

Applications Of Nanotechnology In Mechanical Engineering

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Nano Tribology and Fracture Mechanics Springer Nature

This book covers remarkable contemporary nanomaterials such as carbon nanomaterials, nanoclays, quantum dots, MXene, and metal-organic frameworks. Each chapter discusses the synthesis techniques, characterization methods, properties, and the nanomaterials' use in different aspects of biomedical, energy, polymers, material construction, biosensors, coatings, and catalysis. Moreover, commercialization challenges and environmental risks of nanomaterials are also covered in depth. The book provides an understanding of the fundamental properties, limitations and challenges in nanomaterials synthesis, serving as a valuable resource for researchers, graduate students, academicians, and consultants working with nanomaterials for engineering applications.

Nanoscience and Nanoengineering Springer Science & Business Media

Nanotechnology in Paper and Wood Engineering: Fundamentals, Challenges and Applications describes recent advances made in the use of nanotechnology in the paper and pulp industry. Various types of nano-additives commonly used in the paper industry for modification of raw material to enhance final products are included, with other sections covering the imaging applications of nano-papers and nano-woods in pharmaceuticals, biocatalysis, photocatalysis and energy storage. This book is an important reference source for materials scientists and engineers who are looking to understand how nanotechnology is being used to create more efficient manufacturing processes in for the paper and wood industries. - Provides information on nano-paper production and its applications - Explains the major synthesis techniques and design concepts of cellulosic or wooden nanomaterials for industrial applications - Assesses the major challenges of creating nanotechnology-based manufacturing systems for wood and paper engineering

Engineering of Nanobiomaterials Springer

Intended as a reference for basic and practical knowledge about the synthesis, characterization, and applications of nanotechnology for students, engineers, and researchers, this book focuses on the production of different types of nanomaterials and their applications, particularly synthesis of different types of nanomaterials, characterization of different types of nanomaterials, applications of different types of nanomaterials, including the nanocomposites.

Advanced Research on Nanotechnology for Civil Engineering Applications

Springer Science & Business Media

This book gives an introduction to nanostructured materials and guides the reader through their different engineering applications. It addresses the special phenomena and potentials involved in the applications without going into too much scientific detail of the physics and chemistry involved, which makes the reading interesting for beginners in the field. Materials for different applications in engineering are described, such as those used in opto-electronics, energy, tribology, bio-applications, catalysis, reinforcement and many more. In each application chapter, the reader will learn about the phenomena involved in the application, the nanostructured materials used in the field and their processing, besides finding some practical examples of their use in laboratories and in industry. The clear language and the application-oriented perspective of the book makes it suitable for both engineers and students who want to learn about applications of nanostructured materials in Engineering.

Contemporary Nanomaterials in Material Engineering Applications IGI Global

The usage of nanoscience and nanotechnology in engineering directly links academic research in nanoscience and nanotechnology to industries and daily life. As a result, numerous nanomaterials, nanodevices and nanosystems for various engineering purposes have been developed and used for human betterment. This book, which consists of eight self-contained chapters, provides the essential theoretical knowledge and important experimental techniques required for the research and development on nanoscience and nanotechnology in engineering, and deals with the five key topics in this area — Nanoscience and Nanotechnology in Engineering is based on the many lectures and courses presented around the world by its authors.

Nanotechnology Cambridge University Press

Sustainable Nanotechnology A robust examination of the use of nanotechnology in the manufacture of sustainable products In Sustainable Nanotechnology: Strategies, Products, and Applications, a team of distinguished researchers delivers a comprehensive and up-to-date exploration of nanotechnology applications in environmental, pharmaceutical, and engineering products in the context of global sustainability. The book offers balanced coverage of the benefits and risks of nanotechnology. Divided into three parts, the editors have included contributions from leading scholars discussing sustainability, toxicological impacts, and nanomaterial-based adsorbents. This edited volume helps readers understand how nanotechnology and nanomaterials apply in different global sustainability challenges. It also discusses models for understanding the lifecycle and risk assessments of manufactured nanomaterials. Case studies are included to explore such topics as design, remediation, and technology assessment. The book also provides: Thorough introductions to nanotechnology-based research priorities for global sustainability and the challenges and opportunities of modern, sustainable nanotechnology Comprehensive explorations of improving the sustainability of bio-based products with nanotechnology and the improvement of the environmental sustainability of biopolymers using nanotechnology Practical discussions of nanotechnology-based polymers for drug delivery applications In-depth examinations of green nanotechnology-driven drug delivery systems Perfect for nanotechnology-focused professionals, sustainability experts, biomedical experts, and pharmaceutical industry practitioners, Sustainable Nanotechnology: Strategies, Products, and Applications will also earn a place in the libraries of neuroscientists, bioengineering professionals, and those involved in neuroprosthetic engineering.

