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Nanomaterials for Medical Applications Nanomaterials and Devices Nanomaterials Nanomaterials and Their Applications Nanomaterials Carbon Nanomaterials, Second Edition Analysis and Risk of Nanomaterials in Environmental and Food Samples Nanomaterials in Plants, Algae and Microorganisms Nanomaterials Recycling Nanomaterials Handbook Nanomaterials for Solar Cell Applications Nanomaterials Nanomaterials and Nanochemistry Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases Semiconductor Nanomaterials Industrial Applications of Nanomaterials Green Nanomaterials for Industrial Applications Nanomaterials: A Danger or a Promise? Nanomaterials Nanomaterials Nanomaterials and Nanocomposites for Environmental Remediation Nanomaterials for Biosensors Green Nanomaterials Nanomaterials, Nanotechnologies and Design Liquid and Crystal Nanomaterials for Water Pollutants Remediation Springer Handbook of Nanomaterials Nanomaterials for Drug Delivery and Therapy Nanomaterials for Electrocatalysis X-ray and Neutron Techniques for Nanomaterials Characterization Nanomaterials: Synthesis, Characterization, Hazards and Safety Nanomaterials for 2D and 3D Printing Plasma Processing of Nanomaterials Sample Preparation with Nanomaterials Engineered Nanomaterials for Innovative Therapies and Biomedicine Synthesis, Technology and Applications of Carbon Nanomaterials Functionalized Nanomaterials Applications of Nanomaterials in Sensors and Diagnostics Fundamentals and Properties of Multifunctional Nanomaterials Green Synthesis of Nanomaterials for Bioenergy Applications Amorphous Nanomaterials

Carbon Nanomaterials, Second Edition Nov 24 2022 This book provides information on synthesis, properties, and applications of carbon nanomaterials. With novel materials, such as graphene (atomically flat carbon) or carbon onions (carbon nanospheres), the family of carbon nanomaterials is rapidly growing. This book provides a state-of-the-art overview and in-depth analysis of the most important carbon nanomaterials. Each chapter is written by a leading expert in the field which ensures that both, a review on the subject along with emerging perspectives are provided to the reader.

Functionalized Nanomaterials Apr 24 2020 Nanomaterials contain some unique properties due to their nanometric size and surface functionalization. Nanomaterial functionalization also affects their compatibility to biocompatibility and toxicity behaviors. environment and living organism. This makes functionalized nanomaterials a material with huge scope and few challenges. This book provides detailed information about the nanomaterial functionalization and their application. Recent advancements, challenges and opportunities in the preparation and applications of functionalized nanomaterials are also highlighted. This book can serve as a reference book for scientific investigators, doctoral and post-doctoral scholars; undergrad and grad. This book is very useful for multidisciplinary researchers, industry personnel's, journalists, and policy makers. Features: Covers all aspects of Nanomaterial functionalization and its applications Describes and methods of functionalized nanomaterials synthesis for different applications Discusses the challenges, recent findings, and cutting-edge global research trends on functionalization of nanomaterials and its applications It discusses the regulatory frameworks for the safe use of functionalized nanomaterials. It contains contributions from international experts from multiple disciplines.

Green Nanomaterials Jun 07 2021 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.

Nanomaterials Handbook Jul 20 2022 The book includes 11 new chapters, on topics such as graphene, biomedical applications, nanoceramics, 2D metal carbides and carbonitrides, and safety of nanomaterials. It continues its comprehensive approach covering fundamentals to applications and materials basics to tailored design, with 22 chapters authored by leading international experts.

Nanomaterials Sep 10 2021 Many potential questions regarding the risks associated with the development and use of wide-ranging technologies enabled through engineered nanomaterials. For example, with over 600 consumer products available globally, what information exists that describes their risk to human health and the environment? What engineering or use controls can be deployed to minimize the potential environmental health and safety impacts of nanomaterials throughout the manufacturing and product lifecycles? How can the potential environmental and health benefits of nanotechnology be realized and maximized? The idea for this book was conceived at the NATO Advanced Research Workshop (ARW) on "Nanomaterials: Environmental Risks and Benefits and Emerging Consumer Products." This meeting - held in Algarve, Portugal, in April 2008 - started with building a foundation to harmonize risks and benefits associated with nanomaterials to develop risk management approaches and policies. More than 70 experts, from 19 countries, in the fields of risk assessment, decision-analysis, and security discussed the current state-of-knowledge with regard to nanomaterial risk and benefits. The discussion focused on the adequacy of available risk assessment tools to guide nanomaterial applications in industry and risk governance. The workshop had five primary purposes: Describe the potential benefits of nanotechnology enabled commercial products. Identify and describe what is known about environmental and human health risks of nanomaterials and approaches to assess their safety. Assess the suitability of multicriteria decision analysis for reconciling the benefits and risks of nanotechnology.

