



Nanoengineered Nanofibrous Materials

Edited by

Selcuk Guceri, Yury G. Gogotsi and
Vladimir Kuznetsov

NATO Science Series

Nanoengineered Nanofibrous Materials

**Alan Kin-tak Lau, Farzana
Hussain, Khalid Lafdi**



Nanoengineered Nanofibrous Materials:

Nanoengineered Nanofibrous Materials Selcuk Guceri, Yury G. Gogotsi, Vladimir Kuznetsov, 2005-09-15 The combination of conductive polymer technology with the ability to produce nanofibres will facilitate major new developments in biotechnology and information technology benefiting such areas as scaffolds for tissue engineering and drug delivery systems wires capacitors transistors and diodes sensor technology biohazard protection and energy transport conversion and storage The work on nanofibrous materials presented here is designed first of all to instruct scientists in the most advanced methods for the formation of nanofibres and nanotubes The second section covers the physics and chemistry of nanofibres while the third deals with computer simulation and modelling The applications described in section 4 include biomedical applications nanotube based devices electronic applications of nanotubes and nanofibres nanofluidics and composites Finally the fifth section discusses recent developments in nanomaterials nanoparticles and nanostructures Nano- and Biocomposites Alan Kin-tak Lau, Farzana Hussain, Khalid Lafdi, 2009-08-20 Advances in nanotechnology are leading to the creation of composites with a myriad of medical applications This forward thinking book melds research in biocomposites with advances in nanocomposite technology to provide an interdisciplinary resource on advanced materials for the biomedical industry It brings together pioneering researchers who describe their contributions to the field Among other areas they cover nanostructured polymer composites and nano bio composites They look at developments in tissue engineering safer resins for tooth and bone repair and improved artificial joints They also discuss potential opportunities for continued research in this well funded field Disposal and Recycling Strategies for Nano-engineered Materials Jitendra Kumar Pandey, Prakash Bobde, Ravi Kumar Patel, Suwendu Manna, 2023-12-07 Disposal and Recycling Strategies for Nano engineered Materials enables the reader to understand and implement the latest methods for the safe disposal and re use of nanomaterials found in the environment at end of life Sections introduce nanomaterials their general classification properties and preparation techniques before providing an overview and analysis of common disposal strategies This is followed by in depth chapters that focus on important steps and innovative strategies in dealing with waste nanomaterials including sampling classification and identification of waste materials green technologies and biodegradation strategies physico chemical disposal integrated technologies to prevent or control nanomaterial wastes entering the environment and more This is a valuable resource for researchers advanced students engineers and scientists with an interest in nanomaterials their life cycle waste and recycling water treatment chemical engineering environmental science materials science chemistry and sustainability Provides step by step information on a range of strategies including biodegradation green technologies physico chemical disposal and other integrated methods Explains the sampling classification identification and lifecycle assessment of nanowaste materials Addresses key concerns relating to environmental risk health safety and policy Explores potential options for the reutilization re use and recycling of waste nanomaterials Engineered Carbon Nanotubes and Nanofibrous Material A. K.

Haghi,Praveen K.M.,Sabu Thomas,2018-10-16 Carbon nanotubes with their extraordinary engineering properties have garnered much attention in the past 10 years Because of the broad range of potential applications the scientific community is more motivated than ever to move beyond basic properties and explore the real issues associated with carbon nanotube based applications Presenting up to date literature that presents the current state of the science this book Engineered Carbon Nanotubes and Nanofibrous Material Integrating Theory and Technique fully explores the development phase of carbon nanotube based applications It looks at carbon nanotubes and their applications in diverse areas of science and engineering and considers environmental engineering applications as well This volume is a valuable resource for engineers scientists researchers and professionals in a wide range of disciplines whose focus remains on the power and promise of carbon nanotubes

Advances in Electrochemical Sensor Applications Using Nano-structured Materials Shashanka Rajendrachari,2025-06-11 Various nanomaterials can be used as possible electrocatalysts for the determination of huge amounts of bioactive compounds surfactants dyes toxic chemicals food additives fertilizers heavy metals etc The detection of such compounds in the human body the environment food or water is very important for our safety and well being There are many methods available to detect these compounds and determine their concentration but electrochemical methods are proved to be Highly responsive Comparatively inexpensive Sensitive Simple This state of the art book focuses on recent electrochemical and nanomaterials research taking the reader from basic principles to recent advances before discussing different techniques and tools for determining the presence of a variety of compounds Written for academics working in the fields of electrochemistry nanomaterials and biomedical and materials engineering this book is edited by Dr Shashanka Rajendrachari of SR University Warangal India

