

Nanomaterials An Introduction To Synthesis Properties And Applications

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Nanocomposite Materials - Jyotishkumar Parameswaranpillai 2016-09-19

This book provides a comprehensive collection of the latest information on nanomaterials and nanocomposites. It covers material synthesis, processing, structure characterization, properties and applications. It presents a coherent treatment of how composite properties depend on nanostructure, and covers cutting-edge topics like bionanocomposites for sustainable development. This book summarizes many developments in the field making it an ideal resource for researchers from industry, academia, government and private research institutions.

[Nanomaterials, Nanotechnologies and Design](#) - Daniel L. Schodek 2009-03-24

How could nanotechnology not perk the interest of any designer, engineer or architect? Exploring the intriguing new approaches to design that nanotechnologies offer, **Nanomaterials, Nanotechnologies and Design** is set against the sometimes fantastic sounding potential of this technology. Nanotechnology offers product engineers, designers, architects and consumers a vastly enhanced palette of materials and properties, ranging from the profound to the superficial. It is for engineering and design students and professionals who need to understand enough about the subject to apply it with real meaning to their own work. * World-renowned author team address the hot-topic of nanotechnology * The first book to address and explore the impacts and opportunities of nanotech for mainstream designers, engineers and architects * Full colour production and excellent design: guaranteed to appeal to everyone concerned with good design and the use of new materials

Novel Nanomaterials for Biomedical, Environmental and Energy Applications - Xiaoru Wang 2018-11-16

Novel Nanomaterials for Biomedical, Environmental, and Energy Applications is a comprehensive study on the cutting-edge progress in the synthesis and characterization of novel nanomaterials and their subsequent advances and uses in biomedical, environmental and energy applications. Covering novel concepts and key points of interest, this book explores the frontier applications of nanomaterials. Chapters discuss the overall progress of novel nanomaterial applications in the biomedical, environmental and energy fields, introduce the synthesis, characterization, properties and applications of novel nanomaterials, discuss biomedical applications, and cover the electrocatalytical and photothermal effects of novel nanomaterials for efficient energy applications. The book will be invaluable to academic researchers and biomedical clinicians working with nanomaterials. Offers comprehensive details on novel and emerging nanomaterials Presents a comprehensive view of new and emerging tactics for the synthesis of efficient nanomaterials Describes and monitors the functions of applications of new and emerging nanomaterials in the biomedical, environmental and energy fields

Green Nanomaterials - Shakeel Ahmed 2020-03-16

This book comprises a collection of chapters on advances in green nanomaterials. The book looks at ways to establish long-term safe and sustainable forms of nanotechnology through implementation of nanoparticle biosynthesis with minimum impact on the ecosystem. The book looks at synthesis, processing, and applications of metal and metal oxide nanomaterials and also at bio-nanomaterials. The contents of this book will prove useful for researchers and professionals working in the field of nanomaterials and green technology.

[Silicon-Based Hybrid Nanoparticles](#) - Sabu Thomas 2021-09-24

Silicon-Based Hybrid Nanoparticles: Fundamentals, Properties, and Applications focuses on the fundamental principles and promising applications of silicon-based hybrid nanoparticles in nanoelectronics, energy storage/conversion, catalysis, sensors, biomedicine, environment and imaging. This book is an important reference source for materials scientists and engineers who are seeking to understand more about the major properties and applications of silicon-based hybrid nanoparticles. As the hybridization of silicon nanoparticles with other semiconductors or metal oxides nanoparticles may exhibit superior features, when compared to lone, individual nanoparticles, this book provides the latest insights. In addition, the silicon/iron oxide hybrid nanoparticles also possess excellent fluorescence, super-paramagnetism, and biocompatibility that can be effectively used for the diagnostic imaging system in vivo. Similarly, gold-silicon nanohybrids could be used as highly efficient near-infrared hyperthermia agents for cancer cell destruction. Outlines the major thermal, electrical, optical, magnetic and toxic properties of silicon-based hybrid nanoparticles Describes major applications in energy, environmental science and catalysis Assesses the major challenges to manufacturing silicon-based nanostructured materials on an industrial scale

