

Development Of Biomedical Applications Of Non Equilibrium

The Future of Pharmaceutical Product Development and Research examines the latest developments in the pharmaceutical sciences, also highlighting key developments, research and future opportunities. Written by experts in the field, this volume in the Advances in Pharmaceutical Product Development and Research series deepens our understanding of the product development phase of drug discovery and drug development. Each chapter covers fundamental principles, advanced methodologies and technologies employed by pharmaceutical scientists, researchers and the pharmaceutical industry. The book focuses on excipients, radiopharmaceuticals, and how manufacturing should be conducted in an environment that follows Good Manufacturing Practice (GMP) guidelines. Researchers and students will find this book to be a comprehensive resource for those working in, and studying, pharmaceuticals, cosmetics, biotechnology, foods and related industries. Provides an overview of practical information for clinical trials Outlines how to ensure an environment that follows Good Manufacturing Practice (GMP) Examines recent developments and suggests future directions for drug production methods and techniques

Handbook of Lung Targeted Drug Delivery Systems: Recent Trends and Clinical Evidences covers every aspect of the drug delivery to lungs, the physiology and pharmacology of the lung, modelling for lung delivery, drug devices focused on lung treatment, regulatory requirements, and recent trends in clinical applications. With the advent of nano sciences and significant development in the nano particulate drug delivery systems there has been a renewed interest in the lung as an

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absorption surface for various drugs. The emergence of the COVID-19 virus has brought lung and lung delivery systems into focus, this book covers new developments and research used to address the prevention and treatment of respiratory diseases. Written by well-known scientists with years of experience in the field this timely handbook is an excellent reference book for the scientists and industry professionals. Key Features: Focuses particularly on the chemistry, clinical pharmacology, and biological developments in this field of research. Presents comprehensive information on emerging nanotechnology applications in diagnosing and treating pulmonary diseases Explores drug devices focused on lung treatment, regulatory requirements, and recent trends in clinical applications Examines specific formulations targeted to pulmonary systems

Precious metals and semi-precious metals are used for an increasing number of medical applications due to the properties of these metals and their alloys. Precious Metals for Biomedical Applications reviews the properties of precious metals and their resulting applications in medicine. Part one outlines the fundamentals of precious metals for biomedical applications, discussing their useful properties, such as biocompatibility and corrosion resistance. Part two goes on to provide an overview of the applications of precious metals in biomedicine, including dental, therapeutic, tissue engineering, and bioimaging applications. It discusses the advantages of the structure and properties of precious metals for these applications. Precious Metals for Biomedical Applications is a key reference for material scientists and academics concerned with the properties and uses of these metals. Provides a useful review of this group of materials' unique properties and applications Examines the fundamentals of precious metals for biomedical applications, before looking at a wide range of applications of precious metals in medicine

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Advanced Functional Polymers for Biomedical Applications presents novel techniques for the preparation and characterization of functionalized polymers, enabling researchers, scientists and engineers to understand and utilize their enhanced functionality in a range of cutting-edge biomedical applications. Provides systematic coverage of the major types of functional polymers, discussing their properties, preparation techniques and potential applications Presents new synthetic approaches alongside the very latest polymer processing and characterization methods Unlocks the potential of functional polymers to support ground-breaking techniques for drug and gene delivery, diagnostics, tissue engineering and regenerative medicine

Nanobiomaterials Science, Development and Evaluation examines the practical aspects of producing nanostructured biomaterials for a range of applications. With a strong focus on materials, such as metals, ceramics, polymers, and composites, the book also examines nanostructured coatings and toxicology aspects. Chapters in Part One look at materials classes and their synthesis with information on all major material groups. Part Two focuses on nanostructured coatings and practical aspects associated with the use of nanobiomaterials in vivo. This book brings together the work of international contributors who are actively engaged on the forefront of research in their respective disciplines, and is a valuable resource for materials scientists in academia, industry, and all those who wish to broaden their knowledge in the allied field. Focuses on the synthesis and evaluation techniques for a range of nanobiomaterials Examines nanostructured inorganic coatings for biomaterials Discusses issues related to the toxicology of nanobiomaterials Presents the practical aspects of nanobiomaterials

