

Applications Of Nanotechnology And Nanomaterials In

This book highlights the evolution of, and novel challenges currently facing, nanomaterials science, nanoengineering, and nanotechnology, and their applications and development in the biological and biomedical fields. It details different nanoscale and nanostructured materials syntheses, processing, characterization, and applications, and considers improvements that can be made in nanostructured materials with their different biomedical applications. The book also briefly covers the state of the art of different nanomaterials design, synthesis, fabrication and their potential biomedical applications. It will be particularly useful for reading and research purposes, especially for science and engineering students, academics, and industrial researchers.

Advanced Nanomaterials for Aerospace Applications has been developed for a community interested in space science and nanotechnology. Scientists and engineers from several NASA field centers and the Jet Propulsion Laboratory, University of Puerto Rico, The Pennsylvania State University, and INFN-Laboratori Nazionali di Frascati, Italy, have joined efforts to discuss the applications of nanomaterials in sensors, atmosphere revitalization in habitable space platforms, life support systems, regenerative fuel cells, lithium-ion batteries, robust lightweight materials, nanoelectronics, and electromagnetic shielding. The book concludes with chapters that discuss bringing NASA-relevant nanotechnology into the classroom and the future directions in nanotechnology research and development at NASA.

Nanotechnology in the Automotive Industry explores how nanotechnology and nanomaterials are used to enhance the performance of materials and devices for automotive application by fabricating nano-alloys, nanocomposites, nano coatings, nanodevices, nanocatalysts and nanosensors. Consisting of 36 chapters in 6 parts, this new volume in the Micro and Nano Technologies series is for materials scientists, nanotechnologists and automotive engineers working with nanotechnology and nanomaterials for automotive applications.

Nanotechnology is seen as one of the core technologies for the future automotive industry to sustain competitiveness. The benefits that nanotechnology brings to the automotive sector include stronger and lighter materials for increased safety and reduced fuel consumption, improved engine performance and fuel consumption for gasoline powered vehicles due to nanocatalysts, fuel additives and lubricants, and more.

Discusses various approaches and techniques such as nanoalloys, nanocomposites, nanocoatings, nanodevices, nanocatalysts and nanosensors used in modern vehicles Presents the challenges and future of automotive materials Explores how nanotechnology and nanomaterials are used to enhance the performance of materials and devices for automotive applications

Applications of Nanomaterials: Advances and Key Technologies discusses the latest advancements in the

synthesis of various types of nanomaterials. The book's main objective is to provide a comprehensive review regarding the latest advances in synthesis protocols that includes up-to-date data records on the synthesis of all kinds of inorganic nanostructures using various physical and chemical methods. The synthesis of all important nanomaterials, such as carbon nanostructures, Core-shell Quantum dots, Metal and metal oxide nanostructures, Nanoferrites, polymer nanostructures, nanofibers, and smart nanomaterials are discussed, making this a one-stop reference resource on research accomplishments in this area. Leading researchers from industry, academia, government and private research institutions across the globe have contributed to the book. Academics, researchers, scientists, engineers and students working in the field of polymer nanocomposites will benefit from its solutions for material problems. Provides an up-to-date data record on the synthesis of all kinds of organic and inorganic nanostructures using various physical and chemical methods Presents the latest advances in synthesis protocols Includes the latest techniques used in the physical and chemical characterization of nanomaterials Covers the characterization of all the important materials groups, such as carbon nanostructures, core-shell quantum dots, metal and metal oxide nanostructures, nanoferrites, polymer nanostructures and nanofibers

Environmental Nanotechnology

Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases

Fundamental Concepts, Biological Interactions and Clinical Applications

Nanotechnology in Food Products

Nanotechnology in the Automotive Industry

Food, Medical, and Environmental Applications of Nanomaterials

This book discusses current trends and potential areas of nanotechnology applications in dental materials. Dentistry is undergoing yet another change to benefit mankind via the discipline of nanodentistry. A variety of nanostructures such as nanorobots, nanospheres, nanofibers, nanorods, etc., have been studied for various applications in dentistry and medicine. Preventive dentistry has also utilized nanodentistry to develop the nanomaterials for inclusion in a variety of oral health-care products. Methods to prevent and combat dental problems have been devised, discussed, and implemented since ancient times; however, there is a constant need for improved tools and techniques. This book is relevant academically for undergraduate and post-graduate dental students, dental practitioners, researchers, and faculties of dental universities, as this book explores the application of various nanobiomaterials in dentistry, discusses current research in dental nanomaterials and potential future areas of interest, and examines the use of nanotechnology in various fields of dentistry.