[Synthesis of Nanoparticles and Nanomaterials](#) - Zhypargul Abdullaeva 2017-05-03

This book covers biological synthesis approaches for nanomaterials and nanoparticles, including introductory material on their structure, phase compositions and morphology, nanomaterials chemical, physical, and biological properties. The chapters of this book describe in sequence the synthesis of various nanoparticles by microorganisms, bacteria, yeast, algae, and actinomycetes; plant and plant extract-based synthesis; and green synthesis methods. Each chapter provides basic knowledge on the synthesis of nanomaterials, defines fundamental terms, and aims to build a solid foundation of knowledge, followed by explanations, examples, visual photographs, schemes, tables and illustrations. Each chapter also contains control questions, problem drills, as well as case studies that clarify theory and the explanations given in the text. This book is ideal for researchers and advanced graduate students in materials engineering, biotechnology, and nanotechnology fields. As a reference book this work is also appropriate for engineers in R&D and product manufacturing.

[Diamondoids](#) - Sven Stauss 2017-03-16

Over the past few decades, carbon nanomaterials, most commonly fullerenes, carbon nanotubes, and graphene, have gained increasing interest in both science and industry, due to their advantageous properties that make them attractive for many applications in nanotechnology. Another class of the carbon nanomaterials family that has slowly been gaining (re)newed interest is diamond molecules, also called diamondoids, which consist of polycyclic carbon cages that can be superimposed on a cubic diamond lattice. Derivatives of diamondoids are used in pharmaceuticals, but due to their promising properties—well-defined structures, high thermal and chemical stability, negative electron affinity, and the possibility to tune their bandgap—diamondoids could also serve as molecular building blocks in future nanodevices. This book is the first of its kind to give an exhaustive overview of the structures, properties, and current and possible future applications of diamondoids. It contains a brief historical account of diamondoids, from the discovery of the first diamondoid member, adamantane, to the isolation of higher diamondoids about a decade ago. It summarizes the different approaches to synthesizing diamondoids. In particular, current research on the conventional organic synthesis and new approaches based on microplasmas generated in

high-pressure and supercritical fluids are reviewed and the advantages and disadvantages of the different methods discussed. The book will serve as a reference for advanced undergraduate- and graduate-level students in chemistry, physics, materials science, and nanotechnology and researchers in macromolecular science, nanotechnology, chemistry, biology, and medicine, especially those with an interest in nanoparticles.

Biomedical Nanomaterials - Rostyslav S. Stoika 2021-09-11

This book characterizes how to design and synthesize nanomaterials of an organic and mineral nature. The book also discusses the visualization of developed nanomaterials and their bio-applications, as well as describes the biomedical effects and environmental impact of nanomaterials. This is an ideal book for students studying biomedicine or the life sciences, as well as researchers and professionals in medicine, environmental protection, biotechnology, agriculture, and the food industry. More specifically, this book addresses the important nanomaterials and nanobiotechnologies that are used in those fields in biomedicine and life sciences.

Gold Nanoparticles - Valerio Voliani 2020-04-20

Gold nanoparticles provide a platform for the development of new and efficient diagnostic and therapeutic tools. This book offers a general guide to the synthesis and coating of gold nanoparticles. It describes the links between optical features and geometries of gold nanoparticles and provides a readily comprehensible connection in all the chapters between the geometry of gold nanoparticles and their final applications.

Nanomaterials - A.S Edelstein 1998-01-01

Nanomaterials: Synthesis, Properties and Applications provides a comprehensive introduction to nanomaterials, from how to make them to example properties, processing techniques, and applications. Contributions by leading international researchers and teachers in academic, government, and industrial institutions in nanomaterials provide an accessible guide for newcomers to the field. The coverage ranges from isolated clusters and small particles to nanostructured materials, multilayers, and nanoelectronics. The book contains a wealth of references for further reading. Individual chapters deal with relevant aspects of the underlying physics, materials science, and physical chemistry.

