

AMERICAN CERAMIC SOCIETY

bulletin

emerging ceramics & glass technology

JUNE/JULY 2013

Graphene nanocomposite coatings for protecting low-alloy steels from corrosion



DOUBLE ISSUE

Special topics:

– Manufacturing

– Students

- Annual student edition
- PCSA writing contest winner
- Meetings: Cements Division, ICCPS-12,
- UNITECR'13, MS&T'13



contents

June–July 2013 • Vol. 92 No. 5

feature articles

Graphene nanocomposite coatings for protecting low-alloy steels from corrosion	18
Robert V. Dennis, Lasantha T. Viyannalage, Anil V. Gaikwad, Tapan K. Rout, and Sarbajit Banerjee <i>A scalable roller-coating approach adapts new materials to solving persistent corrosion problems using existing manufacturing methods.</i>	
New uses for carbon steel pipe thanks to corrosion- and wear-resistant claddings	22
Joshua Caris <i>New plasma arc lamp process clads carbon steel pipelines for oil and gas industry.</i>	
Annual student section	25
<i>The annual student-contributed section showcases student activities and research. Articles on laser machining, porous MAX phases, and sea slug research demonstrate the wide—and creative—range of student interests.</i>	
Chair's update on PCSA activities and welcome to the student ACerS Bulletin issue	25
–Derek R. Miller	
Successful 2013 Congressional Visits Day	28
–Tricia Freshour	
Demo and lab kits coming soon!	29
Laser machining of structural ceramics	29
–Hitesh D. Vora and Narendra B. Dahotre	
Simple, inexpensive synthesis of damage-tolerant MAX phase foams	31
–Liangfa Hu, Ibrahim Karaman, and Miladin Radovic	
Extreme interdisciplinary study abroad—From sea slugs to gas turbines	32
–Brad Richards	
International Materials Institute for New Functionality in Glass	34
Karl W. Brisseaux <i>Study abroad benefits glass science and students through the International Materials Institute for New Functionality in Glass Research research opportunities.</i>	
meetings	
12th International Conference on Ceramic Processing Science (ICCP-12) ..	36
Technical program, hotel information	36
Plenary speakers, schedule	37
UNITECR 2013	38
Welcome reception, schedule at a glance	38
Sponsors, conference dinner	39
Poster session, short courses	39
Optional tours, hotel information	39
4th Advances in Cement-Based Materials: Characterization, Processing, Modeling, and Sensing	40
Della Roy lecture, schedule	40
Hotel information	40
Materials Science & Technology 2013 program preview	41
ACerS lectures and special events	41
Short courses	42
Student activities	43



cover story

Graphene nanocomposite coatings for protecting low-alloy steels from corrosion

(Credit: istock)

– page 18



Annual student section

(Credit: Chris McKelvey; AIST)

– page 25



ceramics in biomedicine

Researchers show axial vascularization of Bioglass matrix with animal tests

(Credit: Arkudas et al., Tissue Engineering C/Liebert Publications)

– page 17

Editorial and Production

Eileen De Guire, Editor
ph: 614-794-5828 fx: 614-794-5815
edeguire@ceramics.org

Peter Wray, Contributing Editor
Russell Jordan, Contributing Editor
Tess M. Speakman, Graphic Designer

Editorial Advisory Board

Olivia Graeve, Chair, UCSD
Allen Applett, Oklahoma State University
Andrew Gyekenyesi, Ohio Aerospace Institute
Joe Ryan, Pacific Northwest National Laboratory
Rafael Salomão, University of São Paulo
Finn Giuliani, Imperial College London
Eileen De Guire, Staff Liaison, The American Ceramic Society

Customer Service/Circulation

ph: 866-721-3322 fx: 240-396-5637
customerservice@ceramics.org

Advertising Sales

National Sales

Patricia A. Janeway, Associate Publisher
pjaneway@ceramics.org
ph: 614-794-5826 fx: 614-794-5822

Europe

Richard Rozelaar
media@alaincharles.com
ph: 44-(0)-20-7834-7676 fx: 44-(0)-20-7973-0076

