

he by Cambridge University Press

ttps://doi.org/10.1557/imr.2011.88 Published online

- - - MATI

MATERIALS RESEARCH SOCIETY

Advancing materials. Improving the quality of life.

CAMBRIDGE

Journal of MATERIALS RESEARCH

JOURNAL OF MATERIALS RESEARCH (JMR) is an interdisciplinary journal serving the materials research community through publication of original research articles and invited reviews encompassing the synthesis, processing, characterization, properties, and theoretical description of materials.

JMR publishes new research that demonstrates a significant impact or advance of scientific understanding of interest to the materials research community. Engineering studies and applications to commercial products are beyond the scope of **JMR** and should be submitted elsewhere. Manuscripts that report data without giving an analysis, interpretation, or discussion are only acceptable if the data are sufficiently important that publication is expected to lead to significant new studies or advancements in science or technology.

Manuscripts must be submitted to the *Journal of Materials Research* electronically via ScholarOne manuscripts, at the following website address: http://mc.manuscriptcentral.com/jmr. Electronic submission expedites the review process and also allows authors to track the status of their manuscripts at any time. Complete instructions are available on the ScholarOne site and authors will be prompted to provide all necessary information.

Manuscripts must be prepared in English, using a word processing program, formatted to fit $8\frac{1}{2} \times 11$ in. paper, and saved as .doc, .pdf, .rtf, or .ps files. Separate graphics files (.eps and .tif) must be uploaded for each figure. Authors may also upload .xls or .ppt supplemental files as part of the manuscript submission process. All of these files will be converted to .pdf format. Detailed instructions are available on the submission web site. During submission, authors must enter all coauthor names and e-mail addresses. Manuscripts will not be considered for peer review until this information is provided. Authors must also enter manuscript keywords using the JMR keyword list (located on the submission web site). Authors who are not fluent in English must have their manuscript edited for correct English grammar and sentence structure before submission.

Authors are expected to follow the conventional writing, notation, and illustration style prescribed in *Scientific Style and Format: the CSE Manual for Authors, Editors and Publishers, 7th edition, 2006.* Authors should also study the form and style of printed material in this journal. SI units should be used. Authors should use an identical format for their names in all publications to facilitate use of citations and author indexes.

Manuscripts are accepted with the understanding that they represent original research, except for review articles, and that they have not been copyrighted, published, or submitted for publication elsewhere. Authors submitting manuscripts to *JMR* who have related material under consideration or in press elsewhere should send a copy of the related material to *JMR* at the time of submission. While their manuscripts are under consideration at *JMR*, authors must disclose any such related material. To expedite the review process, authors may provide names and contact information for up to four possible reviewers.

Articles are original research reports that include complete, detailed, self-contained descriptions of research efforts. All articles must contain an abstract and section headings.

Commentaries and Reviews: Journal of Materials Research occasionally publishes commentaries on topics of current interest or reviews of the literature in a given area. If an author proposes a review, the title, abstract, and a brief outline should be submitted to the Editorial Office via e-mail for prior consultation on the appropriateness of the topic.

Color policy: It is not necessary for authors to indicate that a figure should be displayed in color online. JMR will assume that any author who submits figures in color wants and agrees to their being produced in color online. Figures may be printed in color at the author's request for an additional charge. Color figures must be submitted before the paper is accepted for publication, and cannot be received later in the process. Authors cannot submit two versions of the same figure, one for color and one for black and white; only one version can be submitted. Authors need to carefully consider the following when submitting figures in color that will

be published in color online only: 1) The colors chosen must reproduce effectively and the colors should be distinguishable when printed in black and white; 2) The descriptions of figures in text and captions must be sufficiently clear for both online and print copy. When submitting figures to be in color online only, authors should include the phrase <<color online>> in the figure captions. This is the author's responsibility. Authors will see these color figures when viewing their author page proofs on screen. Authors should always print their page proofs in black and white to see how they will appear in print. Authors will NOT be allowed to submit color figures to replace black and white figures in the page proof stage. To maximize the probability that figures will be published in color online and also print as good quality black and white or grayscale graphics, authors are encouraged to follow these figure submission guidelines: 1) Submit a color graphic in Tagged Image File Format (.tif); 2) Submit color graphics with a resolution of at least 300 dpi (600 dpi if there is text or line art in the figure); 3) Submit color graphics in CMYK format; 4) Submit figures sized to fit the actual column or page width of the journal so that reduction or enlargement is not necessary; 5) Submit multipart figures in one single electronic file.

Copyright © 2011, Materials Research Society. All rights reserved. No part of this publication may be reproduced, in any form or by any means, electronic, photocopying, or otherwise, without permission in writing from Cambridge University Press. Policies, request forms and contacts are available at: http://www.cambridge.org/rights/permissions/permission. htm. Permission to copy (for users in the USA) is available from Copyright Clearance Center http://www.copyright.com, email: info@copyright.com.

