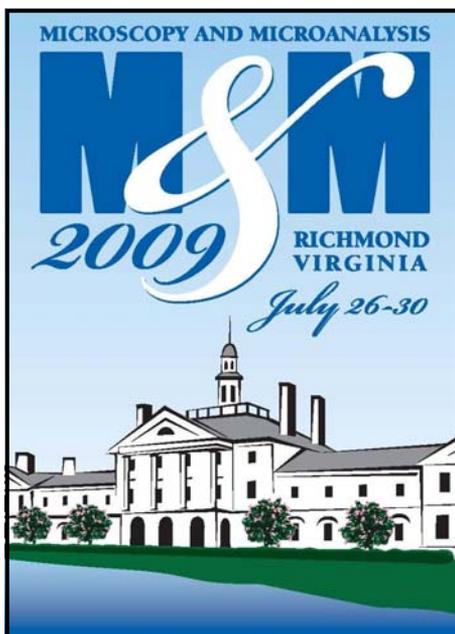
Printed color figures. If you will not be paying to have your figures printed in color, your figures can still be in color in the electronic version of the paper. However, for the printed figure you must supply a grayscale monochrome version that can be completely understood without the need of color. Contrast adjustments may be necessary before submitting the grayscale image or figure.

Permissions. All previously published material included in your manuscript **must** be accompanied by permission forms or letters documenting that permission has been obtained to reprint the material in your article in this journal.

Submitting a manuscript to this journal is easy. Just go to the following website:

<http://mc.manuscriptcentral.com/mam>

Once at the login page, you will be asked to register with a User ID and password. Your manuscript can be submitted by the following seven simple steps displayed at the site. A help menu in orange (upper right) provides several ways to get support if you have difficulty.



VISIT US AT:

[http://](http://mm2009.microscopy.org)

mm2009.microscopy.org

**Online Registration, Hotel
Reservations & Tours**

REGISTER NOW!!

DON'T MISS OUT!

**Registration is now open for the premier
microscopy meeting of the year!**

Scientists and technologists worldwide who use microscopes and microbeams will gather in Richmond, Virginia, USA this July. Join your international colleagues for symposia, tutorials, intensive workshops, short courses, roundtables and vendor sessions on emerging topics in microscopy and microanalysis.

- ❖ Nanostructured Materials
- ❖ Kidney Imaging
- ❖ Biofilm Imaging
- ❖ Materials Characterization—for Responsible Energy Generation & Use
 - ❖ 3-Dimensional Imaging in Bio & Materials Science:
Bridging Nano & Micron Scales
- ❖ Green Product & Biological Imaging
- ❖ Aberration-Corrected Electron Microscopy
- ❖ Microscopy & Analysis in Forensics

Located just off I-95, downtown Richmond is a day's drive from most cities on the east coast, and only 2 hours from Washington, DC.

Register NOW to save \$100!