The Chemistry of Nanomaterials - C. N. R. Rao 2006-01-24

With this handbook the distinguished team of editors has combined the expertise of leading nanomaterials scientists to provide the latest overview of this field. The authors cover the whole spectrum of nanomaterials, ranging from theory, synthesis, properties, characterization to application, including such new developments as: · quantum dots, nanoparticles, nanoporous materials, as well as nanowires, nanotubes and nanostructural polymers · nanocatalysis, nanolithography, nanomanipulation · methods for the synthesis of nanoparticles. The book can thus be recommended for everybody working in nanoscience: Beginners can acquaint themselves with the exciting subject, while specialists will find answers to all their questions plus helpful suggestions for further research.

Nanostructured Zinc Oxide - Kamendra Awasthi 2021-08-10

Nanostructured Zinc Oxide covers the various routes for the synthesis of different types of nanostructured zinc oxide including; 1D (nanorods, nanowires etc.), 2D and 3D (nanosheets, nanoparticles, nanospheres etc.). This comprehensive overview provides readers with a clear understanding of the various parameters controlling morphologies. The book also reviews key properties of ZnO including optical, electronic, thermal, piezoelectric and surface properties and techniques in order to tailor key properties. There is a large emphasis in the book on ZnO nanostructures and their role in optoelectronics. ZnO is very interesting and widely investigated material for a number of applications. This book presents up-to-date information about the ZnO nanostructures-based applications such as gas sensing, pH sensing, photocatalysis, antibacterial activity, drug delivery, and electrodes for optoelectronics. Reviews methods to synthesize, tailor, and characterize 1D, 2D, and 3D zinc oxide nanostructured materials Discusses key properties of zinc oxide nanostructured materials including optical, electronic, thermal, piezoelectric, and surface properties Addresses most relevant zinc oxide applications in optoelectronics such as light-emitting diodes, solar cells, and sensors

Gold Nanoparticles - Valerio Voliani 2020-04-20

Gold nanoparticles provide a platform for the development of new and efficient diagnostic and therapeutic

tools. This book offers a general guide to the synthesis and coating of gold nanoparticles. It describes the links between optical features and geometries of gold nanoparticles and provides a readily comprehensible connection in all the chapters between the geometry of gold nanoparticles and their final applications.

Nano- and Biomaterials - Zhympargul Abdullaeva 2017-06-21

A comprehensive introduction to nano- and biomaterials shining light on the different research disciplines from various perspectives. The straightforward and well-structured concept is designed to cater for entrants as well as experienced researchers in the field of nanotechnology. The initial chapters introduce nanomaterials, their classification and synthesis techniques, while subsequent chapters discuss the various characterization tools as well as mechanical properties and their applications in biotechnological and biomedical fields. Further understanding of the topic is supported by case studies used for practical purposes. The book concludes with a look at future technology advances. With its explanation of a wide variety of materials, this is an essential reference for chemists, physicists, materials scientists and biomedical engineers.

Novel Nanomaterials - George Kyzas 2018-04-18

"Nanomaterials" is a special topic of recent research and is a milestone of nanoscience and nanotechnology. Nanoscale materials are a series of substances/compounds, in which at least one dimension has smaller size than 100 nm. Nanomaterials have a broad area of development, which is growing rapidly day by day. Their impact on commercial applications as well as on the respective academia and education is huge. The basic points of this book can be divided into synthesis of nanomaterials and their applications. For example, special mention is about metal-oxide nanostructures, nanocomposites, and polymeric nanomaterials. Also, synthesis, characterizations, various processes, fabrications and some promising applications are also developed and analyzed.

Nanostructures & Nanomaterials - Guozhong Cao 2004

This important book focuses on the synthesis and fabrication of nanostructures and nanomaterials, but also includes properties and applications of nanostructures and nanomaterials, particularly inorganic nanomaterials. It provides balanced and comprehensive coverage of the fundamentals and processing techniques with regard to synthesis, characterization, properties, and applications of nanostructures and nanomaterials. Both chemical processing and lithographic techniques are presented in a systematic and coherent manner for the synthesis and fabrication of 0-D, 1-D, and 2-D nanostructures, as well as special nanomaterials such as carbon nanotubes and ordered mesoporous oxides. The book will serve as a general introduction to nanomaterials and nanotechnology for teaching and self-study purposes.

