# CHEMISTRY OF MATERIALS

# **EDITOR**

LEONARD V. INTERRANTE

Department of Chemistry Rensselaer Polytechnic Institute Troy, New York 12180

# **Associate Editors**

Dennis W. Hess Department of Chemical Engineering Lehigh University Bethlehem, Pennsylvania 18015

Gary E. Wnek Department of Chemistry Rensselaer Polytechnic Institute Troy, New York 12180

## ADVISORY BOARD

Harry Allcock J. N. Armor **Neal Armstrong** David Avnir George Blasse John S. Bradley Jeffrey Brinker Patrick Cassoux Abraham Clearfield John Corbett James Crivello Larry R. Dalton Peter Day Francis J. Di Salvo Bruce Dunn John G. Ekerdt Arthur Ellis J. M. J. Frechet Patrick Gallagher E. P. Giannelis Wavne Gladfelter Michael Gratzel Martha Greenblatt Shin-ichi Hirano Allan Jacobson Klavs F. Jensen Jack W. Johnson Mercouri G. Kanatzidis Kenneth Klabunde Walter Klemperer

Jacques Livage T. E. Mallouk Tobin Marks Egon Matijevic Joel Miller James Moore Donald Murphy Naoya Ogata Geoffrey A. Ozin Thomas Pinnavaia Kenneth Poeppelmeier Bernard Raveau Helmut Ringsdorf Jean Rouxel Lynn Schneemeyer R. Schollhorn U. Schubert Takeo Shimidzu D. F. Shriver Arthur Sleight Michael Steigerwald Galen D. Stucky Steven Suib John M. Thomas Stanley Whittingham G. L. Wilkes Jack M. Williams C. Grant Willson Aaron Wold Fred Wudl

Chemistry of Materials (ISSN 0897-4756) is published monthly by the American Chemical Society at 1155 16th St., N.W., Washington, DC 20036. Second-class postage paid at Washington, DC, and additional mailing offices. POST-MASTER: Send address changes to Chemistry of Materials, Member & Subscriber Services, P.O. Box 3337, Columbus, OH 43210. Canadian GST Reg. No. R127571347 Printed in the USA.

American Chemical Society 1155 16th St., N.W. Washington, DC 20036 (202) 872-4600 TDD (202) 872-8733 FAX (202) 872-4615

Journals Department American Chemical Society 2540 Olentangy River Road P.O. Box 3330 Columbus, OH 43210 (614) 447-3600, Ext. 3171 TELEX 6842086; FAX (614) 447-3745

Member & Subscriber Services American Chemical Society P.O. Box 3337 Columbus, OH 43210 (614) 447-3776; FAX (614) 447-3671 (800) 333-9511

### **PUBLICATIONS DIVISION**

Robert H. Marks, Director

Journals Department: Charles R. Bertsch, Head

Editorial Office: Mary E. Scanlan, Manager; Kathleen E. Duffy, Anne C. O'Melia, Joseph E. Yurvati, Journals Editing Managers; James W. Cooper, Assistant Editor

Advertising Office: Centcom, Ltd., 1599 Post Road East, P.O. Box 231, Westport, CT 06881

© Copyright 1994 by the American Chemical Society. Copyright permission: An individual may make a single reprographic copy of an article in this publication for personal use. Reprographic copying beyond that permitted by Section 107 or 108 of the U.S. Copyright Law is allowed, provided that the appropriate percopy fee is paid through the Copyright Clearance Center, Inc., 222 Rosewood Dr., Danvers, MA 01923. For reprint permission, please write to the Copyright Administrator, Publications Division, at the ACS Washington address. Bulk reprints: for quotes and information on placing an order, please call (202) 872-4539 or write to the Distribution Office at the ACS Washington address.

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984.

## **Editorial Information**

Instructions for authors and copyright status form are printed in the first issue of each volume. Please conform to these instructions when submitting manuscripts.

Manuscripts for publication should be submitted to the Editor, Leonard V. Interrante.

Correspondence regarding accepted papers and proofs should be directed to the Journals Department at the address above.

The American Chemical Society and its Editors assume no responsibility for the statements and opinions advanced by contributors.

Registered names and trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

### Subscription and Business Information

1994 subscription prices, including postage. Subscriptions are available only on a calendar year basis. (For membership information, contact Office of Member Services at the ACS Washington address.)

U.S.	Canada and Mexico	Europe*	All Other Countries*
\$ 50	<b>\$ 6</b> 3	\$ 81	\$ 90
\$ 90	\$116	\$152	\$170
\$420	\$433	\$451	\$460
\$ 50	\$ 50	\$ 60	\$ 60
\$ 90	\$ 90	\$110	\$110
\$420	\$420	\$430	\$430
\$ 25	\$ 32	\$ 32	\$ 32
	\$ 50 \$ 90 \$420 \$ 50 \$ 90 \$420	U.S. Mexico \$ 50 \$ 63 \$ 90 \$116 \$420 \$433 \$ 50 \$ 50 \$ 90 \$ 90 \$420 \$420	U.S. Mexico Europe*  \$ 50 \$ 63 \$ 81 \$ 152 \$ 420 \$ 433 \$ 451  \$ 50 \$ 50 \$ 60 \$ 90 \$ 110 \$ 420 \$ 430

\* Air service included.

New and renewal subscriptions should be sent with payment to American Chemical Society, Department L-0011, Columbus, OH 43268-0011. Rates quoted do not apply to nonmember subscribers in Japan, who must enter subscription orders with Maruzen Company Ltd., 3-10 Nihonbashi 2-chome, Chuo-ku, Tokyo 103, Japan. Tel: (03) 272-7211.

Printed edition single issue prices: current year, \$35.00; 1993, \$42.00; 1992, \$84.00; prior year, \$67.00. Foreign postage additional. Mail orders and requests for back volume prices should be sent to Microforms & Back Issues Office at the ACS Washington address.

Phone orders can be placed for printed and microfilm editions by calling the ACS toll free at (800) 333-9511 from anywhere in the United States and Canada; elsewhere call (614) 447-3776. Phone orders can be charged to Visa, MasterCard, or American Express accounts.

Changes of address must include both old and new addresses with ZIP code and a recent mailing label. Send all address changes to Member & Subscriber Services. Please allow 6 weeks for change to become effective.

Claims for missing numbers will not be allowed if loss was due to failure of notice of change of address to be received in the time specified; if claim is dated (a) North America: more than 90 days beyond issue date, (b) all other foreign: more than 180 days beyond issue date. Claims are handled by Member & Subscriber Services.

Supplementary material is noted in the table of contents with a . It is available as photocopy (\$12.00 for up to 3 pages and \$1.50 per page for additional pages, plus \$2.00 for foreign postage) or a 24× microfiche (\$12.00, plus \$1.00 for foreign postage). Canadian residents should add 7% GST. See supplementary material notice at end of journal article for number of pages. Orders must state whether for photocopy or for microfiche and give complete title of article, names of authors, journal, issue date, and page numbers. Prepayment is required and prices are subject to change. Order from Microforms & Back Issues Office at the ACS Washington address. Supplementary material also appears in the microfilm edition.