Sample Preparation with Nanomaterials Jul 28 2020 Discover this timely, comprehensive, and up-to-date exploration of crucial aspects of the use of nanomaterials in analytical chemistry Sample Preparation with Nanomaterials: Next Generation Techniques for Sample Preparation delivers insightful and complete overview of recent progress in the use of nanomaterials in sample preparation. The book begins with an overview of special features of nanomaterials and their applications in analytical sciences. Important types of nanomaterials, like carbon nanotubes and magnetic particles, are reviewed and biological sample preparation and lab-on-a-chip systems are presented. The distinguished author places special emphasis on approaches that tend to green and reduce the cost of sample treatment processes. He also discusses the legal, economical, and toxicity aspects of nanomaterial samples. This book includes extensive reference material, like a complete list of manufacturers, that makes it invaluable for professionals in analytical chemistry. Sample Preparation with Nanomaterials offers considerations of the economic aspects of nanomaterials, as well as the assessment of their toxicity and risk. Readers will also benefit from the inclusion of: A thorough introduction to nanomaterials in the analytical sciences and special properties of nanomaterials for sample preparation An exploration of the mechanism of adsorption and desorption on nanomaterials, including carbon nanomaterials used as adsorbents Discussions of membrane applications of nanomaterials, surface enhanced raman spectroscopy, and the use of nanomaterials for biological sample preparation A treatment of magnetic nanomaterials, lab-on-a-chip nanomaterials, and toxicity and risk assessment of nanomaterials Perfect for analytical chemists, materials scientists, and process engineers, Sample Preparation with Nanomaterials: Next Generation Techniques for Sample Preparation will also earn a place in the libraries of analytical laboratories, universities, and companies who conduct research into nanomaterials and seek a one-stop resource for sample preparation.

Analysis and Risk of Nanomaterials in Environmental and Food Samples Oct 23 2022 The application of nanotechnology in different consumer products has delivered new products with highly desirable properties, but at same time has opened a new window for a wide group of emerging contaminants and a new type of human exposure which needs to be assessed. Most of the

current human toxicological information on nanomaterials comes from nano-sized particles in air, and their effects via inhalation. Other routes of human exposure, such as water and food, and the effects on human health and the environment have been less studied. It is the recent research in these areas that is highlighted here in one of the first books covering the analysis and ecotoxicological evaluation of nanomaterials in food and the environment, with both matrices being of considerable interest. In addition to providing a global summary of recent research, this book shows how widely used chromatographic and spectroscopic methods can be added to the analytical arsenal of microscopic techniques that have commonly been used to characterize nanomaterials. Describes the analytical techniques used to characterize nanomaterials and their applications in environmental or food samples Includes analysis and ecotoxicological evaluation of nanomaterials in food and environmental matrices Takes a detailed look at the research on emerging fields of human exposure to nanomaterials and their environmental risks

Springer Handbook of Nanomaterials Mar 04 2021 The Springer Handbook of Nanomaterials covers the description of materials which have dimension on the "nanoscale". The description of the nanomaterials in this Handbook follows the thorough but concise explanation of the synergy of structure, properties, processing and applications of the given material. The Handbook mainly describes materials in their solid phase; exceptions might be e.g. small sized liquid aerosols or gas bubbles in liquids. The materials are organized by their dimensionality. Zero dimensional structures collect clusters, nanoparticles and quantum dots, one dimensional are nanowires and nanotubes, while two dimensional are represented by thin films and surfaces. The chapters in these larger topics are written on a specific materials and dimensionality combination, e.g. ceramic nanowires. Chapters are authored by well-established and well-known scientists of the particular field. They have measurable part of publications and an important role in establishing new knowledge of the particular field.

Industrial Applications of Nanomaterials Jan 14 2022 Industrial Applications of Nanomaterials explains the industry based applications of nanomaterials, along with their environmental impacts, lifecycle analysis, safety and sustainability. This book brings together the industrial applications of nanomaterials with the incorporation of various technologies and areas, covering new trends and challenges. Significant properties, safety and sustainability and environmental impacts of synthesis routes are also explored, as are major industrial applications, including agriculture, medicine, communication, construction, energy, and in the military. This book is an important information source for those in research and development who want to gain a greater understanding of how nanotechnology is being used to create cheaper, more efficient products. Explains how different classes of nanomaterials are being used to create cheaper, more efficient products Explores the environmental impacts of using a variety of nanomaterials Discusses the challenges faced by engineers looking to integrate nanotechnology in new product development

Nanomaterials Oct 11 2021 This timely volume on nanomaterials and their biomedical and environmental applications includes the fundamentals of nanoparticles, and state-of-the-art properties, characterization, and the synthesis methods as well as the applications. The main thrust of the book is to present review chapters that explore all these aspects of nanomaterials for scientists, engineers and students who are fairly new to the field and want to have a deeper understanding of all the recent R & D advances. The 12 chapters are written by subject matter experts and plot the influence of nanomaterials on the analytical systems (macro to micro & lab-on-a-chip) for biomedical and environmental applications.