Journal of Materials Research Subscription Prices (2011) [includes on-line web access]					
[molddes on-line web access]	USA and Poss.	Non-US	Online Only		
MRS Regular and Student					
Members	\$225.00	\$275.00	\$100.00		
Institutions	\$1326.00	\$1423.00	\$1260.00		

Journal of Materials Research (ISSN: 0884-2914) is published twenty-four times a year by Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013 – 2473 for the Materials Research Society. Periodical Postage Paid in New York, NY and additional mailing offices. POSTMASTER: Send address changes to Journal of Materials Research, c/o Journals Dept., Cambridge University Press, 100 Brook Hill Drive, West Nyack, NY 10994-2113, USA.

Subscriptions, renewals, address changes, and single-copy orders should be addressed to Subscription Fulfillment, *Journal of Materials Research*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, NY 10994-2133, USA (for USA, Canada, and Mexico); or Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge, CB2 8RU, England (for UK and elsewhere). Allow at least six weeks advance notice. For address changes, please send both old and new addresses and, if possible, include a mailing label from a recent issue. Requests from subscribers for missing journal issues will be honored without charge only if received within six months of the issue's actual date of publication; otherwise, the issue may be purchased at the single-copy price.

Reprints of individual articles in *Journal of Materials Research* may be ordered. For information on reprints, please contact Cambridge University Press.

Individual member subscriptions are for personal use only.

CODEN: JMREEE ISSN: 0884-2914

Journal of

MATERIALS RESEARCH

Editor-in-Chief: Gary L. Messing, *The Pennsylvania State University*Associate Editor, Biomaterials: Adrian Mann, *Rutgers University*

Associate Editor, Metallic Materials: Jürgen Eckert, IFW Dresden, Germany

Associate Editor, Polymers and Organic Materials: Howard E. Katz, Johns Hopkins University

Editorial Office: Gail A. Oare, Director of Publications and Marketing, Materials Research Society, Warrendale, PA

Eileen Kiley Novak, Assistant Director of Publications, Materials Research Society, Warrendale, PA

Linda A. Baker, JMR Editorial Assistant, Materials Research Society, Warrendale, PA Lorraine K. Wolf, JMR Publishing Assistant, Materials Research Society, Warrendale, PA

2011 Principal Editors:

Patrick Bernier, Universite de Montpellier II, France

Robert C. Cammarata, Johns Hopkins University

Edwin A. Chandross, MaterialsChemistry LLC

Ping Chen, Dalian Institute of Chemical Physics, China

Yang-T. Cheng, University of Kentucky

Franz Faupel, Universitäet Kiel, Germany

David S. Ginley, National Renewable Energy Laboratory

Amit Goyal, UT-Battelle/Oak Ridge National Laboratory

Mikko P. Haataja, Princeton University

Himanshu Jain, Lehigh University

Suk-Joong L. Kang, Korean Advanced Institute of Science and Technology, Republic of Korea

C. Robert Kao, National Taiwan University, Taiwan

Koichi Kugimiya, Osaka University, Japan

Sharvan Kumar, Brown University

Yadong Li, Tsinghua University, China

Erica Lilleodden, GKSS Research Center, Germany

Scott T. Misture, Alfred University

Paul Muralt, Ecole Polytechnique Federale de Lausanne, Switzerland

Michelle Oyen, Cambridge University, United Kingdom

Nitin P. Padture, The Ohio State University

Joan M. Redwing, The Pennsylvania State University

Clifford L. Renschler, Sandia National Laboratories

Ian McLean Robertson, University of Illinois at Urbana-Champaign

Mototsugu Sakai, Toyohashi University of Science and Technology,

Dale Schaefer, University of Cincinnati

Winston Schoenfeld, University of Central Florida

Christopher A. Schuh, *Massachusetts Institute of Technology*

Don W. Shaw, The University of Texas at Dallas

Robert L. Snyder, Georgia Institute of Technology

Jay A. Switzer, Missouri University of Science and Technology

Mauricio Terrones, The Pennsylvania State University; and Shinshu University, Japan

Yoshihisa Watanabe, National Defense Academy, Japan

William J. Weber, University of Tennessee/Oak Ridge National Laboratory

Sam Zhang, Nanyang Technological University, Singapore

Yanchun Zhou, Aerospace Research Institute of Materials and Processing Technology, China

Cover: Prussian blue staining of HeLa cells treated with DMSA-coated Fe $_3O_4$ magnetic nanoparticles at the concentration of 100 μ g/mL for 48 h. Scale bar = 2 μ m. [Y. Liu and J. Wang: Comparative and quantitative investigation of cell labeling of a 12-nm DMSA-coated Fe $_3O_4$ magnetic nanoparticle with multiple mammalian cell lines. p. 822.]