Nanofiber Research Mohammed Rahman,Abdullah Mohammed Asiri,2016-10-19 This book titled Nanofiber Research Reaching New Heights contains a number of latest research results on growth and developments on material fibers in nanoscale It is a promising novel research area that has received a lot of interest in recent years This book includes interesting reports on cutting edge science and technology related to synthesis morphology control self assembly and prospective application of nanofibers I hope that the book will lead to systematization of nanofiber science creation of new nanofiber research field and further promotion of nanofiber technology This potentially unique work offers various approaches on the implementation of nanofibers As it is widely known nanotechnology presents the control of matter at the nanoscale and nano dimensions within few nanometers whereas this exclusive phenomenon enables us to regulate and control novel applications with nanofibers This book presents an overview of recent and current nanofibers fundamental significant applications and implementation research worldwide It examined the methods of nanofiber synthesis types of fibers used and potential applications associated with nanofiber researches It is an important booklet for research organizations governmental research centers academic libraries and R

Nanoengineering Materials for Biomedical Uses Emilio I. Alarcon,Manuel Ahumada,2019-11-02 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.

Nanostructured Polymer Blends and Composites in Textiles Mihai Ciocoiu, Seghir Maamir, 2016-01-05

This new volume reviews recent academic and technological developments behind new engineered modified nanotextile materials. The developments in textiles using nanotechnology give ordinary materials improved properties such as better water resistance, enhanced moisture and odor reduction, increased strength and elasticity and resistance to bacteria.

Recent Advances in Nano-Tailored Multi-Functional Cementitious Composites Mustafa Şahmaran, Faiz Shaikh, Gürkan Yıldırım, 2022-03-08

Over the past few years, concrete technology has advanced quite dramatically thanks to the use of a great variety of additives and admixtures which have paved the way for the effective development of new generation concrete mixtures. Among these additives and admixtures, nanomaterials used in construction materials such as paste, mortar and concrete mixtures have become very popular recently. Much of the previous attention in regard to the utilization of nanomaterials in construction materials was specifically devoted to the characterization of their fresh state hydration microstructure, pore structure, mechanical, transport and durability properties. However, research into the tailoring of multi functional properties of construction materials, especially cementitious, with the use of nanomaterials is still in its infancy. Recent Advances in Nano Tailored Multi Functional Cementitious Composites aims to capture recent major scientific advances and the current state of the art in multi functional cementitious composites developed with nanomaterials. The book will provide researchers, engineers and other stakeholders with an insight into future directions of multi functional capabilities of cementitious composites. Chapters focus on the large scale development, characterization and application of multi functional cementitious composites, addressing the following topics: nano modified concrete, strain hardening cementitious composites, self sensing concrete, self healing and bacteria based concrete, self cleaning concrete, self

consolidating concrete material construction technology for 3D printing thermal insulation capability green concretes including geopolymers concrete nanoscale characterization methods low CO₂ reactive magnesia cements and future developments and challenges of nano tailored cementitious composites The book will be an essential reference resource for academic and industrial researchers materials scientists and civil engineers working on the development and application of nano tailored multi functional cementitious composites Provides very comprehensive and unique details about multi functional properties of cementitious composites Presents a detailed account of investigations conducted into the application of nanomaterials and nanoscale tailoring to achieve multi functional properties for cementitious composites Features state of the art preparation production processing and implementation techniques of nanoscale tailoring of multi functional cementitious composites starting from laboratory to large scale **Nano-Engineered Cementitious Composites** Baoguo Han, Siqi Ding, Jialiang Wang, Jinping Ou, 2019-04-10 This book focuses on civil engineering materials and nanotechnology Highlighting recent advances in the field of nano engineered cementitious composites it discusses their key principles design and fabrication testing and characterization performance and mechanisms as well as applications Future developments and remaining challenges are also outlined Nano engineered cementitious composites are exceptionally strong durable and offer multifunctional smart performance that differs considerably from that of normal cementitious composites Providing valuable insights into these composites future development the book offers an essential source of information inspiration theory and practical guidance for developing sustainable cementitious composites As such it will benefit researchers scientists and engineers in the fields of civil engineering materials and nanotechnology alike *Nano-Engineering at Functional Interfaces for Multidisciplinary Applications* Sai Sathish Ramamurthy, Seemesh Bhaskar, Narendra Reddy, 2024-10-18 Nano Engineering at Functional Interfaces for Multi disciplinary Applications Electrochemistry Photoplasmonics Antimicrobials and Anticancer Applications provides a comprehensive overview of the fundamentals and latest advances of nano engineering strategies for the design development and fabrication of novel nanostructures for different applications in the fields of photoplasmonics and electrochemistry as well as antibacterial and anticancer research areas The book begins with an introduction to the fundamentals and characteristics of nanostructured interfaces and their associated technologies including an overview of their potential applications in different fields The following chapters present a thorough discussion of the synthesis processing and characterization methods of nanomaterials with unique functionalities suitable for energy harvesting food and textile applications electrocatalysis biomedical applications and more It then concludes outlining research future directions and potential industrial applications Presents the advantages and impact of nano engineering in technological advances with up to date discussions on their applications Covers research directions and potential future applications of nano engineering in industry Includes case studies that illustrate important processes Nanoengineered Biomaterials for Regenerative Medicine Masoud Mozafari, Jayakumar Rajadas, David L. Kaplan, 2018-09-17 Nanoengineered Biomaterials for Regenerative