Nanostructured Materials for Engineering Applications Springer Nature

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.

Encyclopedia of Nanotechnology William Andrew

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

Nanoengineering Materials for Biomedical Uses Springer Science & Business Media

This volume focuses on the fundamentals and advancements in micro and nanomanufacturing technologies applied in the biomedical and biochemical domain. The contents of this volume provide comprehensive coverage of the physical principles of advanced manufacturing technologies and the know-how of their applications in the fabrication of biomedical devices and systems. The book begins by documenting the journey of miniaturization and micro-and nano-fabrication. It then delves into the fundamentals of various advanced technologies such as micro-wire moulding, 3D printing, lithography, imprinting, direct laser machining, and laser-induced plasma-assisted machining. It also covers laser-based technologies which are a promising option due to their flexibility, ease in control and application, high precision, and availability. These technologies can be employed to process several materials such as glass, polymers: polycarbonate, polydimethylsiloxane, polymethylmethacrylate, and metals such as stainless steel, which are commonly used in the fabrication of biomedical devices, such as microfluidic technology, optical and fiber-optic sensors, and electro-chemical bio-sensors. It also discusses advancements in various MEMS/NEMS based technologies and their applications in energy conversion and storage devices. The chapters are written by experts from the fields of micro- and nano-manufacturing, materials engineering, nano-biotechnology, and end-users such as clinicians, engineers, academicians of interdisciplinary background. This book will be a useful guide for academia and industry alike.

Nanotribology and Nanomechanics I. K. International Pvt Ltd

This volume serves as a timely, practical introduction to the principles of nanotribology and nanomechanics and applications to magnetic storage systems and MEMS/NEMS. Assuming some familiarity with macrotribology/mechanics, the book comprises chapters by internationally recognized experts, who integrate knowledge of the field from the mechanics and materials-science perspectives. Graduate students, research workers, and practicing engineers will find the book of value.

Nanotechnology Artech House

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 Applications in Agricultural and Bioprocess Engineering Springer Nature

A recent initiative within the civil engineering field is the use of nanotechnology and materials within the construction industry. While there has been great success in the adoption of various nanomaterials, there is still room for development and improvement. Advanced Research on Nanotechnology for Civil Engineering Applications highlights emergent research and theoretical concepts in the implementation of nanotechnology within the construction, geotechnical, and transportation engineering fields. Examining the application of nanomaterials, current trends within the topic area, and the potential health impacts of material usage on the environment, this book is a pivotal reference for professionals, engineers, students, and researchers.

Nanomaterials World Scientific Publishing Company

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.

Introduction to Nanoelectronics William Andrew

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 books 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.

Nanoscale and Microscale Phenomena CRC Press

The Encyclopedia of Nanotechnology provides a comprehensive and multi-disciplinary reference to the many fields relevant to the general field of nanotechnology. It aims to be a comprehensive and genuinely international reference work and will be aimed at graduate students, researchers, and practitioners. The Encyclopedia of Nanotechnology introduces a large number of terms, devices and processes which are related to the multi-disciplinary field of Nanotechnology. For each entry in this 4 volume set a 4-10 page description is provided by an expert in the field. Contributions are made by experts from the US, Europe and Asia, making this a comprehensive and truly international Reference Work. The authors are typically from academia, however one quarter of all entries were written by persons from industry. Topics covered in the Reference Work include: - Nano- Microfabrication Processes and Materials for Fabrication - Nanoscale Measurement Techniques - Nanostructures - Nanomaterials - Nanomechanics - Molecular Modeling and Its Role in Advancing Nanotechnology - MEMS/NEMS - Microfluidics and Nanofluidics - Biomedical Engineering and Biodevices -