Nanomaterials and Nanochemistry Apr 17 2022 Here is a brilliant book that covers the major aspects of nanomaterials production. It integrates the many and varied chemical, material and thermo-dynamical facets of production, offering readers a new and unique approach to the subject. The mechanical, optical, and magnetic characteristics of nanomaterials are also presented in detail. Nanomaterials are a fast developing field of research and this book serves as both a reference work for researchers and a textbook for graduate students.

Nanomaterials: A Danger or a Promise? Nov 12 2021 With the increased presence of nanomaterials

in commercial products such as cosmetics and sunscreens, fillers in dental fillings, water filtration process, catalysis, photovoltaic cells, bio-detection, a growing public debate is emerging on toxicological and environmental effects of direct and indirect exposure to these materials.

Nanomaterials: A Danger or a Promise? forms a balanced overview of the health and environmental issues of nanoscale materials. By considering both the benefits and risks associated with nanomaterials, *Nanomaterials: A Danger or a Promise?* compiles a complete and detailed image of the many aspects of the interface between nanomaterials and their real-life application. The full cycle of nanomaterials life will be presented and critically assessed to consider and answer questions such as: How are nanomaterials made? What they are used for? What is their environmental fate? Can we make them better? Including coverage of relevant aspects about the toxicity of manufactured nanomaterials, nanomaterials life cycle, exposure issues, *Nanomaterials: A Danger or a Promise?* provides a comprehensive overview of the actual knowledge in these fields but also presents perspectives for the future development of a safer nanoscience. This comprehensive resource is a key reference for students, researcher, manufacturers and industry professionals alike.

Plasma Processing of Nanomaterials Aug 29 2020 We are at a critical evolutionary juncture in the research and development of low-temperature plasmas, which have become essential to synthesizing and processing vital nanoscale materials. More and more industries are increasingly dependent on plasma technology to develop integrated small-scale devices, but physical limits to growth, and other challenges, threaten progress. *Plasma Processing of Nanomaterials* is an in-depth guide to the art and science of plasma-based chemical processes used to synthesize, process, and modify various classes of nanoscale materials such as nanoparticles, carbon nanotubes, and semiconductor nanowires. Plasma technology enables a wide range of academic and industrial applications in fields including electronics, textiles, automotives, aerospace, and biomedical. A prime example is the semiconductor industry, in which engineers revolutionized microelectronics by using plasmas to deposit and etch thin films and fabricate integrated circuits. An overview of progress and future potential in plasma processing, this reference illustrates key experimental and theoretical aspects by presenting practical examples of: Nanoscale etching/deposition of thin films Catalytic growth of carbon nanotubes and semiconductor nanowires Silicon nanoparticle synthesis Functionalization of carbon nanotubes Self-organized nanostructures Significant advances are expected in nanoelectronics, photovoltaics, and other emerging fields as plasma technology is further optimized to improve the implementation of nanomaterials with well-defined size, shape, and composition. Moving away from the usual focus on wet techniques embraced in chemistry and physics, the author sheds light on pivotal breakthroughs being made by the smaller plasma community. Written for a diverse audience working in fields ranging from nanoelectronics and energy sensors to catalysis and nanomedicine, this resource will help readers improve development and application of nanomaterials in their own work. About the Author: R. Mohan Sankaran received the American Vacuum Society's 2011 Peter Mark Memorial Award for his outstanding contributions to tandem plasma synthesis.

Nanomaterials, Nanotechnologies and Design May 06 2021 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

Applications of Nanomaterials in Sensors and Diagnostics Mar 24 2020 Recent progress in the synthesis of nanomaterials and our fundamental understanding of their properties has led to

significant advances in nanomaterial-based gas, chemical and biological sensors. Leading experts around the world highlight the latest findings on a wide range of nanomaterials including nanoparticles, quantum dots, carbon nanotubes, molecularly imprinted nanostructures or plastibodies, nanometals, DNA-based structures, smart nanomaterials, nanoproboscopes, magnetic nanomaterials, organic molecules like phthalocyanines and porphyrins, and the most amazing novel nanomaterial, called graphene. Various sensing techniques such as nanoscaled electrochemical detection, functional nanomaterial-amplified optical assays, colorimetry, fluorescence and electrochemiluminescence, as well as biomedical diagnosis applications, e.g. for cancer and bone disease, are thoroughly reviewed and explained in detail. This volume will provide an invaluable source of information for scientists working in the field of nanomaterial-based technology as well as for advanced students in analytical chemistry, biochemistry, electrochemistry, material science, micro- and nanotechnology.

Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases Mar 16 2022 Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases takes a scientific approach to nanotechnology and nanomaterials applications in medicine, while also explaining the core biological principles for an audience of biomedical engineers, materials scientists, pharmacologists, and medical diagnostic technicians. The book is structured by major disease groups, offering a practical, application-based focus for scientists, engineers, and clinicians alike. The spectrum of medical applications is explored, from diagnostics and imaging to drug delivery, monitoring, therapies, and disease prevention. It also focuses specifically on the synthesis of nanomaterials and their potential health risks (particularly toxicity). Nanomedicine — the application of nanomaterials and devices for addressing medical problems — has demonstrated great potential for enabling improved diagnosis, treatment, and monitoring of many serious illnesses, including cancer, cardiovascular and neurological disorders, HIV/AIDS, and diabetes, as well as many types of inflammatory and infectious diseases. Gain an understanding of how nanotechnologies and nanomaterials can be deployed in the fight against the major life-threatening diseases: cancer, neurological disorders (including Alzheimer's and Parkinson's), cardiovascular diseases, and HIV/AIDS Discover the latest developments in nanomedicine, from therapies and drug delivery to diagnostics and disease prevention The authors cover the health risks of nanomaterials as well as their benefits, considering toxicity and potential carcinogens

Engineered Nanomaterials for Innovative Therapies and Biomedicine Jun 26 2020 Research on biomedical applications of nanomaterials has exhibited the rapidly evolving field of biomedical sciences by showing how effective they are in treatment. These particles hold considerable potential for biomedical applications. Work is ongoing, and the results suggest a possibility for a sustainable future for nanomaterials in both therapeutic and biomedical fields. This book highlights current and emerging applications, taking global research findings into consideration. We believe the focus on the identification and role of nanomaterial applications in therapeutic and biomedical sciences can lead to novel solutions in the fields. The chapters of this book are disseminated in a manner that can be readily adopted as sources for new and further study. The editors integrate advanced texts in their research that help graduate students, researchers and professors. Additionally, we believe that international readers will be able to make use of this book for reference purposes.

Nanomaterials Recycling Aug 21 2022 Nanomaterial Recycling provides an update on the many benefits nanomaterials can provide on both environmental and economic issues. Sections cover the appropriate recycling strategies of nanowastes, nanowaste regulations (including nanowaste disposal and recycling standards), promising applications (reuses) of these recycled nanomaterials, and various methods used for the separation of nanoparticles, including (i) centrifugation, (ii) solvent evaporation, (iii) magnetic separation, (iv) using pH/thermal responsive materials, (v) molecular antisolvents, (vi) nanostructured colloidal solvents, and more. This book is an important reference source for materials scientists and engineers who are seeking to increase their understanding of nanomaterials, recycling processes and techniques. As nanomaterials can be recycled from both new/pure products (from nano manufacturing) and used products (nano waste: waste from nano

integrated products), this book is a welcomed addition to many disciplines. Provides information on how nanoscale recycling techniques can mitigate the most hazardous effects of nanomaterials Explains the major recycling processes and techniques used for nanoscale materials Assesses the major challenges of implementing nanoscale recycling approaches in a scalable and cost-effective manner

Nanomaterials for Electrocatalysis Jan 02 2021 Nanomaterials for Electrocatalysis provides an overview of the different types of nanomaterials, design principles and synthesis protocols used for electrocatalytic reactions. The book is divided into four parts that thoroughly describe basic principles and fundamental of electrocatalysis, different types of nanomaterials used, and their electrocatalytic applications, limitations and future perspectives. As electrochemical systems containing nanomaterials, with relevance to experimental situation, yield better results, this book highlights new information and findings. Provides an overview of nanomaterials applications for electrocatalytic processes, such as oxygen reduction reaction (ORR), oxygen evolution reaction (OER), hydrogen evolution reaction (HER) and CO₂ reduction reaction (CO₂RR) Provides information on the design and development of various nanomaterials appropriate for electrocatalytic applications Assesses the challenges of manufacturing nanomaterials at an industrial scale for electronic applications

Nanomaterials: Synthesis, Characterization, Hazards and Safety Oct 31 2020 Nanomaterials: Synthesis, Characterization, Hazards and Safety explains the fundamental properties of nanomaterials, covering their types and classifications. The book includes methods of preparation and characterization of nanostructured materials. It explains the principles and fundamentals of nanomaterials, with information on both pure and composite-based materials with e nanostructures, outlines the latest developments and advances in nanomaterials, and highlights toxic effects and protection. This book is designed to appeal to a wide readership of academic and industrial researchers, focusing on nanotechnology and nanomaterials, sustainable chemistry, energy conversion and storage, nanotechnology, chemical engineering, environmental protection, optoelectronics, sensors, and surface and interface science. Provides information on major concepts and advances made in the areas of nanomaterials properties and nano safety Identifies the major physiochemical properties of nanomaterials Explores the toxicity of different class of nanomaterials and how they can be used safely

Nanomaterials for Solar Cell Applications Jun 19 2022 Nanomaterials for Solar Cell Applications provides a review of recent developments in the field of nanomaterials based solar cells. It begins with a discussion of the fundamentals of nanomaterials for solar calls, including a discussion of lifecycle assessments and characterization techniques. Next, it reviews various types of solar cells, i.e., Thin film, Metal-oxide, Nanowire, Nanorod and Nanoporous materials, and more. Other topics covered include a review of quantum dot sensitized and perovskite and polymer nanocomposites-based solar cells. This book is an ideal resource for those working in this evolving field of nanomaterials and renewable energy. Provides a well-organized approach to the use of nanomaterials for solar cell applications Discusses the synthesis, characterization and applications of traditional and new material Includes coverage of emerging nanomaterials, such as graphene, graphene-derivatives and perovskites