Medicine showcases the advances that have taken place in recent years as an increasing number of nanoengineered biomaterials have been targeted to various organ tissues. The book systematically explores how nanoengineered biomaterials are used in different aspects of regenerative medicine including bone regeneration, brain tissue reconstruction, and kidney repair. It is a valuable reference resource for scientists working in biomaterials science who want to learn more about how nanoengineered materials are practically applied in regenerative medicine. Nanoengineered biomaterials have gained particular focus due to their many advantages over conventional techniques for tissue repair. As a wide range of biomaterials and nanotechnology techniques have been examined for the regeneration of tissues, this book highlights the discussions and advancements made. Provides a digestible reference source for surgeons and physicians who want to learn more on nanoengineered biomaterials and their use in effective medical treatments. Offers systematic coverage on how nanoengineered biomaterials are used for different types of medicine. Assesses the benefits and drawbacks of the use of bioengineered nanomaterials in different areas of regenerative medicine.

Intelligent Medical Technologies and Biomedical Engineering: Tools and Applications Shukla, Anupam, Tiwari, Ritu, 2010-06-30. Intelligent Medical Technologies and Biomedical Engineering: Tools and Applications helps young researchers and developers understand the basics of the field while highlighting the various developments over the last several years. Broad in scope and comprehensive in depth, this volume serves as a base text for any project or work into the domain of medical diagnosis or other areas of medical engineering.

Nanotechnology in Textiles Rajesh Mishra, Jiri Militky, 2018-11-14. Nanotechnology in Textiles: Theory and Application explains how conventional methods for treating fabrics for specific functions can be improved upon with the use of nanotechnology. Overviews of relevant fundamental nanophysics and nanochemistry theory are provided along with explanations of their application in textile finishing, providing a crucial resource for readers exploring this expanding frontier in textiles. The book draws on research from around the globe to address the latest nanotechnological developments that are all examined with references to industrial applications. Provides a complete theoretical overview of nanotechnology and nanofibers for those with materials science or engineering backgrounds. Covers a broad range of topics including aerogels, polymer nanocomposites, nanohazards, and electrospinning. Looks ahead to emerging applications of nanotechnology in textiles to point the way for further research and innovation.

Nanoengineered Materials for Medical and Healthcare Applications Radhakrishnan Edayileveetil, Krishnankutty, Ashitha Jose, Visakh P. M., 2025-03-05. This book is a comprehensive guide on the new generation nanoengineered materials' contribution to the ongoing development of medical devices and other healthcare applications. Nanotechnology has revolutionized cutting-edge medical approaches including gene therapy, targeted drug delivery, treatment of various chronic and genetic diseases, cancer diagnosis and treatment modalities, and more, leading to the establishment of personalized treatment regimens. The book reports on various nanoparticles such as metallic and non-metallic nanoparticles, nano micelles, liposomal nanoparticles, and polymer

nanoparticles being utilized in various aspects of medical and healthcare applications. In addition, novel natural product based nanomaterials and nanomaterial complexes are also detailed showing their potential applications. The impact of nanotechnology in promoting bone regeneration and serving as novel dental implants is investigated along with its applications in skincare. The book examines the crucial role nanotechnology plays in the development of various antimicrobial materials and surfaces which are being used in the medical sector including numerous types of wound healing materials, antimicrobial textiles and PPEs as well as face masks and gloves. The book concludes with a chapter on nano coated medical devices.

Audience: The audience comprises researchers, engineers and scientists in materials science, nanotechnology and bioengineering working in the biomedical and bioscience areas and industries.

Functionalized Nanoscale Materials, Devices and Systems Ashok K. Vaseashta, Ion N. Mihailescu, 2008-10-23

The primary objective of the NATO Advanced Study Institute (ASI) titled *Functionalized Nanoscale Materials, Devices and Systems for Chem Bio Sensors, Photonics and Energy Generation and Storage* was to present a contemporary and comprehensive overview of the field of nanostructured materials and devices and its applications in chem bio sensors, nanophotonics and energy generation and storage devices. The study has become one of the most promising disciplines in science and technology as it aims at the fundamental understanding of new physical, chemical and biological properties of systems and the technological advances arising from their exploration. Such systems are intermediate in size between the isolated atoms and molecules and bulk material where the unique transitional characteristics between the two can be understood, controlled and manipulated. Nanotechnologies refer to the creation and utilization of functional materials, devices and systems with novel properties and functions that are achieved through the control of matter atom by atom, molecule by molecule or at a molecular level. Advances made over the last few years provide new opportunities for scientific and technological developments in nanostructures and nanosystems with new architectures with improved functionality. The field is very actively and rapidly evolving and covers a wide range of disciplines. Recently various nanoscale materials, devices and systems with remarkable properties have been developed with numerous unique applications in chemical and biological sensors, nanophotonics, nano biotechnology and in vivo analysis of cellular processes at the nanoscale.