Executive Staff

Charles G. Spahr, Executive Director and Publisher
cspahr@ceramics.org
Linda Ballinger, Director of Finance and Operations
lbballinger@ceramics.org
Megan Bricker, Dir. Marketing & Membership Services
mbricker@ceramics.org
Eileen De Guire, Director of Communications
edeguire@ceramics.org
Sue LaBute, Human Resources Manager & Exec. Assistant
slabute@ceramics.org
Mark Mecklenborg, Dir. Technical Publications & Meetings
mmecklenborg@ceramics.org

Officers

Richard Brow, President
David Green, President-elect
George Wicks, Past President
Ted Day, Treasurer
Charles Spahr, Executive Director

Board of Directors

Keith Bowman, Director 2012-2015
Elizabeth Dickey, Director 2012-2015
William Fahrenholtz, Director 2009-2013
Vijay Jain, Director 2011-2014
William Lee, Director 2010-2013
Ivar Reimanis, Director 2011-2014
Lora Cooper Rothen, Director 2011-2014
Robert Schwartz, Director 2010-2013
Mrityunjay (Jay) Singh, Director 2012-2015
David Johnson Jr., Parliamentarian

Address

600 North Cleveland Avenue, Suite 210
Westerville, OH 43082-6920



departments

News & Trends 3

- TAMU establishes interdisciplinary Department of Materials Science and Engineering
- Ceram building first commercial-scale flash sintering kiln?
- Schott reports progress in manufacturing ceramics for use in advanced lens systems and LED technology
- Business news
- UK announces £85 million funding for advanced materials, grid storage, and robotics
- Lessons from the ancients—engineered ceramic materials and climate change

ACerS Spotlight 7

- At PACRIM: Career roundtable event for students
- ACerS Ceramographic Exhibit and Competition
- Hench receives Toledo Ceramics and Glass Award
- Order of the Engineer induction at MS&T'13
- Wiley introduces open access online journals program
- Society leadership elections: Candidates statements and ballot
- Education Integration Committee
- Names in the news
- In Memoriam

Ceramics in Energy 14

- Philips claims record for energy-efficient lighting, doubling fluorescents' lumens/watt
- E-glass fiberglass flywheels for low-cost energy storage

Research Briefs 15

- Rare-earth oxides found to produce superhydrophobic ceramics

Ceramics in the Environment 16

- Empa claims new ceramic foam approach advances diesel filter structure

Ceramics in Biomedicine 17

- Researchers show axial vascularization of Bioglass matrix with animal tests

columns

PCSA writing competition 33

Richard Chinn

My salad days in academia, when I was green before sintering

resources

Calendar 44

Classified Advertising 45

Display Advertising Index 48

American Ceramic Society Bulletin covers news and activities of the Society and its members, includes items of interest to the ceramics community and provides the most current information concerning all aspects of ceramic technology, including R&D, manufacturing, engineering and marketing.

American Ceramic Society Bulletin (ISSN No. 0002-7812). ©2013. Printed in the United States of America. *ACerS Bulletin* is published monthly, except for February, July and November, as a "dual-media" magazine in print and electronic format (www.ceramicbulletin.org).

Editorial and Subscription Offices: 600 North Cleveland Avenue, Suite 210, Westerville, OH 43082-6920. Subscription included with American Ceramic Society membership. Nonmember print subscription rates, including online access: United States and Canada, 1 year \$95; international, 1 year \$150.* Rates include shipping charges. International Remail Service is standard outside of the United States and Canada. *International nonmembers also may elect to receive an electronic-only, e-mail delivery subscription for \$75.

Single issues, January–November: member \$6.00 per issue; nonmember \$7.50 per issue. December issue (*ceramicSOURCE*): member \$20, nonmember \$25. Postage/handling for single issues: United States and Canada, \$3 per item; United States and Canada Expedited (UPS 2nd day air), \$8 per item; International Standard, \$6 per item.

POSTMASTER: Please send address changes to *American Ceramic Society Bulletin*, 600 North Cleveland Avenue, Suite 210, Westerville, OH 43082-6920.

Periodical postage paid at Westerville, Ohio, and additional mailing offices. Allow six weeks for address changes.

ACSBA7, Vol. 92, No. 5, pp 1-48. All feature articles are covered in *Current Contents*.