Nanotechnology - Thomas Varghese 2012

Polymer Composites with Functionalized Nanoparticles - Krzysztof Pielichowski 2018-09-22

Polymer Composites with Functional Nanoparticles: Synthesis, Properties, and Applications reviews the latest research in the area of polymer nanocomposites and functionalized nanoparticles, providing an introduction for those new to the field, and supporting further research and development. The book helps researchers and practitioners better understand the key role of nanoparticle functionalization for improving the compatibility of inorganic metallic nanomaterials with organic polymers, and for the fabrication of nanostructured materials with special properties. A range of nanoparticles, such as carbon nanotubes are covered, along with descriptions of the methods of functionalization to support better compatibility with polymer matrices. The book also discusses the various applications of this technology, including uses in electronics and the medical and energy industries. Summarizes the latest research in functionalized nanoparticles for modification of polymer matrices, providing a valuable platform for further research Includes functionalization of a range of nanoparticles for incorporation into nanocomposites, including carbon nanotubes, graphene, gold and silver, silica and clay Provides detailed coverage of application areas, including energy, electronics, biomedical applications, and end-of-life considerations

Nanomaterials - Dieter Vollath 2008-09-02

This first full-colored introduction to nanomaterials and nanotechnology addresses in particular the needs of engineers who have to know the special phenomena and potentials, without going into too much scientific detail of the physics and chemistry involved. Based on the author's own successful courses,

"Nanomaterials: An Introduction to Synthesis, Properties and Applications" shows how to produce nanomaterials and use them in engineering applications for novel products. Following an introduction, the text goes on to treat synthesis, characterization techniques, thermal, optical, magnetic and electronic properties, processing and, finally, emerging applications. Engineers looking for a sound introduction to the "nano world" will find this especially useful, since the features of nanomaterials are discussed from an application-oriented perspective.

Nanomaterials Synthesis - Yasir Beeran Pottathara 2019-06-03

Nanomaterials Synthesis: Design, Fabrication and Applications combines the present and emerging trends of synthesis routes of nanomaterials with the incorporation of various technologies. The book covers the new trends and challenges in the synthesis and surface engineering of a wide range of nanomaterials, including emerging technologies used for their synthesis. Significant properties, safety and sustainability and environmental impacts of the synthesis routes are explored. This book is an important information source that will help materials scientists and engineers who want to learn more about how different classes of nanomaterials are designed. Highlights recent developments in, and opportunities created by, new nanomaterials synthesis methods Explains major synthesis techniques for different types of nanomaterials Discusses the challenges of using a variety of synthesis methods

Nanomaterials for Spectroscopic Applications - Kaushik Pal 2021-06-18

This book provides an overview of key current developments in the synthetic strategy of functional novel nanomaterials in various spectroscopic characterizations and evaluations and highlights possible future applications in nanotechnology and materials science. It illustrates the wide-ranging interest in these areas and provides a background to the later chapters, which address the novel synthesis of high-yield nanomaterials and their biomaterials, graphene, polymeric nanomaterials, green nanomaterials, green polyester, liquid crystal electro-optic switching applications, nanobiotechnology, transition metal oxides, response characteristics of exclusive spectroscopic investigation as well as electron microscopic study, flexible and transparent electrodes, optoelectronics, nanoelectronics, smart displays, switchable device modulation, health care, energy storage, solar/fuel cells, environmental and plant biology, social, ethical, and regulatory implications of various aspects of green nanotechnology, as well as significant foreseeable spectroscopic applications of key functional nanomaterials. Given appropriate regulation for and research on the topics covered, commercial production of manufactured novel composite materials can be realized. Furthermore, the many discoveries highlighted in the book can modulate spectroscopic performances with technical excellence in multidisciplinary research of high competence.