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.

Handbook of Nanomaterials for Manufacturing Applications covers the challenges and obstacles involved in using nanomaterials in manufacturing. In particular, the lack of information, the possibility of adverse impacts on the environment, human health, safety and sustainability and other remaining challenges. This book addresses these challenges for the use of nanomaterials in major manufacturing sectors and suggests how they may be overcome. It was written to summarize, in a one-stop, concise manner, how nanomaterials and nanotechnology are being used to enhance current manufacturing techniques and processes in order to create more sustainable products in a range of industry sectors. This book will be of great use to materials scientists and engineers who are looking to gain a greater understanding on how nanotechnology is being used to improve the products we use in our daily lives. Demonstrates how cutting-edge developments in nanomaterials are being used to make more efficient manufacturing processes in a range of industry sectors Explores how using nanomaterials can help engineers create innovative consumer products Discusses the legal, economic and toxicity issues arising from using nanomaterials in manufacturing processes

Dental Applications of Nanotechnology Springer

Applications of Nanomaterials

Green Nanomaterials for Industrial Applications

Nanoparticles for Biomedical Applications

Nanomaterials and Their Applications

Synthesis, Properties, and Applications

Nanomaterials in Bionanotechnology

Nanoscience and nanotechnology are interdisciplinary fields that bring together physicists, chemists, materials scientists, and engineers to meet the potential future

challenges that humankind will face, including the search for renewable energies for sustainable development and new technologies for carbon capture and environmental protection. Among the current subjects in nanoscience and nanotechnology, nanomaterials are developing fast and explosively and attracting a huge amount of attention. They continue to show promising potential and have found application in solar cells, fuel cells, secondary batteries, supercapacitors, air and water purification, and removal of domestic and outdoor air pollutants. To summarize the past developments and encourage future efforts, this book presents contributions from world-renowned specialists in the fields of nanomaterials, energy, and environmental science. It discusses the design and fabrication of nanostructured materials and their energy and environmental applications. Food, Medical, and Environmental Applications of Nanomaterials is designed to cover different types of nanomaterials that have applications related to the environment, food and medicine. It is an important resource for materials scientists and bioengineers looking to learn more about the applications of nanomaterials for sustainable development applications. Nanoscale materials possess excellent properties that have been explored in the areas of biomedical, food, agriculture, the environment, catalysis, sensing and energy storage. Examples of these new applications include smart and active food packaging, nanobiosensors, bioremediation, wastewater treatment, implant coatings, tissue engineering, delivery systems for food and pharmaceutical applications, and food safety. Helps readers make decisions on the suitability and appropriateness of a synthetic route and characterization technique for a particular nanosystem Enables readers to analyze and compare experimental data and extract in-depth information about the physical properties of the polymeric gels using mathematical models Teaches users about the applications of nanomaterials for sustainable development applications

Nanomaterials: Science and Applications reports up-to-the-minute research on nanoparticles for drug delivery and applications in nanomedicine, nanoelectronics, and microelectromechanical systems (MEMS) for biosensors; melanin as a nano-based future material; nanostructured materials for solar cell applications; the world of quantum dots illustrated by CdSe; and gas transport and transport-based applications of electrospun

nanofibers. The research is primarily undertaken within Australia and gives an excellent overview of topics in advanced nanomaterials and structures and their applications. The reader also gets a tutorial introduction to the computer software used to generate 3D illustrations that are used throughout the book. The first authors are early-career researchers from the Australian Nanotechnology Network.