This e-book presents a selection of papers focused on some novel aspects of electrodeposited coatings, in particular for

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medical applications. The biocoatings applied for surface modification of load-bearing implants are still being developed, especially for titanium implants, for which hundreds and thousands of possible technical solutions have been proposed using different techniques and materials. This book is a collection of papers that demonstrate appropriate attempts using various electrodeposition methods. The specific objectives are different, with several looking for improved bioactivity, another for antibacterial properties, and another for increased adhesion on the helix lines on dental implants. The e-book starts with a paper on the methodic development of electrodes for electrowinning. This is followed by paper on the real performance of the surface of dental implants, a subject not often addressed. The next paper focuses on electro-oxidation: a novel two-stage oxidation method, characteristic of the oxide layer on helix line of a model dental implant, and micro-arc oxidation of 3D printed titanium. The last paper focuses on coatings, describing the carbon nanotubes- (hydroxyapatite, chitosan), Eudragit-, and Fe-containing coatings. The e-book concludes with a review of all electrodeposition methods. It is a collection of papers describing novel results in electrodeposition biocoatings, which will be of interest for many scholars and researchers.

Biomedical Applications of Functionalized Nanomaterials Concepts, Development and Clinical Translation
William Andrew

This book focuses on the materials, synthetic methods, tools and techniques being developed in the nanoregime towards the life sciences -- in particular biology, biotechnology and medicine. Readers from materials science, engineering, chemistry, biology and medical backgrounds will find

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detailed accounts of the design and synthesis of nanomaterials and the tools and techniques involved in their production for applications in biology, biotechnology and medicine.

Surface modification of biomaterials can ultimately determine whether a material is accepted or rejected from the human body, and a responsive surface can further make the material "smart" and "intelligent".

Switchable and Responsive Surfaces and Materials for Biomedical Applications outlines synthetic and biological materials that are responsive under different stimuli, their surface design and modification techniques, and applicability in regenerative medicine/tissue engineering, drug delivery, medical devices, and biomedical diagnostics. Part one provides a detailed overview of switchable and responsive materials and surfaces, exploring thermo-responsive polymers, environmentally responsive polyelectrolytes and zwitterionic polymers, as well as peptide-based and photonic sensitive switchable materials. Further chapters include a detailed overview of the preparation and analysis of switchable polymer brushes and copolymers for biomedical application. Part two explores the biological interactions and biomedical applications of switchable surfaces, where expert analysis is provided on the interaction of switchable surfaces with proteins and cells. The interaction of stimuli-sensitive polymers for tissue

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engineering and drug delivery with biosurfaces is critiqued, whilst the editor provides a skillful study into the application of responsive polymers in implantable medical devices and biosensors. A comprehensive overview of switchable and responsive materials and surfaces Includes in depth analysis of thermo-responsive polymers, photonic sensitive materials and peptide-based surfaces Detailed exploration of biological interactions of responsive and switchable surfaces, covering stimuli-sensitive polymers for drug delivery, surfaces with proteins/cells and application of polymers in medical devices

This book is a detailed reference on biomedical applications using Deep Learning. Because Deep Learning is an important actor shaping the future of Artificial Intelligence, its specific and innovative solutions for both medical and biomedical are very critical. This book provides a recent view of research works on essential, and advanced topics. The book offers detailed information on the application of Deep Learning for solving biomedical problems. It focuses on different types of data (i.e. raw data, signal-time series, medical images) to enable readers to understand the effectiveness and the potential. It includes topics such as disease diagnosis, image processing perspectives, and even genomics. It takes the reader through different sides of Deep Learning oriented solutions. The specific and

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innovative solutions covered in this book for both medical and biomedical applications are critical to scientists, researchers, practitioners, professionals, and educations who are working in the context of the topics.