Nanomaterials - Dieter Vollath 2013-07-03

Successor of the highly acclaimed, first full-color introduction to nanomaterials - now including graphenes and carbon nanotubes This full-colored introduction to nanomaterials and nanotechnology in particular addresses the needs of engineers who need to know the special phenomena and potentials, without getting bogged down in the scientific detail of the physics and chemistry involved. Based on the author's own courses, this textbook shows how to produce nanomaterials and use them in engineering applications for novel products. Following an introduction, the text goes on to treat synthesis, characterization techniques, thermal, optical, magnetic and electronic properties, processing and, finally, emerging applications. A sound overview of the "nano world" from an application-oriented perspective. Reviews for the first edition: "The reader [of this book] profits from the broad scientific teaching experience of the author.... This book is highly recommended for everyone who wants to step onto the new and fascinating field of nanomaterials." (International Journal of Materials Research, May 2009) "The practical presentation and clarity in writing style makes this book a winner for anyone wanting to quickly learn about the fundamentals and practical side of nanomaterials." (IEEE Electrical Insulation Magazine, March/April 2009)

Spinel Nanoferrites - Surender K. Sharma 2021-10-29

This book highlights the complexity of spinel nanoferrites, their synthesis, physio-chemical properties and prospective applications in the area of advanced electronics, microwave devices, biotechnology as well as biomedical sciences. It presents an overview of spinel nanoferrites: synthesis, properties and applications for a wide audience: from beginners and graduate-level students up to advanced specialists in both academic and industrial sectors. There are 15 chapters organized into four main sections. The first section

of the book introduces the readers to spinel ferrites and their applications in advanced electronics industry including microwave devices, whereas the second section mainly focus on the synthesis strategy and their physio-chemical properties. The last sections of the book highlight the importance of this class of nanomaterials in the field of biotechnology and biomedical sector with a special chapter on water purification.

Concepts of Nanochemistry - Ludovico Cademartiri 2009-10-13

Written by a bestselling author and expert in nanochemistry, this title is ideal for interdisciplinary courses in chemistry, materials science, or physics.

Fundamentals of Nanoparticles - Abdel Salam Hamdy Makhlouf 2018-08-09

Fundamentals of Nanoparticles: Classifications, Synthesis Methods, Properties and Characterization explores the nanoparticles and architecture of nanostructured materials being used today in a comprehensive, detailed manner. This book focuses primarily on the characterization, properties and synthesis of nanoscale materials, and is divided into three major parts. This is a valuable reference for materials scientists, and chemical and mechanical engineers working in R&D and academia, who want to learn more about how nanoparticles and nanomaterials are characterized and engineered. Part one covers nanoparticles formation, self-assembly in the architecture nanostructures, types and classifications of nanoparticles, and signature physical and chemical properties, toxicity and regulations. Part two presents different ways to form nanometer particles, including bottom-up and top-down approaches, the classical and non-classical theories of nanoparticles formation and self-assembly, surface functionalization and other surface treatments to allow practical use. Part three covers characterization of nanoparticles and nanostructured materials, including the determination of size and shape, in addition to atomic and electronic structures and other important properties. Includes new physical and chemical techniques for the synthesis of nanoparticles and architecture nanostructures Features an in-depth treatment of nanoparticles and nanostructures, including their characterization and chemical and physical properties Explores the unusual properties of materials that are developed by modifying their shape and composition and by manipulating the arrangement of atoms and molecules Explains important techniques for the synthesis, fabrication and the characterization of complex nano-architectures

Photothermal Nanomaterials - Enyi Ye 2022-01-26

This book covers the photothermal effect of different categories of light-absorbing nanomaterials.

Nano-Sized Multifunctional Materials - Nguyen Hoa Hong 2018-11

Nano-sized Multifunctional Materials: Synthesis, Properties and Applications explores how materials can be down-scaled to nanometer-size in order to tailor and control properties. These advanced, low-dimensional materials, ranging from quantum dots and nanoparticles, to ultra-thin films develop multifunctional properties. As well as demonstrating how down-scaling to nano-size can make materials multifunctional, chapters also show how this technology can be applied in electronics, medicine, energy and in the environment. This fresh approach in materials research will provide a valuable resource for materials scientists, materials engineers, chemists, physicists and bioengineers who want to learn more on the special properties of nano-sized materials. Outlines the major synthesis chemical process and problems of advanced nanomaterials Shows how multifunctional nanomaterials can be practically used in biomedical area, nanomedicine, and in the treatment of pollutants Demonstrates how the properties of a variety of materials can be engineered by downscaling them to nano size

