1. Record Nr. UNINA9910821417203321

Titolo	Advanced hierarchical nanostructured materials / / edited by Qiang Zhang and Fei Wei
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH, Verlag GmbH & Co. KGaA, , [2014] ©2014
ISBN	3-527-66496-3 3-527-66494-7 3-527-66497-1
Descrizione fisica	1 online resource (507 p.)
Altri autori (Persone)	ZhangQiang WeiFei
Disciplina	620.115
Soggetti	Nanostructured materials
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Advanced Hierarchical Nanostructured Materials; Contents; Preface; List of Contributors; Chapter 1 Structural Diversity in Ordered Mesoporous Silica Materials; 1.1 Introduction; 1.2 Electron Crystallography and Electron Tomography; 1.2.1 Electron Crystallography; 1.2.2 Electron Tomography; 1.3 Diverse Structures of Ordered Mesoporous Silicas; 1.3.1 2D Hexagonal Structures with Cylindrical Channels; 1.3.2 3D Mesoporous Structures with Cage-Type Pores; 1.3.3 Bi-Continuous Mesoporous Structures; 1.3.4 Tri-Continuous Mesoporous Structure IBN-9; 1.3.5 Low-Symmetry Mesoporous Structures 1.3.6 Transition and Intergrowth of Different Mesoporous Structures1.4 Outlook; References; Chapter 2 Hierarchically Nanostructured Biological Materials; 2.1 Introduction; 2.2 ""Bottom-Up"" Design Scheme; 2.3 Organic-Inorganic Interfaces; 2.4 Engineering Principles in Biological Materials; 2.4.1 Anisotropy; 2.4.2 Effects of Scaling; 2.4.3 Organizing Defects and Damage in Biological Materials; 2.4.4 Mesocrystalline Schemes in Short- to Long-Range Organization; 2.4.5 Hierarchical Structuring and Its Properties; 2.5 Model Hierarchical Biological Systems and Materials; 2.5.1 Nacre; 2.5.2 Wood 2.5.3 Bone2.5.4 Diatoms; 2.5.5 Butterfly Wings; 2.5.6 Glass Sponge;

2.5.7 Adult Sea Urchin Spine; 2.5.8 Red Coral; 2.6 Conclusions and Outlook; Acknowledgments; References; Chapter 3 Use of Magnetic Nanoparticles for the Preparation of Micro- and Nanostructured Materials; 3.1 Introduction; 3.2 Preparation of Superparamagnetic Nanocolloids; 3.2.1 Synthesis of Magnetic Nanocrystals; 3.2.2 Synthesis of Polymer-Magnetic Nanocomposite Particles and Magnetic Nanoclusters; 3.2.3 Summary; 3.3 Magnetic Gels; 3.3.1 Summary
3.4 Self-Assembly of Magnetic Nanoparticles, Nanoclusters, and Magnetic-Polymer Nanocomposites3.4.1 Assembly in 1-D Structures; 3.4.2 Assembly in Higher Dimensional Structures; 3.4.3 Summary; 3.5 Magnetic Colloidal Crystals; 3.5.1 Summary; 3.6 Concluding Remarks; Acknowledgment; References; Chapter 4 Hollow Metallic Micro/Nanostructures; 4.1 Introduction; 4.2 Synthetic Methods for 1-D Hollow Metallic Micro/Nanostructures; 4.2.1 Template-Directed Approach; 4.2.1.1 Hard Template Methods; 4.2.1.2 Sacrificial Templates; 4.2.1.3 Soft Template Methods; 4.2.2 Template-Free Methods
4.2.3 Electrospinning Technique4.3 Synthetic Methods for 3-D or Nonspherical Hollow Metallic Micro/Nanostructures; 4.3.1 Hard Template Strategy; 4.3.2 Sacrificial Template Strategy; 4.3.3 Soft Template Strategy; 4.3.4 Template-Free Strategy; 4.3.4.1 Ostwald Ripening; 4.3.4.2 Kirkendall Effect; 4.4 Potential Applications of Hollow Metallic Micro/Nanostructures; 4.4.1 Lithium-Ion Batteries; 4.4.2 Magnetic Properties; 4.4.3 Sensors; 4.4.4 Catalytic Properties; 4.5 Conclusions and Outlook; Acknowledgments; References; Chapter 5 Polymer Vesicles; 5.1 Introduction; 5.2 Vesicle Formation
5.3 Smart Polymer Vesicles

Sommario/riassunto

An overview of the recent developments and prospects in this highly topical area, covering the synthesis, characterization, properties and applications of hierarchical nanostructured materials. The book concentrates on those materials relevant for research and development in the fields of energy, biomedicine and environmental protection, with a strong focus on 3D materials based on nanocarbons, mesoporous silicates, hydroxides, core-shell particles and helical nanostructures. Thanks to its clear concept and application-oriented approach, this is an essential reference for experienced resea