Nanomaterials Feb 27 2023 This book grew out of my desire to understand the mechanics of nanomaterials, and to be able to rationalize in my own mind the variety of topics on which the people around me were doing research at the time. The field of nanomaterials has been growing rapidly since the early 1990s. Initially, the field was populated mostly by researchers working in the fields of synthesis and processing. These scientists were able to make new materials much faster than the rest of us could develop ways of looking at them (or understanding them). However, a confluence of interests and capabilities in the 1990s led to the explosive growth of papers in the characterization and modeling parts of the field. That confluence came from three primary directions: the rapid growth in our ability to make nanomaterials, a relatively newfound ability to characterize the nanomaterials at the appropriate length and time scales, and the rapid growth in our ability to model

nanomaterials at atomistic and molecular scales. Simultaneously, the commercial potential of nanotechnology has become apparent to most high-technology industries, as well as to some industries that are traditionally not viewed as high-technology (such as textiles). Much of the rapid growth came through the inventions of physicists and chemists who were able to develop nanotechnology products (nanomaterials) through a dizzying array of routes, and who began to interface directly with biological entities at the nanometer scale. That growth continues unabated.

Nanomaterials May 18 2022 Nanomaterials are being incorporated into products all around us, having an incredible impact on durability, strength, functionality, and other material properties. There are a vast number of nanomaterials presently available, and new formulations and chemistries are being announced daily. **Nanomaterials: A Guide to Fabrication and Applications** provides product developers, researchers, and materials scientists with a handy resource for understanding the range of options and materials currently available. Covering a variety of nanomaterials and their applications, this practical reference: Discusses the scale of nanomaterials and nanomachines, focusing on integrated circuits (ICs) and microelectromechanical systems (MEMS) Offers insight into different nanomaterials' interactions with chemical reactions, biological processes, and the environment Examines the mechanical properties of nanomaterials and potential treatments to enhance the nanomaterials' performance Details recent accomplishments in the use of nanomaterials to create new forms of electronic devices Explores the optical properties of certain nanomaterials and the nanomaterials' use in optimizing lasers and optical absorbers Describes an energy storage application as well as how nanomaterials from waste products may be used to improve capacitors Featuring contributions from experts around the globe, **Nanomaterials: A Guide to Fabrication and Applications** serves as a springboard for the discovery of new applications of nanomaterials.

Nanomaterials for Medical Applications Apr 29 2023 This title covers recent advances in a variety of biomedical applications of nanostructured materials, as the field evolves from prototype device to real-world application. It presents the main types of nanomaterial used in medical application today: semiconductor nanomaterials, Magnetic nanomaterials, metal nanoparticles, Carbon nanomaterials, Hydrogel nanocomposites, Liposomes, Dendrimers, Polymer nanocomposites, and Biodegradable polymers. Structurally the work is demarcated into the six most popular areas of research: (1) biocompatibility of nanomaterials with living organisms in their various manifestations (2) nanobiosensors for clinical diagnostics, detecting biomolecules which are useful in the clinical diagnosis of genetic, metabolically acquired, induced or infectious disease (3) targeted drug delivery for nanomaterials in their various modifications (4) nanomedical devices and structures which are used in the development of implantable medical devices and structures such as nanorobots (5) nanopharmacology, as novel nanoparticles are increasingly engineered to diagnose conditions and recognize pathogens, identify ideal pharmaceutical agents to treat the condition or pathogens, fuel high-yield production of matched pharmaceuticals (potentially in vivo), locate, attach or enter target tissue, structures or pathogens; and dispense the ideal mass of matched biological compound to the target regions (6) nanotoxicology and remediation, which focuses on finished and on-going various toxicity evaluations on various nanomaterials that are used and currently being developed for medical applications Discusses the most important biomedical applications and devices of nanomaterials: drug delivery, medical imaging, gene therapy, nanorobots, biosensors and diagnostics Focuses on current commercialized techniques and applications, ensuring the work is entirely relevant to a rapidly evolving field Reviews the most recent studies on nanomaterial toxicity, thereby responding to the widescale private, policy and public interest in nanoscience

Nanomaterials and Devices Mar 28 2023 Introducing the fields of nanomaterials and devices, and their applications across a wide range of academic disciplines and industry sectors, Donglu Shi bridges knowledge acquisition and practical work, providing a starting point for the research and development of applications. The book describes characterization of nanomaterials, their preparation methods and performance testing techniques; the design and development of nano-scale devices; and the applications of nanomaterials, with examples taken from different industry sectors,

such as lighting, energy, bioengineering and medicine / medical devices. Key nanomaterial types are covered, such as carbon nanotubes, nanobiomaterials, nano-magnetic materials, semiconductor materials and nanocomposites. Shi also provides detailed coverage of key emerging technologies such as DNA nanotechnology and spintronics. The resulting text is equally relevant for advanced students (senior and graduate) and for engineers and scientists from a variety of different academic backgrounds working in the multi-disciplinary field of nanotechnology. Provides detailed guidance for the characterization of nanomaterials, their preparation, and performance testing Explains the principles and challenges of the design and development of nano-scale devices Explores applications through cases taken from a range of different sectors, including electronics, energy and medicine.