Essentials in Nanoscience and Nanotechnology - Narendra Kumar 2016-04-06

This book describes various aspects of nanoscience and nanotechnology. It begins with an introduction to nanoscience and nanotechnology and includes a historical prospective, nanotechnology working in nature, man -made nanomaterial and impact of nanotechnology illustrated with examples. It goes on to describes general synthetic approaches and strategies and also deals with the characterization of nanomaterial using modern tools and techniques to give basic understanding to those interested in learning this emerging area. It then deals with different kinds of nanomaterial such as inorganics, carbon based-, nanocomposites and self-assembled/supramolecular nano structures in terms of their varieties, synthesis, properties etc. In addition, it contains chapters devoted to unique properties with mathematical treatment wherever applicable and the novel applications dealing with information technology, pollution control (environment,

water), energy, nanomedicine, healthcare, consumer goods etc.

Introduction to Nano - Amretashis Sengupta 2015-07-01

This book covers the basics of nanotechnology and provides a solid understanding of the subject. Starting from a brush-up of the basic quantum mechanics and materials science, the book helps to gradually build up understanding of the various effects of quantum confinement, optical-electronic properties of nanoparticles and major nanomaterials. The book covers the various physical, chemical and hybrid methods of nanomaterial synthesis and nanofabrication as well as advanced characterization techniques. It includes chapters on the various applications of nanoscience and nanotechnology. It is written in a simple form, making it useful for students of physical and material sciences.

Synthesis, Properties, and Applications of Oxide Nanomaterials - José A. Rodriguez 2007-03-09

Current oxide nanomaterials knowledge to draw from and build on Synthesis, Properties, and Applications of Oxide Nanomaterials summarizes the existing knowledge in oxide-based materials research. It gives researchers one comprehensive resource that consolidates general theoretical knowledge alongside practical applications. Organized by topic for easy access, this reference: * Covers the fundamental science, synthesis, characterization, physicochemical properties, and applications of oxide nanomaterials * Explains the fundamental aspects (quantum-mechanical and thermodynamic) that determine the behavior and growth mode of nanostructured oxides * Examines synthetic procedures using top-down and bottom-up fabrication technologies involving liquid-solid or gas-solid transformations * Discusses the sophisticated experimental techniques and state-of-the-art theory used to characterize the structural and electronic properties of nanostructured oxides * Describes applications such as sorbents, sensors, ceramic materials, electrochemical and photochemical devices, and catalysts for reducing environmental pollution, transforming hydrocarbons, and producing hydrogen With its combination of theory and real-world applications plus extensive bibliographic references, Synthesis, Properties, and Applications of Oxide Nanomaterials consolidates a wealth of current, complex information in one volume for practicing chemists, physicists, and materials scientists, and for engineers and researchers in government, industry, and academia. It's also an outstanding reference for graduate students in chemistry, chemical engineering, physics, and materials science.

Nanomaterials - A.S Edelstein 1998-01-01

Nanomaterials: Synthesis, Properties and Applications provides a comprehensive introduction to nanomaterials, from how to make them to example properties, processing techniques, and applications. Contributions by leading international researchers and teachers in academic, government, and industrial institutions in nanomaterials provide an accessibl

Nanostructures and Nanomaterials - Guozhong Cao 2011

This text focuses on the synthesis, properties and applications of nanostructures and nanomaterials, particularly inorganic nanomaterials. It provides coverage of the fundamentals and processing techniques with regard to synthesis, properties, characterization and applications of nanostructures and nanomaterials.

Introduction to Nanotechnology - Charles P. Poole, Jr. 2003-05-30

This self-confessed introduction provides technical administrators and managers with a broad, practical overview of the subject and gives researchers working in different areas an appreciation of developments in nanotechnology outside their own fields of expertise.

