Nanotechnology For Biomedical Imaging And Diagnostics From Nanoparticle Design To Clinical Applications

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Small Animal Imaging - Fabian Kiessling 2018-07-28
This textbook is a practical guide to the use of small animal imaging in preclinical research that will assist in the choice of imaging modality and contrast agent and in study design, experimental setup, and data evaluation. All established imaging modalities are discussed in detail, with the assistance of numerous informative illustrations. While the focus of the new edition remains on practical basics, it has been updated to encompass a variety of emerging imaging modalities, methods, and applications. Additional useful hints are also supplied on the installation of a small animal unit, study planning, animal handling, and cost-effective performance of small animal imaging. Cross-calibration methods and data postprocessing are considered in depth. This new edition of Small Animal Imaging will be an invaluable aid for researchers, students, and technicians involved in research into and applications of small animal imaging.

Nanobiomaterials in Medical Imaging - Alexandru Grumezescu 2016-04-13
Nanobiomaterials in Medical Imaging presents the latest developments in medical exploratory approaches using nanotechnology. Leading researchers from around the world discuss recent progress and state-of-the-art techniques. The book covers synthesis and surface modification of multimodal imaging agents, popular examples of nanoparticles and their applications in different imaging techniques, and combinatorial therapy for the development of multifunctional nanocarriers. The advantages and potential of current techniques are also considered. This book will be of interest to postdoctoral researchers, professors and students engaged in the fields of materials science, biotechnology and applied chemistry. It will also be highly valuable to those working in industry, including pharmaceutics and biotechnology companies, medical researchers, biomedical engineers and advanced clinicians. A valuable resource for researchers, practitioners and students working in biomedical, biotechnological and engineering fields A detailed guide to recent scientific progress, along with the latest application methods Presents innovative opportunities and ideas for developing or improving technologies in nanomedicine and medical imaging

Nanoparticles in Biomedical Imaging - Jeff W.M. Bulte 2007-11-22
The current generation of imaging nanoparticles is diverse and dependent on its myriad of applications. This book provides an overview of how these imaging particles can be designed to fulfill specific requirements for applications across different imaging modalities. It presents, for the first time, a comprehensive interdisciplinary overview of the impact nanoparticles have on biomedical imaging and is a common central resource for researchers and teachers.

Diverse Applications of Nanotechnology in the Biological Sciences - Khalid Rehman Hakeem 2022
Explores the diverse roles of nanobiotechnology in the medicine, pharmacy, healthcare, and agriculture. It discusses its importance in drug delivery, biomedical imaging and medical diagnostics, healthcare management. It discusses nanofertilizers in agriculture and how agri-nanobiotechnology can be a tool for green technology.

Medical Nanotechnology and Nanomedicine - Harry F. Tibbals 2010-09-29
Considering the fluid nature of nano breakthroughs—and the delicate balance between benefits and consequences as they apply to medicine—readers at all levels require a practical, understandable base of information about these developments to take greatest advantage of them. Medical Nanotechnology and Nanomedicine meets that need by introducing non-experts to nanomedicine and its evolving organizational infrastructure. This practical reference investigates the impact of nanotechnology on applications in medicine and biomedical sciences, and the broader societal and economic effects. Eschewing technological details, it focuses on enhancing awareness of the business, regulatory, and administrative aspects of medical applications. It gives readers a critical, balanced, and realistic evaluation of existing nanomedicine developments and future prospects—an ideal foundation upon which to plan and make decisions. Covers the use of nanotechnology in medical applications including imaging, diagnosis and monitoring, drug delivery systems, surgery, tissue regeneration, and prosthetics Part of the Perspectives in Nanotechnology series—which contains broader coverage of the societal implications of nanotechnology—this book can be used as a standalone reference. Organized by historical perspective, current status, and future prospects, this powerful book: Explores background, definitions and terms, and recent trends and forces in nanomedicine Surveys the landscape of nanomedicine in government, academia, and the private sector Reviews projected future directions, capabilities, sustainability, and equity of nanomedicine, and choices to be made regarding its use Includes graphical illustrations, references, and keywords to reinforce concepts and aid further research In its assessment of alternative and sometimes conflicting concepts proposed for the application of nanotechnology to medicine, this book surveys major initiatives and the work of leading labs and innovators. It uses informative examples and case summaries to illustrate proven accomplishments and imagined possibilities in research and development.

