

Applications Of Nanotechnology In Mechanical Engineering

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Nanoscience And Nanotechnology In Engineering IGI Global Highlights the latest developments and advances in the field of nanoscience and nanotechnology and their applications in the design and development of material science and devices, energy, drug delivery, cosmetics, biology, biotechnology, tissue engineering, bioinformatics, information technology, agriculture and food, environmental protection, health risk, ethics, and regulations.

Nanotechnology in the Automotive Industry Springer Nature

Volume is indexed by Thomson Reuters CPCI-S (WoS). The objective of this special collection was to provide an excellent platform for updating and discussing the latest advances in precision engineering-related fields by researchers and engineers from research laboratories, academia and industry all over the world. The volume covers a wide gamut of topics in precision engineering-related fields, ranging over precision machining, advanced measurement techniques and green and sustainable manufacturing. This work will provide a stimulus and inspiration for future studies and advancement in precision engineering and manufacturing technologies.

Biopolymeric Nanomaterials Springer Science & Business Media Nanotechnology is a progressive research and development topic with large amounts of venture capital and government funding being invested worldwide. Nano mechanics, in particular, is the study and characterization of the mechanical behaviour of individual atoms, systems and structures in response to various types of forces and loading conditions. This text, written by respected researchers in the field, informs researchers and practitioners about the fundamental concepts in nano mechanics and materials, focusing on their modelling via multiple scale methods and techniques. The book systematically covers the theory behind multi-particle and nanoscale systems, introduces multiple scale methods, and finally looks at contemporary applications in nano-structured and bio-inspired materials.

Mechanical Properties of Nanomaterials CRC Press

Synthetic Engineering Materials and Nanotechnology covers the latest research and developments of synthetic processes, materials, applications and technologies. In addition, innovations in synthetic engineering materials techniques are analyzed. Each chapter addresses key concepts, properties and applications of important categories of synthetic materials, including metals alloys, polymers, composites, rubbers, oils and foams. Advances in nanomaterials produced by synthetic engineering methods are also considered, including ceramic, carbon, metal oxide, composite, and membrane-derived nanomaterials. The primary synthetic engineering materials techniques covered include thermo-mechanical, chemical, physiochemical, electrochemical, bottom-up, hybrid and biological methods. This book is suitable for early career researchers in academia and R&D in areas such as materials science and engineering, mechanical engineering and chemical engineering. Provides the fundamentals on materials produced through synthetic engineering methods, including their properties, experimental and characterization techniques, and applications Reviews the advances of synthetic engineering methods for nanomaterials applications, including electrospinning, atomic layer deposition, ion implantation, bottom-up, hybrid strategies, and more Includes numerous, real-world examples and case studies to apply the fundamental concepts to experiments and real-world applications

Structural Nanocrystalline Materials World Scientific Publishing Company

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.

Quantum Mechanics with Applications to Nanotechnology and Information Science Elsevier

This book provides an overview of the electronic applications of nanotechnology. It presents latest research in the areas of nanotechnology applied to the fields of electronics and energy. Various topics covered in this book include nanotechnology in electronic field, electronic chips and circuits, batteries, wireless devices, energy storage, semiconductors, fuel cells, defense and military equipment, and aerospace industry. This book will be useful for engineers, researchers and industry professionals primarily in the fields of electrical engineering engineering, materials science and nanotechnology.

Advances in Precision Engineering Elsevier

This book presents synthesis techniques for the preparation of low-dimensional nanomaterials including 0D (quantum dots), 1D (nanowires, nanotubes) and 2D (thin films, few layers), as well as their potential applications in nanoelectronic systems. It focuses on the size effects involved in the transition from bulk materials to nanomaterials; the electronic properties of nanoscale devices; and different classes of nanomaterials from microelectronics to nanoelectronics, to molecular electronics. Furthermore, it demonstrates the structural stability, physical, chemical, magnetic, optical, electrical, thermal, electronic and mechanical properties of the nanomaterials. Subsequent chapters address their characterization, fabrication techniques from lab-scale to mass production, and functionality. In turn, the book considers the environmental impact of nanotechnology and novel applications in the mechanical industries, energy harvesting, clean energy, manufacturing materials, electronics, transistors, health and medical therapy. In closing, it addresses the combination of biological systems with nanoelectronics and highlights examples of nanoelectronic-cell interfaces and other advanced medical applications. The book answers the following questions: • What is different at the nanoscale? • What is new about nanoscience? • What are nanomaterials (NMs)? • What are the fundamental issues in nanomaterials? • Where are nanomaterials found? • What nanomaterials exist in nature? • What is the importance of NMs in our lives? • Why so much interest in nanomaterials? • What is at nanoscale in nanomaterials? • What is graphene? • Are pure low-dimensional systems interesting and worth pursuing? • Are nanotechnology products currently available? • What are sensors? • How can Artificial Intelligence (AI) and nanotechnology work together? • What are the recent advances in nanoelectronic materials? • What are the latest applications of NMs?