Nanoelectronic Materials - Loutfy H. Madkour 2019-06-27

This book presents synthesis techniques for the preparation of low-dimensional nanomaterials including 0D (quantum dots), 1D (nanowires, nanotubes) and 2D (thin films, few layers), as well as their potential applications in nanoelectronic systems. It focuses on the size effects involved in the transition from bulk materials to nanomaterials; the electronic properties of nanoscale devices; and different classes of nanomaterials from microelectronics to nanoelectronics, to molecular electronics. Furthermore, it demonstrates the structural stability, physical, chemical, magnetic, optical, electrical, thermal, electronic and mechanical properties of the nanomaterials. Subsequent chapters address their characterization, fabrication techniques from lab-scale to mass production, and functionality. In turn, the book considers the environmental impact of nanotechnology and novel applications in the mechanical industries, energy

harvesting, clean energy, manufacturing materials, electronics, transistors, health and medical therapy. In closing, it addresses the combination of biological systems with nanoelectronics and highlights examples of nanoelectronic-cell interfaces and other advanced medical applications. The book answers the following questions: • What is different at the nanoscale? • What is new about nanoscience? • What are nanomaterials (NMs)? • What are the fundamental issues in nanomaterials? • Where are nanomaterials found? • What nanomaterials exist in nature? • What is the importance of NMs in our lives? • Why so much interest in nanomaterials? • What is at nanoscale in nanomaterials? • What is graphene? • Are pure low-dimensional systems interesting and worth pursuing? • Are nanotechnology products currently available? • What are sensors? • How can Artificial Intelligence (AI) and nanotechnology work together? • What are the recent advances in nanoelectronic materials? • What are the latest applications of NMs?

Carbon Nanomaterials - Rakesh Behari Mathur 2016-12-19

The study of nanostructures has become, in recent years, a theme common to many disciplines, in which scientists and engineers manipulate matter at the atomic and molecular level in order to obtain materials and systems with significantly improved properties. Carbon nanomaterials have a unique place in nanoscience owing to their exceptional thermal, electrical, chemical, and mechanical properties, finding application in areas as diverse as super strong composite materials, energy storage and conversion, supercapacitors, smart sensors, targeted drug delivery, paints, and nanoelectronics. This book is the first to cover a broad spectrum of carbon nanomaterials, namely carbon nanofibers, vapor-grown carbon fibers, different forms of amorphous nanocarbons besides carbon nanotubes, fullerenes, graphene, graphene nanoribbons, graphene quantum dots, etc. in a single volume.

2D Functional Nanomaterials - Ganesh S. Kamble 2022-03-14

2D Functional Nanomaterials Outlines the latest developments in 2D heterojunction nanomaterials with energy conversion applications In 2D Functional Nanomaterials: Synthesis, Characterization, and Applications, Dr. Ganesh S. Kamble presents an authoritative overview of the most recent progress in the rational design and synthesis of 2D nanomaterials and their applications in semiconducting catalysts, biosensors, electrolysis, batteries, and solar cells. This interdisciplinary volume is a valuable resource for materials scientists, electrical engineers, nanoscientists, and solid-state physicists looking for up-to-date information on 2D heterojunction nanomaterials. The text summarizes the scientific contributions of international experts in the fabrication and application of 2D nanomaterials while discussing the importance and impact of 2D nanomaterials on future economic growth, novel manufacturing processes, and innovative products. Provides thorough coverage of graphene chemical derivatives synthesis and applications, including state-of-the-art developments and perspectives Describes 2D/2D graphene oxide-layered double hydroxide nanocomposites for immobilization of different radionuclides Covers 2D nanomaterials for biomedical applications and novel 2D nanomaterials for next-generation photodetectors Discusses applications of 2D nanomaterials for cancer therapy and recent trends in graphene-latex nanocomposites Perfect for materials scientists, inorganic chemists, and electronics engineers, 2D Functional Nanomaterials: Synthesis, Characterization, and Applications is also an essential resource for solid-state physicists seeking accurate information on recent progress in two-dimensional heterojunction materials with energy conversion applications.