The field of nanoceramics for biomedical applications has experienced important advances in the last five years. These advances are mainly focused in the field of new nanostructured bioceramics able to mimic almost the same biomineralization processes. In addition, there has also been significant advances in nanoceramics as vehicles for targeted drug delivery and gene therapy. Building on the success of *Biomimetic Nanoceramics in Clinical Use*, this second edition has been revised and updated to reflect the recent developments in the field. *Nanoceramics in Clinical Use* includes additional material on bone mineralization processes, new synthesis strategies and applications of nanostructured bioceramics to manufacture 3D macroporous scaffolds and as nanovehicles for targeted drug delivery and gene therapies, to provide the reader with a complete overview of the topic, from fundamental principles to the latest advances. Written by World leading experts in bioceramics, this title will appeal to a broad audience, from academic researchers to those working within the commercial industry. Materials and chemical engineers, chemists, biologists,

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physicists and those working in medicine, in particular with medical implants, will appreciate the comprehensive coverage of this fast-developing area.

Biomedical Applications of Magnetic Particles discusses fundamental magnetic nanoparticle physics and chemistry and explores important biomedical applications and future challenges. The first section presents the fundamentals of the field by explaining the theory of magnetism, describing techniques to synthesize magnetic particles, detailing methods to characterize magnetic particles, and quantitatively describing the applied magnetic forces, torques, and the resultant particle motions. The second section describes the wide range of biomedical applications, including chemical sensors, cellular actuators, drug delivery, magnetic hyperthermia, magnetic resonance imaging contrast enhancement, and toxicity. Additional key features include: Covers both introduction to physics and characterization of magnetic nanoparticles and the state of the art in biomedical applications Authoritative reference for scientists and engineers for all new or old to the field Describes how the size of magnetic nanoparticles affects their magnetic properties, colloidal properties, and biological properties. Written by a team of internationally respected experts, this book provides an up-to-date authoritative reference for scientists and engineers.

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Electrospinning, an electro-hydrodynamic process, is a versatile and promising platform technology for the production of nanofibrous materials for tissue engineering and biomedical applications.

Electrospun Materials for Tissue Engineering and Biomedical Applications, examines the rapid development of electrospun materials for use in tissue engineering and biomedical applications. With a strong focus on fundamental materials science and engineering, this book also looks at successful technology transfers to the biomedical industry, highlighting biomedical products already on the market as well as the requirements to successfully commercialize electrospun materials for potential use in tissue engineering and biomedical areas. This book is a valuable resource for materials and biomedical scientists and engineers wishing to broaden their knowledge on the tissue engineering and biomedical applications of electrospun fibrous materials. Provides all-encompassing coverage of fundamental science, technology and industrial case studies Presents guidance on industrial scalability of electrospun biomaterials Written by a multidisciplinary team of researchers from academia and industry, offering a balanced viewpoint on the subject

Optimization techniques have developed into a modern-day solution for real-world problems in various industries. As a way to improve performance

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and handle issues of uncertainty, optimization research becomes a topic of special interest across disciplines. Problem Solving and Uncertainty Modeling through Optimization and Soft Computing Applications presents the latest research trends and developments in the area of applied optimization methodologies and soft computing techniques for solving complex problems. Taking a multi-disciplinary approach, this critical publication is an essential reference source for engineers, managers, researchers, and post-graduate students.

This book describes 200 bio-polymers, including the most recent and advanced nanotechnology applications. The applications of various bio-medical and other future potential uses are covered and examined in depth. Systematic discussion of current leading natural polymers is also included.