Explore the Properties of Today's Widely Used Nanomaterials— and Assess Their Potentially Harmful Effects on the Environment Environmental Nanotechnology is the first book to assist you in both understanding the properties of new nanomaterial-centered technology and assessing the potentially harmful effects these materials may have on the environment. Written by a team of 29 leading experts from around the world, this comprehensive book presents cutting-edge coverage of the fabrication, characterization, and measurement of nanomaterials...emerging markets for nanomaterials...nanotechnologies in the energy industry...nanotechnologies for environmental quality...nanotechnology transport and fate in the environment...toxicological impacts of nanomaterials...and much more. Filled with detailed illustrations, Environmental Nanotechnology features: State-of-the-art techniques for the characterization and measurement of nanomaterials The latest findings on the transport and fate of nanomaterials in the environment Nanotechnologies for energy production, storage, and distribution In-depth analyses of the ecotoxicological impacts of nanomaterials New methods for developing nanomaterials with less environmental risk Inside This Landmark Environmental Engineering Guide _ • Nanomaterials: New Challenges and Opportunities • Fabrication of Nanomaterials • Characterization and Measurement of Nanomaterials • Emerging Markets for Nanomaterials • Nanomaterial-Enabled Technologies for Energy Production, Storage, and Distribution • Nanomaterial-Enabled Technologies for Environmental Quality • Nanomaterial Transport and Fate in the Environment • Ecotoxicological Impacts of Nanomaterials • Toxicological Impacts of Nanomaterials Nanomaterials and Nanocomposites, Nanostructure Surfaces, and Their Applications Nanotechnology and Nanomaterial Applications in Food, Health, and Biomedical Sciences Advanced Nanomaterials for Aerospace Applications

Nanomaterials for Medical Applications
Current Prospects and Future Trends
Nanotechnology

This book provides a complete overview of a wide range of nanomaterials from their synthesis and characterization to current and potential applications with special focus on the use of such nano-based products as functional agents in biomedical, environmental and industrial applications. It addresses the intrinsic relationship between aspects involving the synthesis of nanocompounds, their bio-physico-chemical properties and their interactions occurring in biomedical, environmental and industrial matrix. This book is of interest to engineers, academics and research scholars working in these fields.

This book highlights some of the latest advances in nanotechnology and nanomaterials from leading researchers in Ukraine, Europe and beyond. It features contributions presented at the 8th International Science and Practice Conference Nanotechnology and Nanomaterials (NANO2020), which was held on August 26-29, 2020 at Lviv Polytechnic National University, and was jointly organized by the Institute of Physics of the National Academy of Sciences of Ukraine, University of Tartu (Estonia), University of Turin (Italy), and Pierre and Marie Curie University (France). Internationally recognized experts from a wide range of universities and research institutions share their knowledge and key findings on material properties, behavior, and synthesis. This book's companion volume also addresses topics such as nano-optics, energy storage, and biomedical applications. Nano particles have created a high interest in recent years by virtue of their unusual mechanical, electrical, optical and magnetic properties and find wide applications in all fields of engineering. This edited volume aims to present the latest trends and updates in nanogenerators, thin film solar cells and green synthesis of metallic nanoparticles with a focus on nanostructured semiconductor devices. Exclusive chapter on electrical transport of nanostructure explains device physics for material properties for reduced dimensions. Additionally, the text describes the functionality of metallic nanoparticles and their application in molecular imaging and optical metamaterials. Piezoelectric nanogenerators has been touched upon from the energy perspective as well. Key Features: • Organized contents on Nanogenerators, VOC sensing, nanoelectronics, and NEMS. • Discusses eco-friendly green synthesis methods for metallic nanoparticles. • Touches upon low power nano devices (e.g. nanogenerators) for energy harvesting with quantum mechanical study. • Thin film/heterojunction based high efficiency solar cell addressed aimed at reducing global energy consumption.