Handbook of Nanotechnology Applications Elsevier

Details the water research applications of nanotechnology in various areas including environmental science, remediation, membranes, nanomaterials, and water treatment At the nano size, materials often take on unique and sometimes unexpected properties that result in them being 'tuned' to build faster, lighter, stronger, and more efficient devices and systems, as well as creating new classes of materials. In water research, nanotechnology is applied to develop more cost-effective and high-performance water treatment systems, as well as to provide instant and continuous ways to monitor water quality. This volume presents an array of cutting-edge nanotechnology research in water applications including treatment, remediation, sensing, and pollution prevention. Nanotechnology applications for waste water research have significant impact in maintaining the long-term quality, availability, and viability of water. Regardless of the origin, such as municipal or industrial waste water, its remediation utilizing nanotechnology can not only be recycled and desalinated, but it can simultaneously detect biological and chemical contamination. Application of Nanotechnology in Water Research describes a broad area of nanotechnology and water research where membrane processes (nanofiltration, ultrafiltration, reverse osmosis, and nanoreactive membranes) are considered key components of advanced water purification and desalination technologies that remove, reduce, or neutralize water contaminants that threaten human health and/or ecosystem productivity and integrity. Various nanoparticles and nanomaterials that could be used in water remediation (zeolites, carbon nanotubes, self-assembled monolayer on mesoporous supports, biopolymers, single-enzyme nanoparticles, zero-valent iron nanoparticles, bimetallic iron nanoparticles, and

nanoscale semiconductor photocatalysts) are discussed. The book also covers water-borne infectious diseases as well as water-borne pathogens, microbes, and toxicity approach.

Nanotechnology Springer

This book describes the use of modern micro- and nanofabrication technologies to develop improved tools for stimulating and recording electrical activity in neuronal networks. It provides an overview of the different ways in which the "nano-world" can be beneficial for neuroscientists, including improvement of mechanical adhesion of cells on electrodes, tight-sealed extracellular recordings or intracellular approaches with strongly reduced invasiveness and tools for localized electrical or optical stimulation in optogenetics experiments. Specific discussion of fabrication strategies is included, to provide a comprehensive guide to develop micro and nanostructured tools for biological applications. A perspective on integrating these devices with state-of-the-art technologies for large-scale in vitro and in vivo experiments completes the picture of neuronal interfacing with micro- and nanostructures.

Application of Nanotechnology in Water Research Engineering

Applications of Nanotechnology

his easy-to-grasp book introduces nanotechnology, a fast growing field with applications in a large number of areas. Nanotechnology is increasingly present in manufactured products and in daily life objects. It uses less raw materials to provide similar, improved or new functions for materials and systems. It also allows to cut down costs of objects and processes. This introductory book is divided in two parts. One presents the basics of this new field and introduce the physics involved and its consequences. The topics that are addressed are about nanoscience and nanotechnology, quantum effects, nanomaterials and nanostructures, nanofabrication and the new forms of carbon. The second part present some applications in different areas as well as the issue of risks and toxicity of nanomaterials. The different areas of applications are health, food, nanoelectronics and molecular electronics, nanocatalysis, energy (production, housing and transport), defense and security. We also address the issue of risks and toxicity of nanomaterials. This book is not intended to be a comprehensive presentation of nanotechnology but just a flavor of this exciting area that will be more and more important for our future.

Functionalized Nanomaterials Based Devices for Environmental Applications Engineering Science Reference

Nanocrystalline materials exhibit exceptional mechanical properties, representing an exciting new class of structural materials for technological applications. The advancement of this important field depends on the development of new fabrication methods, and an appreciation of the underlying nanoscale and interface effects. This authored book addresses these essential issues, presenting for the first time a fundamental, coherent and current account at the theoretical and practical level of nanocrystalline and nanocomposite bulk materials and coatings. The subject is approached systematically, covering processing methods, key structural and mechanical properties, and a wealth of applications. This is a valuable resource for graduate students studying nanomaterials science and nanotechnologies, as well as researchers and practitioners in materials science and engineering.