Nanomaterials and Nanocomposites - Rajendra Kumar Goyal 2017-10-30

The main aims of this book are to summarize the fundamentals, synthesis methods, properties and applications of nanomaterials, so as to provide readers with a systematic knowledge on nanomaterials. In addition, the book covers most commonly used characterization tools pertaining to nanomaterials. Further, it deals with relevant aspects of nanocomposites which contains dispersion of nano-sized particulates, and carbon nanotubes (CNTs) in the matrices (polymer, metal and ceramic). It also discusses development of smart nano textiles (intelligent textiles), self-cleaning glass, sensors, actuators, ferro-fluids, and wear resistant nano coatings. Aimed at senior undergraduate and graduate students, the key features on this book include: Top-down and bottom-up approaches for the synthesis of nanomaterials included Illustrates sample preparation and basic principle of characterization tools for nanomaterials Explains calculation of ratios of surface area to volume and surface atoms to bulk atoms Reviews synthesis, properties and applications of carbon nanotubes and magnetic nanomaterials Discusses size effect on thermal, mechanical,

optical, magnetic and electrical properties

Nanoparticles - Nanocomposites - Nanomaterials - Dieter Vollath 2013-11-14

Meeting the demand for a readily understandable introduction to nanomaterials and nanotechnology, this textbook specifically addresses the needs of students - and engineers - who need to get the gist of nanoscale phenomena in materials without having to delve too deeply into the physical and chemical details. The book begins with an overview of the consequences of small particle size, such as the growing importance of surface effects, and covers successful, field-tested synthesis techniques of nanomaterials. The largest part of the book is devoted to the particular magnetic, optical, electrical and mechanical properties of materials at the nanoscale, leading on to emerging and already commercialized applications, such as nanofluids in magnetic resonance imaging, high-performance nanocomposites and carbon nanotube-based electronics. Based on the author's experience in teaching nanomaterials courses and adapted, in style and level, for students with only limited background knowledge, the textbook includes further reading, as well as information boxes that can be skipped upon first reading.

Nanomaterials Chemistry - C. N. R. Rao 2007-09-24

With this handbook, the distinguished team of editors has combined the expertise of leading nanomaterials scientists to provide the latest overview of this field. They cover the whole spectrum of nanomaterials, ranging from theory, synthesis, properties, characterization to application, including such new developments as quantum dots, nanoparticles, nanoporous materials, nanowires, nanotubes, and nanostructured polymers. The result is recommended reading for everybody working in nanoscience: Newcomers to the field can acquaint themselves with this exciting subject, while specialists will find answers to all their questions as well as helpful suggestions for further research.

Nanomaterial Characterization - Ratna Tantra 2016-04-04

Nanomaterial Characterization Providing various properties of nanomaterials and the various methods

available for their characterization Over the course of the last few decades, research activity on nanomaterials has gained considerable press coverage. The use of nanomaterials has meant that consumer products can be made lighter, stronger, esthetically more pleasing, and less expensive. The significant role of nanomaterials in improving the quality of life is clear, resulting in faster computers, cleaner energy production, target-driven pharmaceuticals, and better construction materials. It is not surprising, therefore, that nanomaterial research has really taken off, spanning across different scientific disciplines from material science to nanotoxicology. A critical part of any nanomaterial research, however, is the need to characterize physicochemical properties of the nanomaterials, which is not a trivial matter. Nanomaterial Characterization: An Introduction is dedicated to understanding the key physicochemical properties and their characterization methods. Each chapter begins by giving an overview of the topic before a case study is presented. The purpose of the case study is to demonstrate how the reader may make use of the background information presented to them and show how this can be translated to solve a nanospecific application scenario. Thus, it will be useful for researchers in helping them design experimental investigations. The book begins with a general overview of the subject, thus giving the reader a solid foundation to nanomaterial characterization. Nanomaterial Characterization: An Introduction features: Nanomaterial synthesis and reference nanomaterials Key physicochemical properties and their measurements including particle size distribution by number, solubility, surface area, surface chemistry, mechanical/tribological properties, and dustiness Scanning tunneling microscopy methods operated under extreme conditions Novel strategy for biological characterization of nanomaterial methods Methods to handle and visualize multidimensional nanomaterial characterization data The book is written in such a way that both students and experts in other fields of science will find the information useful, whether they are in academia, industry, or regulation, or those whose analytical background may be limited. There is also an extensive list of references associated with every chapter to encourage further reading.