Smart Nanoparticles Technology Abbass A. Hashim, 2012-04-18

In the last few years, nanoparticles and their applications dramatically diverted science in the direction of brand new philosophy. The properties of many conventional materials changed when formed from nanoparticles. Nanoparticles have a greater surface area per weight than larger particles which causes them to be more reactive and effective than other molecules. In this book, we, InTech publisher, editor and authors have invested a lot of effort to include 25 most advanced technology chapters. The book is organised into three well-heelled parts. We would like to invite all Nanotechnology scientists to read and share the knowledge and contents of this book.

Electrospinning for Tissue Regeneration L. Bosworth, S. Downes, 2011-06-21

Electrospinning is a simple and highly versatile method for generating ultrathin fibres with diameters ranging from a few

micrometres to tens of nanometres Although most commonly associated with textile manufacturing recent research has proved that the electrospinning technology can be used to create organ components and repair damaged tissues Electrospinning for tissue regeneration provides a comprehensive overview of this innovative approach to tissue repair and regeneration and examines how it is being employed within the biomaterials sector The book opens with an introduction to the fundamentals of electrospinning Chapters go on to discuss polymer chemistry the electrospinning process conditions control and regulatory issues Part two focuses specifically on electrospinning for tissue regeneration and investigates its uses in bone cartilage muscle tendon nerve heart valve bladder tracheal dental and skin tissue regeneration before concluding with a chapter on wound dressings Part three explores electrospinning for in vitro applications Chapters discuss cell culture systems for kidney pancreatic and stem cell research With its distinguished editors and international team of expert contributors Electrospinning for tissue regeneration is a valuable reference tool for those in academia and industry concerned with research and development in the field of tissue repair and regeneration Provides a comprehensive overview of this innovative approach to tissue repair and regeneration covering issues from polymer chemistry to the regulatory process Examines employment within the biomaterials sector reviewing extensive applications in areas such as uses in bone muscle tendon heart valve and tissue regeneration Explores electrospinning for in vitro applications and discusses cell culture systems for kidney pancreatic and stem cell research

Advanced Materials for Thermal Management of Electronic Packaging Xingcun Colin Tong, 2011-01-05 The need for advanced thermal management materials in electronic packaging has been widely recognized as thermal challenges become barriers to the electronic industry's ability to provide continued improvements in device and system performance With increased performance requirements for smaller more capable and more efficient electronic power devices systems ranging from active electronically scanned radar arrays to web servers all require components that can dissipate heat efficiently This requires that the materials have high capability of dissipating heat and maintaining compatibility with the die and electronic packaging In response to critical needs there have been revolutionary advances in thermal management materials and technologies for active and passive cooling that promise integrable and cost effective thermal management solutions This book meets the need for a comprehensive approach to advanced thermal management in electronic packaging with coverage of the fundamentals of heat transfer component design guidelines materials selection and assessment air liquid and thermoelectric cooling characterization techniques and methodology processing and manufacturing technology balance between cost and performance and application niches The final chapter presents a roadmap and future perspective on developments in advanced thermal management materials for electronic packaging

Carbon for Micro and Nano Devices Swati Sharma, 2024-03-18 Micro and nano devices are an integral part of modern technology To address the requirements of the state of the art technology topics are selected from both chip based and flexible electronics A wide range of carbon materials including graphene carbon nanotube glass like

carbon porous carbon carbon black graphite carbon nanofiber laser patterned carbon and heteroatom containing carbon are covered This goal is to elucidate fundamental carbon material science along with compatible micro and nanofabrication techniques Real life example of sensors energy storage and generation devices MEMS NEMS and implantable bioelectronics enable visualization of the outcome of described processes Students will also benefit from the attractive aspects of carbon science explained in simple terms Hybridization allotrope classification and microstructural models are presented with a whole new outlook Discussions on less studied hypothetical and undiscovered carbon forms render the contents futuristic and highly appealing

Fuel your quest for knowledge with is thought-provoking masterpiece, **Nanoengineered Nanofibrous Materials** . This educational ebook, conveniently sized in PDF (*), is a gateway to personal growth and intellectual stimulation. Immerse yourself in the enriching content curated to cater to every eager mind. Download now and embark on a learning journey that promises to expand your horizons. .

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Nanoengineered Nanofibrous Materials Introduction

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