## **About the Materials Research Society**

The Materials Research Society (MRS), a not-forprofit scientific association founded in 1973, promotes interdisciplinary goal-oriented basic research on materials of technological importance. Membership in the Society includes almost 15,000 scientists, engineers, and research managers from industrial, government, and university research laboratories in the United States and close to 70 countries.

The Society's interdisciplinary approach differs from that of single-discipline professional societies because it promotes information exchange across the many technical fields touching materials development. MRS sponsors two major international annual meetings encompassing approximately 70 topical symposia, and also sponsors numerous single-topic scientific meetings. The Society recognizes professional and technical excellence and fosters technical interaction in local geographic regions through Sections and University Chapters.

MRS participates in the international arena of materials research through the International Union of Materials Research Societies (IUMRS). MRS is a member of ASTRA and is an affiliate of the American Institute of Physics.

MRS publishes symposium proceedings, MRS Bulletin, Journal of Materials Research, and other pub-

lications related to current research activities.

MRS Bulletin (ISSN: 0883-7694, print; ISSN 1938-1425, online) is published monthly by the Materials Research Society, 506 Keystone Drive, Warrendale, PA 15086-7573. Copyright ©2008, Materials Research Society. Permission required to reproduce content. Periodical postage paid at Warrendale, PA, and at additional mailing offices. POSTMASTER: Send address changes to MRS Bulletin in care of the Materials Research Society, at the address listed; tel. 724-779-3003; fax 724-779-8313. Printed in the U.S.A.

Membership in MRS is \$105 annually for regular members, \$30 for students. Dues include an allocation of \$29 (\$17 for students) to a subscription to MRS Bulletin. Individual member subscriptions are for personal use only. Non-member subscription rates are \$260 for one calendar year (12 issues) within the U.S.A. and \$320 elsewhere. Single copies may be purchased for \$45 each. 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.

MRS Bulletin is included in Current Contents®/ Engineering, Computing, and Technology; Current Contents®/Physical, Chemical, and Earth Sciences, the SciSearch® online database, Research Alert®, Science Citation Index®, and the Materials Science Citation Index<sup>™</sup>. Back volumes of MRS Bulletin are available on microfiche through University Microfilms Inc., 300 North Zeeb Road, Ann Arbor, MI 48106, USA

Send Letters to the Editor to:

**MRS Bulletin Materials Research Society** 506 Keystone Drive Warrendale, PA 15086-7573 USA Fax 724-779-8313 Bulletin@mrs.org

Letters must include your name, affiliation, and full contact information.

## MRS BULLETIN

Editorial Office • 506 Keystone Drive • Warrendale, PA 15086-7573 USA Tel. 724-779-3004 ext. 522; fax 724-779-8313; Bulletin@mrs.org; http://www.mrs.org/

Editor

E.L. Fleischer

**Managing Editor** 

J. Meiksin

**Technical Editor** 

I Wilson

**Associate Technical Editor** 

A. Predith

**Editorial Assistants** 

E. Ellison, G. Lister, B. Moriarty, L.R. Protzman, and M. Wilmoth

**Editorial Intern** 

D. Hudson

**Guest Editors** 

R. Ramesh and D.G. Schlom

**Special Contributors** 

S. Baneriee, S.R. Barnes, J.J. Carvaial. A. Hatt, C. McCormick, G. Rao, S. Trohalaki, T.D. Washington, and

A 7inn

Special Consultants

B. Chalamala and L. Merhari

**Book Review Board** 

J.H. Westbrook (Chair), C. Batich, R.J. Matyi, L. Olafsen, S. Sant, and

J.-C. Zhao

Visiting Scientist

V.S. Arunachalam

Center for Study of Science, Technology & Policy, Bangalore, India

MRS Office of Public Affairs

499 South Capitol Street SW, Suite 600 Washington, DC 20003

Art Director

K. Bruniany

Production/Design

Franklin Design and SPI Technologies, Inc.

M.E. Kaufold and D.L. Watterson

Circulation

S. Forrest and M. Judt

EDITORIAL BOARD \_

P.S. Drzaic. Chair Unidym Corp. Menlo Park, CA

V.S. Arunachalam Center for Study of Science, Technology & Policy Bangalore, India

M.-I. Baraton University of Limoges Limoges, France

R.C. Cammarata Johns Hopkins University Baltimore, MD

I Fornaro University of Uruguay Montevideo, Uruguay

H - U Habermeier Max Planck Institute Stuttgart, Germany

S.C. Moss Aerospace Corp. Los Angeles, CA

J.A. Nucci Cornell University Ithaca, NY

D.N. Seidman Northwestern University

Evanston, IL

J.R. Weertman Northwestern University Evanston, IL

E. Werwa Washington, DC

J.H. Westbrook Brookline Technologies Ballston Spa, NY

S.M. Yalisove University of Michigan Ann Arbor, MI

**VOLUME ORGANIZERS** 

2007

T.F. Kuech University of

Wisconsin-Madison

Pennsylvania State University

T.E. Mallouk

J A Nucci Cornell University R.A. Register Princeton University

2008

Y.-T. Cheng University of Kentucky

R.S. Goldman University of Michigan R. Krishnamoorti University of Houston A. Sellinger Stanford University

2009

A. Misra Los Alamos National Laboratory

R. O'Havre Colorado School of Mines K. Shull Northwestern University S. Stemmer University of California, Santa Barbara

**2008 MRS OFFICERS** 

President C.A. Volkert

University of Göttingen

Secretary B.J.H. Stadler University of Minnesota Immediate Past President

A.I Hurd Los Alamos National Laboratory

Vice President and President-Elect

S.P. Baker Cornell University Treasurer D.S. Ginley

**Executive Director** 

Materials Research Society

National Renewable Energy Laboratory T. Osman

**INTERNATIONAL UNION OF MATERIALS RESEARCH SOCIETIES** 

First Vice President President G M Crean H Katz Tyndall Natl, Inst. Johns Hopkins University Baltimore, MD, USA Cork, Ireland

Second Vice President O. Takai Nagoya University Japan

Secretary J.E.E. Baglin IBM Almaden Research Center San Jose, CA, USA Treasurer Y Han Inst. of Aeronautical Materials

Beijing, China

Immediate Past President I 7hou MIM Xian, Shaanxi, China

General Secretary R.P.H. Chang Northwestern University Evanston, IL, USA

**IUMRS ADHERING BODIES** 

Australian Materials Research Society (A-MRS) J.S. Williams, Australian National University

Brazil Materials Research Society (B-MRS) F. Lázaro Freire Jr., PUC-Rio

Chinese Materials Research Society (C-MRS) L. Zhou, NW Institute for Nonferrous Metal Research European Materials Research Society (E-MRS) A. Slaoui, CNRS

Materials Research Society (MRS) C.A. Volkert, University of Göttingen

Materials Research Society of Argentina (MRS-Argentina) J. Ovejero García, CNEA

Materials Research Society of India (MRS-I) R.A. Mashelkar, Council of Scientific & Industrial Research

Materials Research Society of Japan (MRS-J) O. Takai, Nagoya University

Materials Research Society of Korea (MRS-K) J.-W. Park, Hanyang University

Materials Research Society of Russia (MRS-Russia) N.Z. Lyakhov, Russian Academy of Sciences

Materials Research Society of Singapore (MRS-S) B.V.R. Chowdari, National University of Singapore

Materials Research Society of Taiwan (MRS-T) T.P. Perng, Yuan Ze University

Mexican Materials Research Society (Mexican-MRS) P.H. Hernández Tejeda, Benemérita Universidad Autónoma de Puebla