Journal of MATERIALS RESEARCH

Volume 26, Number 6, March 28, 2011

ARTICLES		
727–738	Measuring substrate-independent modulus of thin films	Jennifer Hay, Bryan Crawford
739–744	Noncontact, in-line measurement of boron concentration from ultrathin boron-doped epitaxial $\mathrm{Si}_{1-x}\mathrm{Ge}_x$ layers on $\mathrm{Si}(100)$ by multiwavelength micro-Raman spectroscopy	Yu Fen Tzeng, Scott Ku, Stock Chang, Chi Ming Yang, Chyi Shieng Chern, John Lin, Noriyuki Hasuike, Hiroshi Harima, Takeshi Ueda, Toshikazu Ishigaki, Kitaek Kang, Woo Sik Yoo
745–753	Impedance analysis of amorphous and polycrystalline tantalum oxide sputtered films	Guneet Sethi, Brian Bontempo, Eugene Furman, Mark W. Horn, Michael T. Lanagan, S.S.N. Bharadwaja, Jing Li
754–762	Photoinduced formation of thin-film structures in titanium alkoxides via direct deposition from solution and from spin-coated solid-state precursor films	Z.V. Schneider, J.D. Musgraves, K. Simmons-Potter, B.G. Potter, Jr, T.J. Boyle
763–769	Femtosecond optical nonlinearities of $\mathrm{Au}/\mathrm{TiO_2}$ thin films prepared by a sputtering method	Ichiro Tanahashi, Akihiro Mito
770–774	Growth-mode induced defects in epitaxial $SrTiO_3$ thin films grown on single crystal $LaAlO_3$ by a two-step PLD process	Dong Su, Tomoaki Yamada, Roman Gysel, Alexander K. Tagantsev, Paul Muralt, Nava Setter, Nan Jiang
775–780	Structural properties of InN films grown in different conditions by metalorganic vapor phase epitaxy	Xiuhua Wang, Shanshan Chen, Wei Lin, Shuping Li, Hangyang Chen, Dayi Liu, Junyong Kang
781–784	Room-temperature creep of nanoporous silica	S.O. Kucheyev, K.A. Lord, A.V. Hamza
785–795	Indentation of polydimethylsiloxane submerged in organic solvents	Yuhang Hu, Xin Chen, George M. Whitesides, Joost J. Vlassak, Zhigang Suo
796–803	Structure manufacturing of proton-conducting organic-inorganic hybrid silicophosphite membranes by solventless synthesis	Yomei Tokuda, Satoshi Oku, Teppei Yamada, Masahide Takahashi, Toshinobu Yoko, Hiroshi Kitagawa, Yoshikatsu Ueda
804–814	A silanol protection mechanism: Understanding the decomposition behavior of surfactants in mesostructured solids	Dahai Pan, Lingzhi Zhao, Kun Qian, Lei Tan, Liang Zhou, Jun Zhang, Xiaodan Huang, Yu Fan, Haiyan Liu, Chengzhong Yu, Xiaojun Bao
815–821	Processing and immobilization of enzyme Ribonuclease A through laser irradiation	C. Popescu, J. Roqueta, A. Pérez del Pino, M. Moussaoui, M.V. Nogués, E. György

	u	n
	ũ	ŋ
	g	J
	۵	ממח
	>	>
į,	:	=
	۲	7
	ā	Ū
	5	5
ľ	7	=
	-	5
9	-	,
	a	J
	ζ	7
•	τ	7
ľ	ī	
	c	2
	۶	
	'n	=
١		ĭ
ľ	`	•
	\geq	2
٠	٠	2
	a	J
	2	=
1	-	=
	2	=
	C	כ
•	τ	3
	ā	Ď
	Š	
	ç	<u>-</u>
	,	2
	2	2
	L L	
	DI PI	2
	S DIP	
	S DINIGH	
	A DITPLOY	
	1 XX DILPIGA	
	C C C C C C C C C C C C C C C C C C C	
	2011 XX Dilblich	
	r 2011 XX Dirbich	
	ar 2011 88 Dilblish	2
	mr 2011 88 Dilblish	200
	/imr 2011 88 Dilblish	200
	7/imr 2011 88 Dirblish	200.
	557/imr 2011 88 Dilblish	200.
	1557/imr 2011 88 Dilblish	200
	1557/imr 2011 88 Dilblich	200
	1557/imr 2011 88 Dilblich	200.
	/10 1557/imr 2011 88 Dirblich	200.
	10 1557/imr 2011 88 Dilblish	200.
	2011 1557/imr 2011 88 Dirbich	200
	org/10 1557/imr 2011 88 Dirlich	200
	ora/10 1557/imr 2011 88 Dillich	200
	oi org/10 1557/imr 2011 88 Dirlich	
	/doi org/10 1557/imr 2011 88 Dirhich	00.
	1/00 jord/10 1557/imr 2011 88 Dillich	
	6-//doi ord/10 1557/imr 2011 88 Dilblish	
	ne-//doi ord/10 1557/imr 2011 88 Dilblish	
	the //doi ord/10 1557/imr 2011 88 Diblish	
	https://doi.org/10.1557/imr.2011.88.Di.blish	

822–831	Comparative and quantitative investigation of cell labeling of a 12-nm DMSA-coated Fe ₃ O ₄ magnetic nanoparticle with multiple mammalian cell lines	Yingxun Liu, Jinke Wang
832–836	Convective effect on the solidification of hypermonotectic alloys	Haili Li, Jiuzhou Zhao
837–844	Hybrid nanocomposite coatings for corrosion protection of low carbon steel: A substrate-integrated and scalable active–passive approach	Tapan K. Rout, Anil V. Gaikwad, Vincent Lee, Sarbajit Banerjee