



APRIL 28, 2013

# 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 © 2013, 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 (2013) [includes on-line web access]						
[molddes on-line web access]	USA and Poss.	Non-US	Online Only			
MRS Regular and Student Members	\$248.00	\$303.00	\$100.00			
Institutions	\$1568.00	\$1683.00	\$1442.00			

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: Eileen Kiley Novak, Director of Communications, Materials Research Society, Warrendale, PA

Ellen W. Kracht, Publications Manager, 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

#### 2013 Principal Editors:

Lennart Bergström, Stockholm University, Sweden

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

Andrea M. Hodge, University of Southern California

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

Edson Roberto Leite, Universidade Federal de São Carlos, Brazil

Yadong Li, Tsinghua University, China

Sanjay Mathur, University of Cologne, Germany

Michael E. McHenry, Carnegie Mellon University

Scott T. Misture, Alfred University

Paul Muralt, Ecole Polytechnique Federale de Lausanne, Switzerland

Cewen Nan, Tsinghua University, China

George M. Pharr, University of Tennessee

lan M. Reaney, The University of Sheffield, United Kingdom

Joan M. Redwing, The Pennsylvania State University

Clifford L. Renschler, Sandia National Laboratories

Winston Schoenfeld, University of Central Florida

Don W. Shaw, The University of Texas at Dallas

Susan B. Sinnott, University of Florida

Eric A. Stach, Brookhaven National Laboratory

Jay A. Switzer, Missouri University of Science and Technology

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

Terry M. Tritt, Clemson University

José Arana Varela, University of Sao Paulo State, Brazil

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: Multi-Walled Carbon Nanotubes are effectively grafted with polystyrene by a reductive alkylation method. [C.G. Espinosa-González, F.J. Rodríguez-Macías, A.G. Cano-Márquez, J. Kaur, M.L. Shofner, and Y. Vega-Cantú: Polystyrene composites with very high carbon nanotubes loadings by in situ grafting polymerization. p. 1087.]

## Journal of MATERIALS RESEARCH

### Volume 28, Number 8, April 28, 2013

INIVI	LED	FF/	\TI	IRF	$D\Lambda$	PERS
114 61	ᇆ	$\Gamma \subset F$	A I U	nE	PА	FENS

1013–1020	Novel nanosample preparation with a helium ion microscope	Maria Rudneva, Emile van Veldhoven, Sairam K. Malladi, Diederik Maas, Henny W. Zandbergen
1021–1030	Enhancement of solar cells with photonic and plasmonic crystals - overcoming the Lambertian limit	Rana Biswas, Sambit Pattnaik, Chun Xu, Joydeep Bhattacharya, Nayan Chakravarty, Vikram Dalal
1031–1041	Ferromagnetism induced by lattice volume expansion and amorphization in ${\rm EuTiO_3}$ thin films	Katsuhisa Tanaka, Koji Fujita, Yuya Maruyama, Yoshiro Kususe, Hideo Murakami, Hirofumi Akamatsu, Yanhua Zong, Shunsuke Murai
ARTICLES		
1042–1046	Effect of substrate temperature on the crystallographic structure and first-order magnetic phase transition of FeRh thin films	Wei Lu, Ping Huang, Kaikai Li, Biao Yan
1047–1055	Indentation-induced delamination of plasma-enhanced chemical vapor deposition silicon nitride film on gallium arsenide substrate	Mingyuan Lu, Hongtao Xie, Han Huang, Jin Zou, Yuehui He
1056–1060	Correlation of indentation-induced phase transformations with the degree of relaxation of ion-implanted amorphous silicon	Leonardus B. Bayu Aji, S. Ruffell, B. Haberl, J.E. Bradby, J.S. Williams
1061–1069	Highly efficient and stable solid-state luminescent nanohybrids: Precise architecture and enhancement mechanism	Ya Kun Zhu, Shan Yi Guang, Xin Yan Su, Hong Yao Xu, Xiang Yang Liu
1070–1077	Dielectric properties of $Ba_{1-x}Sr_xZrO_3$ (0 $\leq x \leq$ 1) nanoceramics developed by citrate precursor route	Omar A. Al-Hartomy, Mohd Ubaidullah, Dinesh Kumar, Jamal H. Madani, Tokeer Ahmad
1078–1086	Resistance degradation behavior of Zr-doped $BaTiO_3$ ceramics and multilayer ceramic capacitor	Seok-Hyun Yoon, Jeong-Ryeol Kim, Sun-Ho Yoon, Chang-Hoon Kim, Doo-Young Kim
1087–1096	Polystyrene composites with very high carbon nanotubes loadings by in situ grafting polymerization	Claudia G. Espinosa-González, Fernando J. Rodríguez-Macías, Abraham G. Cano-Márquez, Jasmeet Kaur, Meisha L. Shofner, Yadira I. Vega-Cantú
1097–1104	Electron transport properties of graphene with charged impurities and vacancy defects	Yasuhiko Kudo, Kazuyuki Takai, Toshiaki Enoki
1105–1110	Preparation of nonaggregated silver nanoparticles by the liquid phase plasma reduction method	Heon Lee, Sung Hoon Park, Sang-Chul Jung, Je-Jung Yun, Sun-Jae Kim, Do-Heyoung Kim
1111–1117	Crystallization behavior and thermal properties of biodegradable poly(L-lactide)-poly(ethylene glycol) block copolymers	Hsin-Jiant Liu, Hawn-Chung Chu, Li-Huei Lin, Jia-He Wu

1118–1128 Determination of structure-property relationships for 3-aminopropyltriethoxysilane films using x-ray reflectivity

1129-1138 Multimineral nutritional supplements in a nano-CaO matrix

Sandip U. Argekar, Terence L. Kirley, Dale W. Schaefer

Jesper T.N. Knijnenburg, Florentine M. Hilty, Frank Krumeich, Michael B. Zimmermann, Sotiris E. Pratsinis