This book reviews the various applications of nanotechnology in human health. The introductory chapters focus on the classifications, types, synthesis, and characterization of various types of nanomaterials, while subsequent chapters highlight current applications of nanomaterials in the diagnosis and treatment of microbial

and viral infections, and also in stem cell biology and regenerative medicine. Further, the book explores the potential role of nanomaterials in connection with neuronal differentiation, neuronal protection, and neurological diseases. It demonstrates the use of nanotechnology to diagnose and treat genetic disorders, as well as endocrine and metabolic syndrome diseases. It also discusses the ethics and the negative impacts of nanomaterials on human health. Lastly, it examines the intellectual property aspects and government regulations associated with the research, design, and commercialization of nanotechnology-based products. Given its scope, it offers a valuable resource for all researchers and professionals working with nanotechnology-based applications in human health.

Synthesis to Applications

Nanomaterials in Energy and Environmental Applications

Fundamentals and Applications

Handbook of Nanomaterials for Manufacturing Applications

Technological Applications of Nanomaterials

Applications of Nanomaterials in Human Health

Engineered nanopolymer and nanoparticles, with their extraordinary mechanical and unique electronic properties, have garnered much attention in recent years. With a broad range of potential applications, including nanoelectronics, composites, chemical sensors, biosensors, microscopy, nanoelectromechanical systems, and many more, the scientific community is more motivated than ever to move beyond basic properties and explore the real issues associated with carbon nanotube-based applications. Engineered nanopolymer and nanoparticles are exceptionally interesting from a fundamental research point of view. They open up new perspectives for various applications, such as nano-transistors in circuits, field-emission displays, artificial muscles, or added reinforcements in alloys. This informative book is an introduction to the physical concepts needed for investigating carbon nanotubes and other one-dimensional solid-state systems. Written for a wide scientific readership, each chapter consists of an instructive approach to the topic and sustainable ideas for solutions. This new book presents leading-edge research in this dynamic field. It reviews the recent progress in application of engineered nanopolymer and nanoparticles and their composites. The advantages and disadvantages of different methods are discussed. The ability of continuum methods to bridge different scales is emphasized. Recommendations for future research are given by focusing on what each method has to learn from the nano-scale. The scope of the book is to provide current knowledge to support

researchers entering the scientific area of carbon nanotubes and help them choose the appropriate modeling tool for accomplishing their study and where to place their efforts to further improve continuum methods.

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 for Food Applications highlights recent developments in nanotechnologies, covering the different food areas where these novel products or technologies can be applied. The book covers five major themes, showing how nanotechnology is used in food, the use of ingredients in nanoform to improve bioavailability or nanoencapsulation technologies, nanotechnologies for food processing, nanosensors for food quality and safety, nanotechnologies for food packaging, and

methods to evaluate potential risks and regulatory issues. This is an important research reference that will be of great value to academic and industrial readers, as topics of importance, both at a research level and for commercial applications, are covered. Regulatory agencies will also be interested in the latest developments covered in the book as they will help set the foundation for further regulations. Demonstrates how nanotechnology can improve food quality and safety Shows how nanotechnology is used to create more effective food processing techniques Discusses the regulatory issues surrounding the use of nanomaterials in food to ensure they are used safely and responsibly

Nanotechnology is increasingly used in the food industry in the production, processing, packaging, and preservation of foods. It is also used to enhance flavor and color, nutrient delivery, and bioavailability, and to improve food safety and in quality management.

Nanotechnology Applications in the Food Industry is a comprehensive reference book containing exhaustive information on nanotechnology and the scope of its applications in the food industry. The book has five sections delving on all aspects of nanotechnology and its key role in food industry in the present scenario. Part I on Introduction to Nanotechnology in Food Sector covers the technological basis for its application in food industry and in agriculture. The use of nanosized foods and nanomaterials in food, the safety issues pertaining to its applications in foods and on market analysis and consumer perception of food nanotechnology has been discussed in the section. Part II on Nanotechnology in Food Packaging reviews the use of nanopolymers, nanocomposites and nanostructured coatings in food packaging. Part III on Nanosensors for Safe and Quality Foods provides an overview on nanotechnology in the development of biosensors for pathogen and food contaminant detections, and in sampling and food quality management. Part IV on Nanotechnology for Nutrient Delivery in Foods deals with the use of nanotechnology in foods for controlled and effective release of nutrients. Part V on Safety Assessment for Use of Nanomaterials in Food and Food Production deliberates on the benefits and risks associated with the extensive and long term applications of nanotechnology in food sector.

