

Advanced Smart and Multifunctional Materials

**Volume 2: Advanced Processing, Polymers,
Ceramics, and Related Functional Materials**

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Email: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

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 Z39.48n1984. | ISBN 9798331330064 (pod)

Copyright © 2025 American Chemical Society

All Rights Reserved. Reprographic copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Act is allowed for internal use only, provided that a per-chapter fee of \$40.25 plus \$0.75 per page is paid to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. Republication or reproduction for sale of pages in this book is permitted only under license from ACS. Direct these and other permission requests to ACS Copyright Office, Publications Division, 1155 16th Street, N.W., Washington, DC 20036.

The citation of trade names and/or names of manufacturers in this publication is not to be construed as an endorsement or as approval by ACS of the commercial products or services referenced herein; nor should the mere reference herein to any drawing, specification, chemical process, or other data be regarded as a license or as a conveyance of any right or permission to the holder, reader, or any other person or corporation, to manufacture, reproduce, use, or sell any patented invention or copyrighted work that may in any way be related thereto. Registered names, trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.

PRINTED IN THE UNITED STATES OF AMERICA

Contents

Preface	ix
1. Advanced Applications and Processing Techniques for Porous Ceramics	1
Siddharth and Roy Siddhartha	
2. Processing Techniques and Applications of Advanced Bulk Functionally Graded Materials (FGMs)	43
Ajit Kumar Naik, Tapas Laha, and Siddhartha Roy	
3. Advanced Smart and Multifunctional Polymer Materials	77
Mahmoud E. Abd El-Aziz, Emad S. Shafik, and Heba Kandil	
4. Mechanoresponsive and Mechanoadaptive Polymeric Materials. Rheological Perspective	107
Robert Aguirresarobe, Mercedes Fernández, and Itxaso Calafel	
5. Stimuli-Responsive Shape Memory Polymer Aerogels	143
Liying Zhang, Xilong Chen, Xiang Li, Jianyong Yu, and Hui Zhang	
6. Ethyl Cellulose-Based Hybrid Films for Advanced and AI-Driven Sensing Applications	161
Muzammal Hussain, Abbas Faheem, Mulenga Kalulu, and Guodong Fu	
7. The Overlooked Polymer Frontier: Niche yet Transformative Strategies for Merging Thermoplastics and Thermosets in Future Materials	205
Robert E. Przekop and Roksana Konieczna	
8. Rheology as the Cornerstone of 2D Ink Formulation	227
Pedro C. Rijo and Francisco J. Galindo-Rosales	
9. Self-Cleaning Coatings Based on Fluorinated Graphene Hybrids	259
Kasibhatta Kumara Ramanatha Datta and Kalyan Raidongia	
10. Antimicrobial Nanomaterials for the Future	281
Vesna Vodnik and Una Stamenović	
Editors' Biographies	309
Indexes	
Author Index.....	313

Subject Index	315
----------------------------	------------