Nanomaterials in Diagnostic Tools and Devices - Suvardhan Kanchi 2020-06-04
Nanomaterials in Diagnostic Tools and Devices provides a complete overview of the significance of nanomaterials in fabricating selective and performance enhanced nanodevices. It is an interdisciplinary reference that includes contributing subjects from nanomaterials, biosensors, materials science, biomedical instrumentation and medicinal chemistry. This book is authored by experts in the field of nanomaterial synthesis, modeling, and biosensor applications, and provides insight to readers working in various science fields on the latest advancements in smart and miniaturized nanodevices. These devices enable convenient real-time diagnosis of diseases at clinics rather than laboratories, and include implantable devices that cause less irritation and have improved functionality. Research in the field of nanomaterials is growing rapidly, creating a significant impact across different science disciplines and nanotechnology industries. This synthesis and modeling of nanomaterials has led to many technology breakthroughs and applications, especially in medical science. Provides a distinctive platform for the latest trends in the synthesis of smart nanomaterials for nanodevices in disease diagnostics Presents a broad range of advancements and applications of lateral-flow nanostrip for point-of-care applications Examines smart-phone based nanodevices for field-based diagnosis with accurate information Comprises more than 70 figures and illustrations that will help readers visualize and easily understand the role of nanodevices in the field of nanomedicine Serves as an ideal reference for those studying smart nanomaterials, biosensors, and nanodevices for real-time and in-situ clinical diagnosis and drug delivery

Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases - Narenda Kumar 2013-12-05
Nanotechnology and Nanomaterials in the Treatment of Life-threatening Diseases takes a scientific approach to nanotechnology and nanomaterials applications in medicine, while also explaining the core biological principles for an audience of biomedical engineers, materials scientists, pharmacologists, and medical diagnostic technicians. The book is structured by major disease groups, offering a practical, application-based focus for scientists, engineers, and clinicians alike. The spectrum of medical applications is explored, from diagnostics and imaging to drug delivery, monitoring, therapies, and disease prevention.

It also focuses specifically on the synthesis of nanomaterials and their potential health risks (particularly toxicity). Nanomedicine — the application of nanomaterials and devices for addressing medical problems — has demonstrated great potential for enabling improved diagnosis, treatment, and monitoring of many serious illnesses, including cancer, cardiovascular and neurological disorders, HIV/AIDS, and diabetes, as well as many types of inflammatory and infectious diseases. Gain an understanding of how nanotechnologies and nanomaterials can be deployed in the fight against the major life-threatening diseases: cancer, neurological disorders (including Alzheimer's and Parkinson's), cardiovascular diseases, and HIV/AIDS Discover the latest developments in nanomedicine, from therapies and drug delivery to diagnostics and disease prevention The authors cover the health risks of nanomaterials as well as their benefits, considering toxicity and potential carcinogens

Nanobiotechnology - Rajesh Singh Tomar 2020-04-20

This new book, Nanobiotechnology: Concepts and Applications in Health, Agriculture, and Environment, presents a broad conceptual overview regarding the synthesis, applications, and toxicological aspects of nanobiotechnology. It focuses on the entrance into and interaction of nanomaterials in the human body, which has generated intense scientific curiosity, attracting much attention as well as increasing concern from the nanomaterial-based industries and academia across the world. This book looks at the scientific aspects of nanomaterials used in many applications of biosciences, taking an interdisciplinary approach that encompasses medicine, biology, pharmacy, physics, chemistry, engineering, nanotechnology, and materials science. The volume covers the basics of nanosciences and nanotechnology; different schemes and routes of synthesis; and various biological applications, including sensing, medicine, drug delivery systems, and remediation. Further, special chapters will be devoted to nanotoxicology and the developing risk factors associated with nanosized particles during use along with the ethical issues related to nanobiotechnology.