Nanomaterials in Plants, Algae and Microorganisms Sep 22 2022 *Nanomaterials in Plants, Algae and Microorganisms: Concepts and Controversies: Volume 2* not only covers all the new technologies used in the synthesis of nanoparticles, it also tests their response on plants, algae and microorganisms in aquatic ecosystems. Unlike most works in the field, the book doesn't focus exclusively on the higher organisms. Instead, it explores the smaller life forms on which they feed. Topics include the impacts of plant development, how different nanoparticles are absorbed by biota, the impact different metals—including silver and rare earth metals—have on living organisms, and the effects nanoparticles have on aquatic ecosystems as a whole. As nanotechnology based products have become a trillion-dollar industry, there is a need to understand the implications to the health of our biota and ecosystems as the earth is increasingly inundated with these materials. Covers the issues of nanoparticles on more simple organisms and their ecosystems Draws upon global experts to help increase understanding of the interface mechanisms at the physiological, biochemical, molecular, and even genomic and proteomic level between ENPs and biological systems Provides a critical assessment of the progress taking place on this topic Sheds light on future research needs and scientific challenges that still exist in nanoparticle and living organism interactions

Synthesis, Technology and Applications of Carbon Nanomaterials May 26 2020 *Synthesis, Technology and Applications of Carbon Nanomaterials* explores the chemical properties of different classes of carbon nanomaterials and their major applications. As carbon nanomaterials are used for a variety of applications due to their versatile properties and characteristics, this book discusses recent advances in synthesis methods, characterization, and applications of 0D -3D dimensional carbon nanomaterials. It is an essential resource for readers focusing on carbon nanomaterials research. Explores the chemical properties of different classes of carbon nanomaterials and their major applications Discusses recent advances in synthesis methods, characterization, and applications of 0D -3D dimensional carbon nanomaterials

Fundamentals and Properties of Multifunctional Nanomaterials Feb 21 2020 *Fundamentals and Properties of Multifunctional Nanomaterials* outlines the properties of highly intricate nanosystems, including liquid crystalline nanomaterials, magnetic nanosystems, ferroelectrics, nanomultiferroics, plasmonic nanosystems, carbon-based nanomaterials, 1D and 2D nanomaterials, and bio-nanomaterials. This book reveals the electromagnetic interference shielding properties of nanocomposites. The fundamental attributes of the nanosystems leading to the multifunctional applications in diverse areas are further explored throughout this book. This book is a valuable reference source for researchers in materials science and engineering, as well as in related disciplines, such as chemistry and physics. Explains the concepts and fundamental applications of a variety of multifunctional nanomaterials; Introduces fundamental principles in the fields of magnetism and multiferroics; Addresses ferromagnetics, multiferroics, and carbon nanomaterials.

Green Synthesis of Nanomaterials for Bioenergy Applications Jan 22 2020 An authoritative summary of the quest for an environmentally sustainable synthesis process of nanomaterials and their application for environmental sustainability *Green Synthesis of Nanomaterials for Bioenergy Applications* is an important guide that provides information on the fabrication of nanomaterial and the application of low cost, green methods. The book also explores the impact on various existing bioenergy approaches. Throughout the book, the contributors—noted experts on the topic—offer a reliable summary of the quest for an environmentally sustainable synthesis process of nanomaterials

and their application to the field of environmental sustainability. The green synthesis of nanoparticles process has been widely accepted as a promising technique that can be applied to a variety of fields. The green nanotechnology-based production processes to fabricate nanomaterials operates under green conditions without the intervention of toxic chemicals. The book's exploration of more reliable and sustainable processes for the synthesis of nanomaterials, can lead to the commercial application of the economically viability of low-cost biofuels production. This important book: Summarizes the quest for an environmentally sustainable synthesis process of nanomaterials for their application to the field of environmental sustainability Offers an alternate, sustainable green energy approach that can be commercially implemented worldwide Covers recent approaches such as fabrication of nanomaterial that apply low cost, green methods and examines its impact on various existing bioenergy applications Written for researchers, academics and students of nanotechnology, nanosciences, bioenergy, material science, environmental sciences, and pollution control, *Green Synthesis of Nanomaterials for Bioenergy Applications* is a must-have guide that covers green synthesis and characterization of nanomaterials for cost effective bioenergy applications.