Principles of Cloning, Second Edition is the fully revised edition of the authoritative book on the science of cloning. The book presents the basic biological mechanisms of how cloning works and progresses to discuss current and potential applications in basic biology, agriculture, biotechnology, and medicine. Beginning with the history and theory behind cloning, the book goes on to examine methods of micromanipulation, nuclear transfer, genetic modification, and pregnancy and neonatal care of cloned animals. The cloning of various species—including mice, sheep, cattle, and non-mammals—is considered as well. The Editors have been involved in a number of breakthroughs using cloning

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technique, including the first demonstration that cloning works in differentiated cells done by the Recipient of the 2012 Nobel Prize for Physiology or Medicine – Dr John Gurdon; the cloning of the first mammal from a somatic cell – Drs Keith Campbell and Ian Wilmut; the demonstration that cloning can reset the biological clock - Drs Michael West and Robert Lanza; the demonstration that a terminally differentiated cell can give rise to a whole new individual – Dr Rudolf Jaenisch and the cloning of the first transgenic bovine from a differentiated cell – Dr Jose Cibelli. The majority of the contributing authors are the principal investigators on each of the animal species cloned to date and are expertly qualified to present the state-of-the-art information in their respective areas. First and most comprehensive book on animal cloning, 100% revised Describes an in-depth analysis of current limitations of the technology and research areas to explore Offers cloning applications on basic biology, agriculture, biotechnology, and medicine This book discusses the recent innovations in the development of various advanced biopolymeric systems, including gels, in situ gels, hydrogels, interpenetrating polymer networks (IPNs), polyelectrolyte complexes (PECs), graft co-polymers, stimuli-responsive polymers, polymeric nanoparticles, nanocomposites, polymeric micelles, dendrimers, liposomes and scaffolds. It also examines their applications in drug delivery. This book is based on the principles, limitations, challenges, improvements and applications of nanotechnology in medical science as described in the literature. It highlights various parameters affecting the

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synthesis of bio-nanomaterials and exclusive techniques utilized for characterizing the nanostructures for their potential use in biomedical and environmental applications. Moreover, biodegradable synthesis of nanomaterials is regarded as an important tool to reduce the destructive effects associated with the traditional methods of synthesis for nanostructures commonly utilized in laboratory and industry and as well as academic scale of innovative research foundation. These proceedings of the World Congress 2006, the fourteenth conference in this series, offer a strong scientific program covering a wide range of issues and challenges which are currently present in Medical physics and Biomedical Engineering. About 2,500 peer reviewed contributions are presented in a six volume book, comprising 25 tracks, joint conferences and symposia, and including invited contributions from well known researchers in this field.

Semiconducting Silicon Nanowires for Biomedical Applications reviews the fabrication, properties and biomedical applications of this key material. Sections review basics, growth, characterization, biocompatibility, and surface modification of semiconducting. Chapters go on to focus on silicon nanowires for tissue engineering and delivery applications, including cellular binding and internalization, orthopedic tissue scaffolds, mediated differentiation of stem cells, and silicon nanoneedles for drug delivery. Finally, the book highlights the use of silicon nanowires for detection and sensing. These chapters explore the fabrication and use of semiconducting silicon nanowire arrays for high-

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throughput screening in the biosciences, neural cell pinning on surfaces, and probe-free platforms for biosensing. This book provides a comprehensive resource for biomaterials scientists who are focused on biosensors, drug delivery and tissue engineering, but it is also ideal for researchers and developers in industry and academia who are concerned with nanoscale biomaterials, in particular electronically-responsive biomaterials. Reviews the growth, characterization, biocompatibility, and surface modification of semiconducting silicon nanowires Describes silicon nanowires for tissue engineering and delivery applications, including cellular binding and internalization, orthopedic tissue scaffolds, mediated differentiation of stem cells, and silicon nanoneedles for drug delivery Highlights the use of silicon nanowires for detection and sensing

Biomedical Applications of Functionalized Nanomaterials: Concepts, Development and Clinical Translation presents a concise overview of the most promising nanomaterials functionalized with ligands for biomedical applications. The first section focuses on current strategies for identifying biological targets and screening of ligand to optimize anchoring to nanomaterials, providing the foundation for the remaining parts. Section Two covers specific applications of functionalized nanomaterials in therapy and diagnostics, highlighting current practice and addressing major challenges, in particular, case studies of successfully developed and marketed functionalized nanomaterials. The final section focuses on regulatory issues and