Advances and Real-Life Applications

Nanomaterials and Nanotechnology for Composites

Workshop Summary

Dental Applications of Nanotechnology

Science and Applications

Nanotechnology: Advances and Real-Life Applications offers a comprehensive reference text about advanced concepts and applications in the field of nanotechnology. The text – written by researchers practicing in the field – presents a detailed discussion of key concepts including nanomaterials and their synthesis, fabrication and characterization of nanomaterials, carbon-based nanomaterials, nano-bio interface, and nanoelectronics. The applications of nanotechnology in the fields of renewable energy, medicine and agriculture are each covered in a dedicated chapter. The text will be invaluable for senior undergraduate and graduate students in the fields of electrical engineering, electronics engineering, nanotechnology and nanoscience. Dr. Cherry Bhargava is an Associate Professor and Head, VLSI domain, at the School of Electrical and Electronics Engineering of Lovely Professional University, Jalandhar, India. Dr. Amit Sachdeva is an Associate Professor at Lovely Professional University, Jalandhar, India.

This book collects reviews and original articles from eminent experts working in the interdisciplinary arena of nanotechnology use in drug delivery. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of nanotechnology application of drug delivery. Since the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. On the other hand, this reference discusses advances in design, optimization, and adaptation of gene delivery systems for the treatment of cancer, cardiovascular, pulmonary, genetic, and infectious diseases, and considers assessment and review procedures involved in the development of gene-based pharmaceuticals.

This new volume discusses the multitude of possibilities for new development in nanotechnology that focuses on overcoming the problems and challenges faced by the biomedical and food industries. The volume hopes to facilitate the development of devices and materials that benefit patients and their healthcare. The book is broken into three parts that cover: nanotechnology techniques for biomedical applications nanoparticles and materials for food, health, and pharmaceutical application potential applications of nanotechnology in food safety Nanotechnology is often described as an emerging technology - one that not only holds promise for society, but also is capable of revolutionizing our approaches to common problems. Nanotechnology is not a completely new field; however, it is only recently that discoveries in this field have advanced so far as to warrant examination of their impact upon the world around us. Nanotechnology has direct beneficial applications for medicine and the environment, but like all technologies it may have unintended effects that can adversely

impact the environment, both within the human body and within the natural ecosystem. How does the science move forward in a way that best protects the public and gets health and safety right the first time? Implications of Nanotechnology for Environmental Health Research identifies the areas in which additional research is needed and the processes by which changes can occur.

Nanomaterials

Nanomaterials and Nanotechnology

Environment, Energy, Agriculture and Medicine

Biomedical Applications of Nanoparticles

Advances and Key Technologies

Nanomaterials and Their Biomedical Applications

Biomedical Applications of Nanoparticles describes the most interesting and investigated biomedical applications of nanoparticles, emphasizing their therapeutic impact. Progress made in the therapy of severe diseases, such as cancer and difficult infections is strictly correlated to the scientific progress and technological development in the field of materials science. Nanoparticles have numerous therapeutic applications, starting with the design of new drugs, delivery systems, therapeutic materials, and their contribution to the development of preventive strategies. The book highlights the impact of nanoparticles on the therapy of infections, antimicrobial effect and also anti-cancer strategies. Successful examples are given throughout the book, along with analysis in order to improve future outcomes of novel therapies. Highlights the term nanotherapeutics and presents several classifications of nanotherapeutics from different points-of-view Presents the recent progress related to nanotherapeutics in the oral cavity Provides the recent progress in the field of biomedical nanoparticles

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.

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

This book is dedicated to the applications of nanobiotechnology, i.e. the way that nanotechnology is used to create devices to study biological systems and phenomena. It includes seven chapters, organized in two sections. The first section (Chapters 1–5) covers a large spectrum of issues associated with nanoparticle synthesis, nanoparticle toxicity, and the role of nanotechnology in drug delivery, tissue engineering, agriculture, and biosensing. The second section (Chapters 6 and 7) is devoted to the properties of nanofluids and the medical and biological applications of computational fluid dynamics modeling.

