

Nano-Hybrid Smart Coatings: Advancements in Industrial Efficiency and Corrosion Resistance

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 Z39.48-1984.

Copyright © 2024 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. Introduction to Nano-Hybrid Smart Coatings	1
Walid Daoudi, Omar Dagdag, W. B. Wan Nik, Adyl Oussaid, and Abdelmalik El Aatiaoui	
2. Nanomaterials and Their Properties	17
Omar Dagdag, Rajesh Haldhar, Taiwo W. Quadri, Walid Daoudi, Elyor Berdimurodov, and Hansang Kim	
3. Synthesis and Characterization Techniques for Nano-Hybrid Smart Coatings	41
Valentine Chikaodili Anadebe, Vitalis Ikenna Chukwuike, Maduabuchi Arinzechukwu Chidiebere, Lei Guo, Eno E. Ebenso, and Rakesh Chandra Barik	
4. Chemical and Physical Properties of Nano-Hybrid Smart Coatings	59
Abhinay Thakur and Ashish Kumar	
5. Synthesis Methodology of Carbon Dots: Modern Trends and Enhancements	95
Ruby Aslam, Qihui Wang, Ruo Zhou Wang, and Zhitao Yan	
6. Sustainable Design and Production of Nano-Hybrid Smart Coatings	121
Punniyakotti Parthipan, Arunagiri Santhosh Kumar, Perumal Dhandapani, Punniyakotti Elumalai, and Durairaj Thirumurugan	
7. Smart Corrosion Resistance Coatings Based on Hybrid Nanomaterials: The Recent Advancements and Achievements	139
Javad Ramezanpour, Bahram Ramezanzadeh, and Hossein Eivaz Mohammadloo	
8. Corrosion Resistant Coating of Bipolar Plates for Proton Exchange Membrane Fuel Cells	185
Manilal Murmu, Parikshit Mahato, and Priyabrata Banerjee	
9. Anti-Fouling Nano-Hybrid/Composite Smart Coatings with Specific Reference to Marine Applications	205
Amita Somya, Amit Varshney, Abhinay Thakur, Ashish Kumar, Swarnalatha KS, and Punam Kumari	
10. Nano-Hybrid Smart Coatings for Automotive Applications	227
Sanmugapriya Ravi, Monisha Ravi, and J Arockia Selvi	
11. Nano-Hybrid Smart Coatings for Biomedical Applications	245
Elyor Berdimurodov, Khasan Berdimuradov, Ashish Kumar, Omar Dagdag, Mohamed Rbaa, Bhawana Jain, Anzirat Dusmatova, and Laziz Azimov	

12. Progress Nano-Hybrid Smart Coatings for Aerospace Applications	267
Gururaj Kudur Jayaprakash, Bhavana Rikhari, and Praveen Naik	
13. Nano-Hybrid Smart Coatings: Advancements in Self-Healing and Responsive Functionalities	279
Khalid Bouiti, Najoua Labjar, Mohammed Benmessaoud, Anas Chraka, Mohamed Omari, Said Jebbari, Hamid Nasrellah, and Souad El Hajjaji	
14. Self-Healing and Self-Lubricating Nano-Hybrid Smart Coatings	303
Hasan Vafaenezhad and Reza Eslami-Farsani	
15. Challenges and Opportunities in the Development of Nano-Hybrid Smart Coatings..	353
Abhinay Thakur and Ashish Kumar	
16. Future Developments in Nano-Hybrid Smart Coatings.....	385
Deepak Sharma, Abhinay Thakur, Ashok Kumar Sharma, Jaibir Kherb, Ashish Kumar, and Hari Om	
Editors' Biographies	417

Indexes

Author Index.....	421
Subject Index	423