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clinical translation, providing a legal framework for their use in biomedicine. This book is an important reference source for worldwide drug and medical devices policymakers, biomaterials scientists and regulatory bodies. Provides an overview of the methodologies for biological target identification and ligand screening Includes case studies showing the development of functionalized nanomaterials and their biomedical applications Highlights the importance of functionalized nanomaterials for drug delivery, diagnostics and regenerative medicine applications

With rapid advancements in technology, body imaging or components thereof, have become ubiquitous in medicine. While the biomedical devices such as the MRI, CT, X-rays, Ultrasound, PET/SPECT and Microscopy etc, provide us with high resolution images, the challenges that have continued to confront us with, lie in the interpretation of the vast amounts of data generated by these devices. Biomedical applications are the 'bottom-line' essentials in the diagnostic world. It is this diagnostic interpretation feature that forms the core niche for these books and will serve the needs of a broad spectrum of audience including researchers, research clinicians, and students. Together the three volumes will illustrate the role of the fusion of registration and segmentation systems for complete biomedical applications therapy delivery benefiting the biomedical doctors, clinical researchers, radiologists and others. Design and Development of Biomedical and Surgical Instruments in Biomedical Applications.

This book provides the field with a much-needed

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fundamental overview of the science, addressing the chemistry of a broad range of biomaterial types, and their applications in the biomedical industry.

The field of encapsulation, especially microencapsulation, is a rapidly growing area of research and product development. Applications of Encapsulation and Controlled Release offers a broad perspective on a variety of applications and processes, including, up-to-date research, figures, tables, illustrations, and references. Written at a level comprehensible to non-experts, it is a rich source of technical information and current practices in research and industry.

Nanofiber Composite Materials for Biomedical Applications presents new developments and recent advances in nanofiber-reinforced composite materials and their use in biomedical applications, including biomaterial developments, drug delivery, tissue engineering, and regenerative medicine. Unlike more conventional titles on composite materials, this book covers the most innovative new developments in nanofiber-based composites, including polymers, ceramics, and metals, with particular emphasis on their preparation and characterization methodology. Selected case studies illustrate new developments in clinical and preclinical use, making the information critical for the development of new medical materials and systems for use in human health care, and for the exploration of new design spaces based on these nanofibers. This book is essential reading for those working in biomedical science and engineering, materials science, nanoscience, biomedical nanotechnology, and biotechnology. Covers

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innovative new developments in nanofiber composites, including polymers, ceramics, and metals with particular emphasis on their preparation and characterization methodology Deals with biomedical applications, including biomaterials developments, drug delivery, tissue engineering, and regenerative medicine Presents selected case studies on nanofiber composite materials in both clinical and preclinical use

This compilation of proceedings covering the latest scientific and technological developments in design, development, and applications of engineering ceramics and composites provides a useful one-stop resource for understanding the most important issues in design, development, and applications of engineering ceramics and composites. Logically organized and carefully selected articles give insight into design, development, and applications of engineering ceramics and composites and incorporates the latest developments related to design, development, and applications of engineering ceramics and composites including developments in engineering ceramics, advanced ceramic coatings, and geopolymers.

Electronic Devices, Circuits, and Systems for Biomedical Applications: Challenges and Intelligent Approaches explains the latest information on the design of new technological solutions for low-power, high-speed efficient biomedical devices, circuits and systems. The book outlines new methods to enhance system performance, provides key parameters to explore the electronic devices and circuit biomedical applications, and discusses innovative materials that improve device

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performance, even for those with smaller dimensions and lower costs. This book is ideal for graduate students in biomedical engineering and medical informatics, biomedical engineers, medical device designers, and researchers in signal processing. Presents major design challenges and research potential in biomedical systems Walks readers through essential concepts in advanced biomedical system design Focuses on healthcare system design for low power-efficient and highly-secured biomedical electronics