Nanostructures and Nanomaterials

Biomedical, Environmental, and Industrial Applications

Applications and Impacts of Nanomaterials

Application of Nanotechnology in Drug Delivery

Emerging Applications of Nanoparticles and Architectural Nanostructures

Nanomaterials for Clinical Applications

Emerging Applications of Nanoparticles and Architecture Nanostructures: Current Prospects and Future Trends discusses the most important current applications of nanoparticles and architecture nanostructures in a comprehensive, detailed manner. The book covers major applications of nanoparticles and architecture nanostructures, taking into account their unusual shapes and high surface areas. In particular, coverage is given to applications in aerospace, automotive, batteries, sensors, smart textile design, energy conversion, color imaging, printing, computer chips, medical implants, pharmacy, cosmetics, and more. In addition, the book discusses the future of research in these areas. This is a valuable reference for both materials scientists, chemical and mechanical engineers working both in R&D and academia who want to learn more on how nanoparticles and nanomaterials are commercially applied. Provides an in-depth look at the properties of nanoparticles and architecture nanostructures in terms of their applicability for industrial uses Analyzes the most recent advances and industrial applications of different types of nanoparticles and architecture nanostructures, taking into account their unusual structures and compositions Identifies novel nanometric particles and architectures that are of particular value for applications and the techniques required to use them effectively

In the food industry, scientists are exploring the potential of nanotechnology to enhance the flavor and other sensory characteristics of foods, introduce antibacterial nanostructures into food packaging and encapsulate and deliver nutrients directly into targeted tissues, among other applications. However, as with any new technology, along with the benefits, there is the potential for unanticipated adverse effects. There is still a great deal to learn about any health outcomes related to introducing nanosized materials into foods and food packaging materials. Developing nanotechnology into a safe, effective tool for use in food science and technology will require addressing these and other questions. Assuring consumer confidence will be equally important to the success of this new emerging technology. The Institute of Medicine held a one-day workshop, summarized in this volume, to further explore the use of

nanotechnology in food. Specifically, the workshop was organized around three primary topic areas: (1) the application of nanotechnology to food products; (2) the safety and efficacy of nanomaterials in food products; and (3) educating and informing consumers about the applications of nanotechnology to food products.

Nanomaterials in Bionanotechnology: Fundamentals and Applications offers a comprehensive treatment of nanomaterials in biotechnology from fundamentals to applications, along with their prospects. This book explains the basics of nanomaterial properties, synthesis, biological synthesis, and chemistry and demonstrates how to use nanomaterials to overcome problems in agricultural, environmental, and biomedical applications. Features Covers nanomaterials for environmental analysis and monitoring for heavy metals, chemical toxins, and water pollutant detection Describes nanomaterials-based biosensors and instrumentation and use in disease diagnosis and therapeutics Discusses nanomaterials for food processing and packaging and agricultural waste management Identifies challenges in nanomaterials-based technology and how to solve them This work serves as a reference for industry professionals, advanced students, and researchers working in the discipline of bionanotechnology.

Nanomaterials in Clinical Medicine: Case Studies in Nanomedicines focuses on the nanomaterials that can be formulated as drug delivery vehicles, such as liposomes, micelles, nanoemulsions and nanogels. Their physicochemical, morphological, thermo-dynamical and nanotoxicological properties are analyzed with respect to the design and development of drug delivery nanosystems for the encapsulation of an active pharmaceutical ingredient and its controlled release. Each chapter covers basic properties, the nanosystem (e.g., liposomes), the added value in drug delivery and targeting, and future perspectives. Case studies and examples of how nanomaterials are being used in clinical medicine, including marketed liposomal medicines and medical utility and regimens are also included. Particular attention is given to new nanocarriers, such as elastic liposomes, lipid polymeric hybrid nanoparticles, organogel, nanofibers carbon nanomaterials, quantum dots and inorganic nanoparticles. This book is an important information source for those wanting to increase their understanding of what major nanomaterials are being used to create more effective drug delivery systems. Summarizes the major nanomaterials used in clinical medicine, explaining how their properties make them suitable for this purpose Explains how nanomaterials are used to create increasingly efficient drug delivery vehicles Includes real-life examples, demonstrating how nanomaterials are being used in medical practice