Green Nanomaterials for Industrial Applications Dec 13 2021 *Green Nanomaterials for Industrial Applications* explores the applications of nanomaterials for a variety of industry sectors, along with their environmental impacts, lifecycle analysis, safety and sustainability. This book brings together the industrial applications of nanomaterials, covering new trends and challenges. Significant properties, safety and sustainability and environmental impacts of synthesis routes are also explored, as are major industrial applications, including agriculture, medicine, communications, construction, energy, and in the military. This book is an important information source for those in research and development who want to gain a greater understanding of how nanotechnology is being used to create cheaper, more efficient products. Green nanomaterials have significant advantages including low cost, high efficiency, neutral environmental impact, and stability. *Green Nanomaterials for Industrial Applications* provides comprehensive information about green nanomaterials, their types, and methods for generation, characterization as well as their properties. Furthermore, this book also provides coverage of industrial scale fabrication methods for green nanomaterials and their applications for various industrial sectors at both experimental and theoretical models scales. This book is an important reference source for materials scientists, engineers and environmental scientists who want to learn more about how sustainable nanomaterials are being used in a range of industrial applications. Explores industrial scale fabrication of green nanomaterials Assesses environmental, legal, health and safety aspects Discusses how green nanomaterials can be manufactured on an industrial scale

Liquid and Crystal Nanomaterials for Water Pollutants Remediation Apr 05 2021 Nanoscience technology is playing a vital role in multidisciplinary research due to its unique characteristics at nanoscale as compared to bulk materials. In view of such excellent properties, like high surface area, semiconducting nature, and non-toxicity, nanotechnology has emerged as a promising means to curb pollution. Liquid and crystal nanomaterials aim for products and processes that are ecofriendly, economically sustainable, safe, and energy-efficient. One of the most popular fields widely adopted is photocatalysis of nanomaterials that involves photo-conduction in efficient removal/degradation of noxious pollutants. This book focuses on generation of liquid and crystal nanomaterials for environmental remediation.

Nanomaterials Dec 25 2022 Nanomaterials and nanostructures are the original product of nanotechnology, and the key building blocks for enabling technologies. In this context, this book presents a concise overview of the synthesis and characterization methods of nanomaterials and nanostructures, while integrating facets of physics, chemistry, and engineering. The book summarizes the fundamentals and technical approaches in synthesis, and processing of nanostructures and nanomaterials, so as the reader can have a systematic and quick picture of the field. This book focuses on functional aspects of nanomaterials that have a high relevance to immediate applications, such as catalysis, energy harvesting, biosensing, and surface

functionalization. There are chapters addressing nanostructured materials and composites and covering basic properties and requirements of this new class of engineered materials.

Nanomaterials for Biosensors Jul 08 2021 Nanomaterials for Biosensors: Fundamentals and Applications provides a detailed summary of the main nanomaterials used in biosensing and their application. It covers recent developments in nanomaterials for the fabrication of biosensor devices for healthcare diagnostics, food freshness and bioprocessing. The various processes used for synthesis and characterization of nanostructured materials are examined, along with the design and fabrication of bioelectronic devices using nanostructured materials as building blocks. Users will find the fundamentals of the main nanomaterials used in biosensing, helping them visualize a systematic and coherent picture of how nanomaterials are used in biosensors. The book also addresses the role of bio-conjugation of nanomaterials in the construction of nano-biointerfaces for application in biosensors. Such applications, including metal nanoparticles, metal oxide nanoparticles, nanocomposites, carbon nanotubes, conducting polymers and plasmonic nanostructures in biosensing are discussed relative to each nanomaterial concerned. Finally, recent advancements in protein functionalized nanomaterials for cancer diagnostics and bio-imaging are also included. Provides a detailed study on how nanomaterials are used to enhance sensing capabilities in biosensors Explains the properties, characterization methods and preparation techniques of the nanomaterials used in biosensing Arranged in a material-by-material way, making it clear how each nanomaterial should be used

Nanomaterials and Their Applications Jan 26 2023 This book focuses on the latest advances in the field of nanomaterials and their applications, and provides a comprehensive overview of the state-of-the-art of research in this rapidly developing field. The book comprises chapters exploring various aspects of nanomaterials. Given the depth and breadth of coverage, the book offers a valuable guide for researchers and students working in the area of nanomaterials.

Semiconductor Nanomaterials Feb 15 2022 The book series Nanomaterials for the Life Sciences, provides an in-depth overview of all nanomaterial types and their uses in the life sciences. Each volume is dedicated to a specific material class and covers fundamentals, synthesis and characterization strategies, structure-property relationships and biomedical applications. The series brings nanomaterials to the Life Scientists and life science to the Materials Scientists so that synergies are seen and developed to the fullest. Written by international experts of various facets of this exciting field of research, the series is aimed at scientists of the following disciplines: biology, chemistry, materials science, physics, bioengineering, and medicine, together with cell biology, biomedical engineering, pharmaceutical chemistry, and toxicology, both in academia and fundamental research as well as in pharmaceutical companies. VOLUME 6 - Semiconductor Nanomaterials

X-ray and Neutron Techniques for Nanomaterials Characterization Dec 01 2020 Fifth volume of a 40 volume series on nanoscience and nanotechnology, edited by the renowned scientist Challa S.S.R. Kumar. This handbook gives a comprehensive overview about X-ray and Neutron Techniques for Nanomaterials Characterization. Modern applications and state-of-the-art techniques are covered and make this volume an essential reading for research scientists in academia and industry.