Traditional methods in synthetic chemistry produce chemical waste and byproducts, yield smaller desired products, and generate toxic chemical substances, but the past two centuries have seen consistent, greener improvements in organic synthesis and transformations. These improvements have contributed to substance handling efficiency by using green-engineered forerunners like sustainable techniques, green processes, eco-friendly catalysis, and have minimized energy consumption, reduced potential waste, improved desired product yields, and avoided toxic organic precursors or solvents in organic synthesis. Green synthesis has the potential to have a major ecological and monetary impact on modern pharmaceutical R&D and organic chemistry fields. This book presents a broad scope of green techniques for medicinal, analytical, environmental, and organic chemistry applications. It presents an accessible overview of new innovations in the field, dissecting the highlights and green chemistry attributes of approaches to green synthesis, and provides cases to exhibit applications to pharmaceutical and organic chemistry. Although daily chemical processes are a major part of the sustainable development of pharmaceuticals and industrial products, the resulting environmental pollution of these processes is of worldwide concern. This edition

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discusses green chemistry techniques and sustainable processes involved in synthetic organic chemistry, natural products, drug syntheses, as well various useful industrial 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

Porous Silicon for Biomedical Applications, Second Edition, provides an updated guide to the diverse range of biomedical applications of porous silicon, from biosensing and imaging to tissue engineering and cancer therapy. Across biomedical disciplines, there is an ongoing search for biomaterials that are biocompatible, modifiable, structurally sound, and versatile. Porous silicon possesses a range of properties that make it ideal for a variety of biomedical applications, such as controllable geometry, tunable nanoporous structure, large pore volume/high specific surface area, and versatile surface chemistry. This book provides a fully updated and detailed

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overview of the range of biomedical applications for porous silicon. Part One offers the reader a helpful insight into the fundamentals and beneficial properties of porous silicon, including thermal properties and stabilization, photochemical and nonthermal chemical modification, protein modification, and biocompatibility. The book then builds on the systematic detailing of each biomedical application using porous silicon, from bioimaging and sensing to drug delivery and tissue engineering. This new edition also includes new chapters on in-vivo assessment of porous silicon, photodynamic and photothermal therapy, micro- and nanoneedles, Raman imaging, cancer immunotherapy, and more. With its acclaimed editor and international team of expert contributors, *Porous Silicon for Biomedical Applications, Second Edition*, is a technical resource and indispensable guide for all those involved in the research, development, and application of porous silicon and other biomaterials, while providing a comprehensive introduction for students and academics interested in this field. Reviews the fundamental aspects of porous silicon, including the fabrication and unique properties of this useful material. Discusses a broad selection of biomedical applications, offering a detailed insight into the benefits of porous silicon in both research and clinical settings. Includes fully updated content from the previous edition, as well as brand new chapters, covering topics such as porous silicon micro- and nanoneedles, and cancer immunotherapy.

This thesis reports on essential advances in the design, synthesis and biomedical applications of multifunctional Mesoporous Silica Nanoparticles (MSNs). It provides several examples of multifunctional MSN-based drug delivery nanosystems and demonstrates successful synergistic cancer therapies combining MSNs and high-intensity focused ultrasound. The book will especially be of interest to

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researchers and graduate students in the fields of biomaterials, biology, chemistry, medicine and the life sciences who are working to develop new methods and technologies to combat cancer.

The study of nanostructures has become, in recent years, a theme common to many disciplines, in which scientists and engineers manipulate matter at the atomic and molecular level in order to obtain materials and systems with significantly improved properties. Carbon nanomaterials have a unique place in nanoscience owing to their exceptional thermal, electrical, chemical, and mechanical properties, finding application in areas as diverse as super strong composite materials, energy storage and conversion, supercapacitors, smart sensors, targeted drug delivery, paints, and nanoelectronics. This book is the first to cover a broad spectrum of carbon nanomaterials, namely carbon nanofibers, vapor-grown carbon fibers, different forms of amorphous nanocarbons besides carbon nanotubes, fullerenes, graphene, graphene nanoribbons, graphene quantum dots, etc. in a single volume.

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