Handbook of Nanotechnology Applications

Smart Nanotechnology with Applications

Industrial Applications of Nanomaterials

Nanotechnology Applications in the Food Industry

Applications of Nanomaterials in Agriculture, Food Science, and Medicine

Implications of Nanotechnology for Environmental Health Research

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

The uses of nanotechnologies continue to rise exponentially. Due to their multifaceted nature, nanomaterials have a vast amount of potential uses in various scientific professions. Professionals in sectors including agriculture, nutrition, and healthcare are discovering the numerous benefits that nanomaterials carry when applied to traditional practices. In order to understand the dynamic properties of nanomaterials and how to utilize them in specific fields, significant research is required. Applications of Nanomaterials in Agriculture, Food Science, and Medicine is an essential reference source that discusses the emerging development of nanotechnology in various sectors of the scientific community as well as the current benefits and future uses. Industries that the book covers include energy storage and renewable energy, environmental science and wastewater treatment, food and agriculture, and medicine and bioinformatics. This book is ideally designed for researchers, engineers, practitioners, industrialists, educators, strategists, policymakers, scientists, and students seeking coverage on the strategic role of nanomaterials in these imperative fields.

This comprehensive reference text discusses advance concepts and applications in the field of nanotechnology. The text presents a detailed discussion of key important concepts including nanomaterials and nanodevices, nano-bio interface, nanoscale memories, and semiconductor nanotechnology. It discusses applications of nanotechnology in the fields of aerospace engineering, cosmetic industry, pharmaceutical science, food industry, and the textile industry. The text will be useful for senior undergraduate and graduate students in the field of electrical engineering, electronics engineering, nanotechnology, and pharmaceutical science. Discussing fundamental, advanced concepts and their applications in a single volume, this text will be useful as a reference text for senior undergraduate and graduate students in the field of electrical engineering, electronics engineering, nanotechnology, and pharmaceutical science. It comprehensively discusses important concepts such as nano-robotics, carbon-based nanomaterials, and nanoscale memories. The text discusses advanced concepts of nanotechnology and its applications in the fields of textile, pharmaceutical sciences, aerospace, and food industry. It will be an ideal reference text for senior undergraduate and graduate students in the field of electrical engineering, electronics engineering, nanotechnology, and nanoscience.

Handbook of Nanotechnology Applications: Environment, Energy, Agriculture and Medicine presents a comprehensive overview on recent developments and prospects surrounding nanotechnology use in water/wastewater separation and purification, energy storage and conversion, agricultural and food process, and effective diagnoses and treatments in medical fields. The book includes detailed overviews of nanotechnology, including nanofiltration membrane for water/wastewater treatment, nanomedicine and nanosensor development for medical implementation, advanced nanomaterials of different structural dimensions (0D, 1D, 2D and 3D) for energy applications, as well as food and agricultural utilization. Other sections discuss the challenges of lab-based research transitioning towards practical industrial use. Helps scientists and researchers quickly learn and understand the key role of nanotechnology in important industrial applications Takes an interdisciplinary approach, demonstrating how nanotechnology is being used in a wide range of industry sectors Outlines the role nanotechnology plays in creating safer, cheaper and more energy-efficient projects and devices

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Nanomaterials and Devices

Design, Simulation and Applications

Nanomaterials for Food Applications

Applications of Nanobiotechnology

Case Studies in Nanomedicines

Nanoparticles for Biomedical Applications: Fundamental Concepts, Biological Interactions and Clinical Applications brings into one place information on the design and biomedical applications of different classes of nanoparticles. While aspects are dealt with in individual journal articles, there is not one source that covers this area comprehensively. This book fills this gap in the literature. Outlines an in-depth review of biomedical applications of a variety of nanoparticle classes Discusses the major techniques for designing nanoparticles for use in biomedicine Explores safety and regulatory aspects for the use of nanoparticles in biomedicine

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.

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