

This book encompasses the fundamental concepts of Nanochemistry that involve the self-assembly of nanostructures, surface stabilization, and functionalization of nanoparticles. It's a review of the work of world-renowned scientists and is the first of its kind that gives a detailed fundamental understanding of physical, chemical, and biological methods of nanoparticle synthesis. There is a comprehension of different characterization techniques of nanoparticles. This book, for the first time, explains applications of such nanochemicals in nanomedicine, nanoimmunomedicine, lab-on-a-chip, organ-on-a-chip, bioimplants, cyborgs, hydrogen storage, electrochemical splitting of water, and construction industries.

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Contents

<i>Preface</i>	iii
1. Self-Assembled Nanostructures	1
<i>Amreen Khan, Manali Jadhav, Nishant Kumar Jain, Rajendra Prasad and Rohit Srivastava</i>	
2. Surface Stabilization and Functionalities of Nanostructures	16
<i>M. Cruz-Leal, M. Ávila-Gutiérrez and E. Coutino-Gonzalez</i>	
3. Inorganic Nanoparticles: Properties and Applications	33
<i>Victor Merupo, Jose Carlos Zarate, Alla Abramova, Noé Arjona, José Herrera-Celis, L.G. Arriaga, Ashutosh Sharma and Goldie oza</i>	
4. Physical Methods for Synthesis of Nanoparticles	66
<i>Kailas R. Jagdeo</i>	
5. Chemical Methods for the Synthesis of Nanomaterials	77
<i>Jagruti S. Suroshe</i>	
6. Bionanofabrication: A Green Approach towards Nanoparticle Synthesis using Plants and Microbes	88
<i>Annika Durva Gupta and Darshana Rajput</i>	
7. Electron Microscopy Characterization of Nanoparticles	114
<i>Diana F. Garcia-Gutierrez and Domingo I. Garcia-Gutierrez</i>	
8. Magnetic Characterization of Nanoparticles	141
<i>Marlene González Montiel</i>	
9. Nanostructures in Diagnostics: Bio-sensing and Lab-on-a-chip Systems	167
<i>Jan-carlo M. Diaz-González and Jannu R. Casanova-Moreno</i>	
10. Drug-delivery using Inorganic and Organic Nanoparticles	194
<i>Juan Luis de la Fuente-Jiménez, Goldie oza, Brian A. Korgel, Abraham Ulises and Ashutosh Sharma</i>	
11. Engineering Immunity to Disease Using Nanotechnology	229
<i>Michelle Z. Dion and Dr. Natalie Artzi</i>	
12. Basics of Organ-On-A-Chip Technology	279
<i>Brandon Ortiz-Casas and Gloria Cristina Enriquez Cortina</i>	

13. Overview of Nanostructured Carbon-based Catalysts: Recent Advances and Perspectives	313
<i>Mattia Bartoli, Pravin Jagdale, Mauro Giorcelli, Massimo Rovere and Alberto Tagliaferro</i>	
14. Synthesis of Graphene onto Semi-insulating Substrates: Epitaxial Graphene on SiC and CVD Graphene on Sapphire	339
<i>Neeraj Mishra and Domenica Convertino</i>	
15. Nanostructures for Hydrogen Storage	361
<i>Bholanath Mukherjee, Vikaskumar Gupta and Suyash Agnihotri</i>	
16. Electrochemical Water Splitting	378
<i>Bhushan Patil, A. Martinez-Lázaro, R. Escalona-Villalpando, Mayra Polett Gurrola, J. Ledesma-García and L.G. Arriaga</i>	
17. Nanomaterials Applied in the Construction Industry	396
<i>D.L. Trejo-Arroyo, D. Pech-Núñez, J.C. Cruz, L.G. Arriaga, R.E. Vega-Azamar and M.P. Gurrola</i>	
18. The Era of Human-Machine Hybrid: Medical Advances in Biomimetic Devices	413
<i>Mauricio A. Medina, Amanda V. Haglund, José Manuel Hernández Hernández and José Tapia Ramírez</i>	
Index	425

CHAPTER 17

Nanomaterials Applied in the Construction Industry

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1. Introduction

Historically, nanotechnology has been adopted in various industrial fields such as microbiology, medicine, engineering, computer science, chemistry, and materials (Ho and Kjeang 2011, Gurrola et al. 2016, Francesko et al. 2018), which contributes to the improvement of the quality of life and greater welfare. Some of these industries are associated to the construction sector, for which it is important to focus on the demands of nanotechnology and nanomaterials that can stimulate the sector's overall productivity. The developments and implementation of nanotechnology are promising in terms of improving traditional materials, making the construction industry benefit by opening a new vision of the materials needed to generate more sophisticated, innovative, modern and environmental-friendly constructions (Papadaki et al. 2018, Vishwakarma 2020). The growth of nanotechnology can be related to the development of nanomaterials with a wide variety of particles that can be used to generate both functional and structural properties in cement-based composites, such as cementitious structures with the ability to self-heal, improved mechanical properties, that are lighter, reduce heat transfer, and have high solar reflectance, with antibacterial and self-cleaning surfaces, with greater energy and environmental efficiency. Nanocoatings can also provide fire protection due to their insulating capabilities and protection against the phenomenon of corrosion of steel structures, either in structures exposed to the environment or as reinforcement of concrete (Askarian et al. 2019). In general, nanotechnology provides unique features for construction and building through a variety of applications (Spitzmiller et al. 2013, Huseien et al. 2019, Ardalan et al. 2020).

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