Design of Nanostructures for Theranostics Applications - Alexandru Mihai Grumezescu 2018-01-15

Design of Nanostructures for Theranostics Applications focuses on the theranostics applications of nanostructures. In particular, multifunctional nanoparticles for diagnostics and treatment of different diseases, including those relating to the blood-brain barrier, are discussed in detail. Chapters explore different type of nanostructures, covering design, fabrication, functionalization and optimization, helping readers obtain the desired properties. Written by a diverse range of international academics, this book is a valuable reference resource for those working in both nanoscience and the pharmaceutical industry. Explores how the design of a range of nanomaterials make them effective theranostic agents, including multifunctional core-shell nanostructures, mesoporous silica nanoparticles, and quantum dots Shows how nanomaterials are used effectively for a range of diseases, including breast cancer, prostate cancer and neurological disorders Assesses the pros and cons of using different nanomaterials for different types of treatment

Nanomaterials for Air Remediation - Abdeltif Amrane 2020-01-22

Nanomaterials for Air Remediation provides a comprehensive description of basic knowledge and current research progress in the field of air treatment using nanomaterials. The book explores how nanomaterials are used in various air remediation techniques, including advanced oxidation processes, biological processes, and filtration. It also covers their combined use as nanocatalysts, nanoantibiotics, nanoadsorbents, nanocontainers, nanofiltrations and nanosensors. Major challenges to using nanomaterials for improving air quality on a mass scale, both practical and regulatory, are also presented. This is an important resource for materials scientists and environmental engineers who are looking to understand how nanotechnology is used to enhance air quality. Includes coverage of a wide range of nanomaterials, from biochemical to chemical materials, and nanomaterials supported photocatalysts Discusses how the properties of nanomaterials are being used to make more efficient air purification systems and products Assesses the practical and regulatory challenges of using different types of nanomaterials for air remediation

Nanotechnology for Biomedical Imaging and Diagnostics - Mikhail Y. Berezin 2015-02-02

Nanotechnology for Biomedical Imaging and Diagnostics: FromNanoparticle Design to Clinical Applications reflects upon theincreasing role of nanomaterials in biological and medical imaging,presenting a thorough description of current research as wellas future directions. With contributions from experts innanotechnology and imaging from academia, industry, andhealthcare, this book provides a comprehensive coverage of thefield, ranging from the architectural design of nanomaterials totheir broad imaging applications in medicine. Grouped into three sections, the book: Elucidates all major aspects of nanotechnology andbioimaging Provides comprehensive coverage of the field, ranging from thearchitectural design of nanomaterials to their broad imagingapplications in medicine Written by well-recognized experts in academia, industry, andhealthcare, will be an excellence source of reference With a multidisciplinary approach and a balance of research anddiagnostic topics, this book will appeal to students, scientiests,and healthcare professionals alike

Advanced Imaging and Bio Techniques for Convergence Science - Jun Ki Kim 2021-04-08

This book is a wide-ranging guide to advanced imaging techniques and related methods with important applications in translational research or convergence science as progress is made toward a new era in integrative healthcare. Conventional and advanced microscopic imaging techniques, including both non-fluorescent (i.e., label-free) and fluorescent methods, have to date provided researchers with specific and quantitative information about molecules, cells, and tissues. Now, however, the different imaging techniques can be correlated with each other and multimodal methods developed to simultaneously obtain diverse and complementary information. In addition, the latest advanced imaging techniques can be integrated with non-imaging techniques such as mass spectroscopic methods, genome editing, organic/inorganic probe synthesis, nanomedicine, and drug discovery. The book will be of high value for researchers in the biological and biomedical sciences or convergence science who need to use these multidisciplinary and integrated techniques or are involved in developing new analytical methods focused on convergence science.

Nanomaterial - Based Biomedical Applications in Molecular Imaging, Diagnostics and Therapy - Amitabha Acharya 2020-05-23

This book comprehensively reviews the recent advances in nanomaterial-based molecular imaging, diagnostics, and personalized therapy. It discusses the novel biocompatible fluorescent nanomaterials, their synthesis, and modern state of art characterization, as well as the various strategies for immobilization of biomacromolecules on the nanomaterial surface and approaches for increasing their stability. In addition, the book describes the synthesis of lectin nanoconjugates using different types of biocompatible raw materials and their systematic characterization. Lastly, it presents our current understanding of the biomolecular carona, which affects nanoparticle-based targeted drug delivery, and examines the conceptual approaches to improve the in-vivo efficacy of targeted drug delivery.