Nanomaterials and Nanocomposites for Environmental Remediation Aug 09 2021 p="" This monograph focuses on recent development of nanomaterials and nanocomposites for pollution measurement and their control in water, air, and soil. The contents incorporate carbon-based, metal-based, and metal-organic framework based nanomaterials and nanocomposites for emerging contaminants (pharmaceuticals and personal care products) degradation, disinfection, and other traditional pollutants degradation and removal. The book also offers updated literature for researchers and academicians working in the field of environmental remediation by nanomaterials. Readers will learn about different metal and non-metal based nanoparticles for environmental remediation. It will be a useful guide for professionals, and post-graduate students involved in material science & engineering, chemical engineering and environmental nanotechnology research.

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Nanomaterials for Drug Delivery and Therapy Feb 03 2021 *Nanomaterials for Drug Delivery and Therapy* presents recent advances in the field of nanobiomaterials and their important applications in drug delivery, therapy and engineering. The book offers pharmaceutical perspectives, exploring the development of nanobiomaterials and their interaction with the human body. Chapters show how nanomaterials are used in treatments, including neurology, dentistry and cancer therapy. Authored by a range of contributors from global institutions, this book offers a broad, international perspective on how nanotechnology-based advances are leading to novel drug delivery and treatment solutions. It is a valuable research resource that will help both practicing medics and researchers in pharmaceutical science and nanomedicine learn more on how nanotechnology is improving treatments. Assesses the opportunities and challenges of nanotechnology-based drug delivery systems Explores how nanotechnology is being used to create more efficient drug delivery systems Discusses which nanomaterials make the best drug carriers

Amorphous Nanomaterials Dec 21 2019 A valuable overview covering important fundamental and applicative aspects of amorphous nanomaterials! Amorphous nanomaterials are very important in non-crystalline solids, which have emerged as a new category of advanced materials. Compared to the crystalline counterpart, amorphous nanomaterials with isotropic nature always exhibit fast ion diffusion, relieved strain, and higher reactivity, enabling such materials to exhibit high performance in mechanics and catalysis, as well as other interesting properties. *Amorphous Nanomaterials: Preparation, Characterization, and Applications* covers the fundamental concept, synthesis, characterization, properties, and applications of nanoscaled amorphous materials. It starts with the introduction of amorphous materials, then gives a global view of the history, structure, and growth mechanism of amorphous nanomaterials. Subsequently, some powerful techniques to characterize amorphous materials, such as X-ray absorption fine structure spectroscopy, spherical aberration electron microscope, in-situ-Transmission Electron Microscope, Electron Energy Loss Spectroscopy, and some other defect characterization technologies are included. Furthermore, the emerging innovative methods to fabricate well-defined, regularshaped amorphous nanomaterials, including zero-, one-, two-, and three-dimensional amorphous nanomaterials are systematically introduced. The fascinating properties and applications related to amorphous nanomaterials including the applications in electrocatalysis, batteries, supercapacitors, photocatalysis, mechanics, etc., are presented. It will greatly help the researchers to find professional answers related to amorphous materials. Great topic: amorphous nanomaterials are a very large and important field in both academia and industry Comprehensive: in-depth discussion of various important aspects, from both a fundamental and an applied point of view, on the chemistry, physics and technological importance of the amorphous nanomaterials are presented Vitaly needed: the understanding of the fundamentals of amorphous nanomaterials is a prerequisite for devising new applications of such materials Highly relevant: amorphous nanomaterials have found specific applications in chemistry, catalysis, physics, sensing, batteries, supercapacitors, and engineering *Amorphous Nanomaterials* is a vital resource for materials scientists, inorganic and physical chemists, solid state chemists, physicists, catalytic and analytical chemists, as well as organic chemists.

Nanomaterials for 2D and 3D Printing Sep 29 2020 The first book to paint a complete picture of the challenges of processing functional nanomaterials for printed electronics devices, and additive manufacturing fabrication processes. Following an introduction to printed electronics, the book focuses on various functional nanomaterials available, including conducting, semi-conducting, dielectric, polymeric, ceramic and tailored nanomaterials. Subsequent sections cover the preparation and characterization of such materials along with their formulation and preparation as inkjet inks, as well as a selection of applications. These include printed interconnects, passive and active modules, as well as such high-tech devices as solar cells, transparent electrodes, displays, touch screens, sensors, RFID tags and 3D objects. The book concludes with a look at the future for printed nanomaterials. For all those working in the field of printed electronics, from entrants to specialized researchers, in a number of disciplines ranging from chemistry and materials science to engineering and manufacturing, in both academia and industry.