

## About the Materials Research Society

The Materials Research Society (MRS), a not-for-profit scientific association founded in 1973, promotes interdisciplinary goal-oriented basic research on materials of technological importance. Membership in the Society includes almost 16,000 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 90 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 publications 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 ©2009, 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 \$115 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 \$275 for one calendar year (12 issues) within the U.S.A. and \$335 elsewhere. Single copies may be purchased for \$50 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™*. 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

L. Wilson

### Associate Technical Editor

T. Palucka

### Editorial Assistants

E. Ellison, B. Moriarty, and  
M. Wilmoth

### Special Contributors

J.J. Carvajal, R. Geilenkeuser,  
F.J. Hartland, G. Lister, A.A. Odukale,  
S. Olugebefola, R. Serna, and  
S. Trohalaki

### Book Review Board

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

### InterFaces

R.C. Cammarata (Chair), M. Green,  
J.A. Nucci, S.M. Prokes, and  
C. Trager-Cowan

### Visiting Scientist

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

### MRS Office of Public Affairs

R. Kelley  
499 South Capitol Street SW, Suite 600  
Washington, DC 20003

### Art Director

K. Bruniany

### Production/Design

Franklin Design and SPI Technologies, Inc.

### Advertising

M.E. Kaufold and D.L. Watterson

### Circulation

M. Judt

## EDITORIAL BOARD

P.S. Drzaic, Chair  
Drzaic Consulting Services  
Morgan Hill, CA

L. Fornaro  
University of Uruguay  
Montevideo, Uruguay

D.N. Seidman  
Northwestern University  
Evanston, IL

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

H.-U. Habermeier  
Max Planck Institute  
Stuttgart, Germany

J.R. Weertman  
Northwestern University  
Evanston, IL

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

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

E. Werwa  
Washington, DC

R.C. Cammarata  
Johns Hopkins University  
Baltimore, MD

J.A. Nucci  
Cornell University  
Ithaca, NY

J.H. Westbrook  
Brookline Technologies  
Ballston Spa, NY

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

## VOLUME ORGANIZERS

### 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'Hayre  
Colorado School of Mines

K. Shull  
Northwestern University

S. Stemmer  
University of California,  
Santa Barbara

### 2010

T.J. Balk  
University of Kentucky

D. Cahen  
Weizmann Institute of  
Science

F. Meldrum  
University of Bristol

S. Streiffer  
Argonne National  
Laboratory

## 2009 MRS OFFICERS

### President

S.P. Baker  
Cornell University

### Secretary

B.J.H. Stadler  
University of Minnesota

### Immediate Past President

C.A. Volkert  
University of Göttingen

### Vice President and President-Elect

D.S. Ginley  
National Renewable Energy Laboratory

### Treasurer

L.L. Horton  
Oak Ridge National Laboratory

### Executive Director

Materials Research Society  
T. Osman

## INTERNATIONAL UNION OF MATERIALS RESEARCH SOCIETIES

### President

H. Katz  
Johns Hopkins University  
Baltimore, MD, USA

### First Vice President

B.V.R. Chowdari  
Natl. Univ. of Singapore  
Singapore

### Second Vice President

O. Takai  
Nagoya University  
Japan

### Secretary

Q. Feng  
University of Science  
and Technology  
Beijing, China

### Treasurer

Y. Han  
Inst. of Aeronautical  
Materials  
Beijing, China

### Immediate Past President

G.M. Crean  
Tyndall Natl. Inst.  
Cork, Ireland

### 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)  
X. Peng, Beijing, China

European Materials Research Society (E-MRS)  
A. Slaoui, CNRS

Materials Research Society (MRS)  
S.P. Baker, Cornell University

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

Materials Research Society of India (MRS-I)  
T. Ramasami, Ministry of Science and Technology

Materials Research Society of Japan (MRS-J)  
N. Kishimoto, National Institute for Materials Science

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 Tejada, Benemérita Universidad  
Autónoma de Puebla