Explorations in the Application of Nanotechnology to Improve the Mechanical Properties of Composite Materials Trans Tech Publications Ltd

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 world of nanomaterials has been growing rapidly since the early 1990s. Initially, the world 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 convergence of interests and capabilities in the 1990s led to the explosive growth of papers in the characterization and modeling parts of the world. That convergence 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.

Food Applications of Nanotechnology Springer

Ongoing research in nanotechnology promises both innovations and risks, potentially and profoundly changing the world. This book helps to promote a balanced understanding of this important emerging technology, offering an informed and impartial look at the technology, its science, and its social impact and ethics. Nanotechnology is crucial for the next generation of industries, financial markets, research labs, and our everyday lives; this book provides an informed and balanced look at nanotechnology and its social impact Offers a comprehensive background discussion on nanotechnology itself, including its history, its science, and its tools,

creating a clear understanding of the technology needed to evaluate ethics and social issues. Authored by a nanoscientist and philosophers, offers an accurate and accessible look at the science while providing an ideal text for ethics and philosophy courses. Explores the most immediate and urgent areas of social impact of nanotechnology.

Smart Nanotechnology with Applications CRC Press

The study of electrochemical nanotechnology has emerged as researchers apply electrochemistry to nanoscience and nanotechnology. These two related volumes in the Modern Aspects of Electrochemistry Series review recent developments and breakthroughs in the specific application of electrochemistry and nanotechnology to biology and medicine. Internationally renowned experts contribute chapters that address both fundamental and practical aspects of several key emerging technologies in biomedicine, such as the processing of new biomaterials, biofunctionalization of surfaces, characterization of biomaterials, discovery of novel phenomena and biological processes occurring at the molecular level.

Nanotechnology I. K. International Pvt Ltd

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.

Synthetic Engineering Materials and Nanotechnology Springer Nature

"This book provides the latest developments in the field of space research and structural mechanics. It also explores the mechanics of nanomaterials, the advancement of their electronic properties, the development of the methods of synthesis of the nanomaterials for fabricating nanodevices, and related technological expertise to assemble the nano components for fabricating the devices"--

Nanomaterials Springer

This book covers the recent research on nanomaterials and nanotechnology based on the hybridization of graphene with other nanoparticles. With their simple synthesis, nanoscale dimensions, high aspect ratio, mechanical, electrical and thermal properties, graphene and its hybridized materials have witnessed a great interest, and the chapters in this book cover the spectrum of research from the preparation and synthesis of novel nanocomposites to their potential use in aeronautic, automotive, energy and environmental applications. Written by respected researchers from both industry and academia, this book is of interest to researchers and students working on nanomaterials.

Nanotechnology for Defence Applications John Wiley & Sons

The realms of aerospace and structural mechanics have been revolutionized due to a plethora of technological advances. These two important sectors most notably have been impacted by the advancement of nanotechnology and have introduced potential groundbreaking changes for lightweight, high strength, and improved electronic properties of nanomaterials. *Nanotechnology in Aerospace and Structural Mechanics* aims to provide a collection of innovative research on the latest development of materials and methods for designing smart and intelligent devices for use in the field of space research and structural mechanics. It provides a thorough study of the fabrication and control of mechanical systems required for the successful application of nanotechnology in aerospace and structural engineering. While highlighting topics including nanomaterial properties, aerospace electronics, and polymer nanocomposites, this book is ideally designed for engineers, researchers, students, and academicians with interests in the fields of civil engineering, mechanical engineering, aerospace engineering, and nanoscience.

Nanotechnology and Nanometrology for Mechanical

Engineering Applications John Wiley & Sons

Potential of Nanotechnology is immense and encompasses virtually every field of life. Technologists and researchers all across the globe have realized this and call it the Technology of the Future. The book is intended to develop interest amongst students of all branches of Engineering and incumbent researchers so that they get to know fundamentals of the subject. The book deals with all the aspects of nanotechnology and its fundamentals and applications, i.e. Nanotechnology, tools and techniques, nanomaterials, nanocomputers, nanocomposites, risks related with the use of nanotechnology and its relation with the environment. Applications of nanotechnology in textiles, solar power, electronics, space explorations and in communication find a reasonable place in the book.

Nanoelectronic Materials Springer Science & Business Media

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.