Bio/Nanotechnology and Nanomedicine - Bio/Nanotechnology for cellular engineering - Drug Delivery – Technology and Applications - Assembly - Organic Electronics - Nano-optical Devices - Micro/nano Integration - Materials, Coatings and Surface Treatments for Nanotribology - Micro/NanoReliability – thermal, mechanical etc. - Biomimetics

Sustainable Nanotechnology Elsevier

This reference text discusses recent advances in the field of nanotechnology with applications in the fields of electronics sector, agriculture, health services, smart cities, food industry, and energy sector in a comprehensive manner. The text begins by discussing important concepts including bio nanotechnology, nano electronics, nano devices, nano medicine, and nano memories. It then comprehensively covers applications of nanotechnology in different areas including healthcare, energy sector, environment, security and defense, agriculture sector, food industry, automotive sector, smart cities, and Internet of Things (IoT). Aimed at senior undergraduate, graduate students and professionals in the fields of electrical engineering, electronics engineering, nanoscience and nanotechnology, this text: Discusses nano image sensors useful for imaging in medical and for security applications. Covers advances in the field of nanotechnology with their applications. It covers important concepts including neuro simulators, nano medicine, and nano materials. Covers applications of nanotechnology in diverse fields including health sector, agriculture, energy sector, and electronics.

Nanotechnology Applications for Tissue Engineering I K International Pvt Ltd

This text provides an introduction, at the level of an advanced student in engineering or physics, to the field of nanomechanics and nanomechanical devices. It provides a unified discussion of solid mechanics, transducer applications, and sources of noise and nonlinearity in such devices. Demonstrated applications of these devices, as well as an introduction to fabrication techniques, are also discussed. The text concludes with an overview of future technologies, including the potential use of carbon nanotubes and other molecular assemblies.

Nanomaterials for Theranostics and Tissue Engineering CRC Press

Nanomaterials for Theranostics and Tissue Engineering: Techniques, Trends and Applications provides information on the major methodologies for the application of nanomaterials in the medical field. In recent years, nanotechnology for medicine, commonly known as bionanotechnology, or nanomedicine, has revolutionized various types of medical treatment. This book is intended for practicing engineers and scientists, and includes detailed, readily applicable protocols. It focuses on 4 major themes, including the synthesis of nanosystems for controlled drug delivery, nanotechnology-enhanced sensing systems, the application of nanotechnologies to the synthesis of novel biomaterials, and safety issues related to the application of medicinal nanotechnology. - Provides a comprehensive overview on how nanotechnology is being used to create new tissue engineering techniques - Covers, in detail, the physicochemical fundamentals of bionanotechnologies - Explores major applications in the fields of theranostics and tissue engineering - Assesses important challenges and safety issues related to the implementation of nanotechnology in medicine

Synthetic Engineering Materials and Nanotechnology John Wiley & Sons

This book fills the gap between fundamental and applied research in the use of nanomaterials in biomedical applications, covering the most relevant areas, such as the fundamental concepts of the preparation of nanostructures and regulatory requirements for their safe use in biomedical devices. It also critically discusses what has been achieved in the field, and what needs to be urgently addressed and reviews the state-of-the-art medical uses of nanomaterials for treating damaged organs and tissues. Combining the expertise of clinical researchers working in the field of tissue engineering and novel materials, the book explores the main topics regarding the characterization of materials, specific organ-oriented biomaterials and their applications, as well as regulations and safety. Further, it also examines recent advances, difficulties, and clinical requirements in terms of human bone, cornea, heart, skin and the nervous system, allowing readers to gain a clear and comprehensive understanding of current nanomaterial use in biomedical applications and devices, together with the challenges and future trends. This book is a valuable tool for multidisciplinary scientists and experts interested in fundamental concepts and synthetic routes for preparing nanomaterials. It is also of interest to students and researchers involved in cross-disciplinary research in nanomaterials for clinical applications and offers practical insights for clinicians as well as engineers and materials scientists working in nanoengineering.

Nanotechnology Springer

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