Nanomedicine - Christoph Alexiou 2011

A meeting report of the 2nd international Else Kr ner-Fresenius Symposium on Nanomedicine Nanomedicine -- the application of nanotechnology to human health -- is a promising field of research at the interface of physical, chemical, biological, and medical science. Recent advances have made it possible to analyze biological systems at cellular and subcellular levels, offering numerous promising approaches to improve medical diagnosis and therapy. It is expected that nanomedicine will have a great impact especially on drug delivery and imaging. In this context, the development of targeted, highly specific nanoparticles is of pivotal importance. The results of these advances will offer personalized diagnostic tools and treatments in the future. Based on the 2nd Else Kr ner-Fresenius-Symposium, this book presents a broad spectrum of topics ranging from nanoscale drug delivery/drug design to nanotoxicity and from diagnostics and imaging to therapeutic applications including antibody therapies. The contributions are authored by leading experts in the field and provide an excellent overview of the current knowledge in nanomedicine. Due to the interdisciplinary nature of the subject area this volume will be of special interest to physicians, biologists, chemists, engineers, and physicists as well as to students in the respective fields.

Emerging Nanotechnologies for Diagnostics, Drug Delivery and Medical Devices - Ashim K Mitra 2017-02-13

Emerging Nanotechnologies for Diagnostics, Drug Delivery and Medical Devices covers the modern micro and nanotechnologies used for diagnosis, drug delivery, and theranostics using micro, nano, and implantable systems. In-depth coverage of all aspects of disease treatment is included. In addition, the book covers cutting-edge research and technology that will help readers gain knowledge of novel approaches and their applications to improve drug/agent specificity for diagnosis and efficient disease treatment. It is a comprehensive guide for medical specialists, the pharmaceutical-industry, and academic researchers discussing the impact of nanotechnology on diagnosis, drug

delivery, and theranostics. Gives readers working in immunology, drug delivery, and medicine a greater awareness on how novel nanotechnology orientated methods can help improve treatment Provides readers with backgrounds in nanotechnology, chemistry, and materials science an understanding on how nanotechnology is used in immunology and drug delivery Includes focused coverage of the use of nanodevices in diagnostics, therapeutics, and theranostics not offered by other books

Nanotechnology Characterization Tools for Biosensing and Medical Diagnosis - Challa S.S.R. Kumar 2018-12-16

Eighth volume of a 40 volume series on nanoscience and nanotechnology, edited by the renowned scientist Challa S.S.R. Kumar. This handbook gives a comprehensive overview about Nanotechnology Characterization Tools for Biosensing and Medical Diagnosis. Modern applications and state-of-the-art techniques are covered and make this volume an essential reading for research scientists in academia and industry.

Nanomaterials in Drug Delivery, Imaging, and Tissue Engineering - Ashutosh Tiwari 2013-02-19

This groundbreaking, multidisciplinary work is one of the first books to cover Nanotheragnostics, the new developmental edge of nanomedicine. Through a collection of authoritative chapters, the book reports on nanoscopic therapeutic systems that incorporate therapeutic agents, molecular targeting, and diagnostic imaging capabilities. An invaluable reference for researchers in materials science, bioengineering, pharmacy, biotechnology, and nanotechnology, this volume features four main parts on biomedical nanomaterials, advanced nanomedicine, nanotheragnostics, and nanoscaffolds technology.

Biomedical Applications of Nanotechnology - Vinod Labhasetwar 2007-09-28

An overview of nanotechnology and its potential The field of nanotechnology is undergoing rapid developments on many fronts. This reference provides a comprehensive review of various nanotechnologies with a view to their biomedical applications. With chapters contributed by distinguished scientists from diverse disciplines, Biomedical Applications of Nanotechnology : Reviews recent advances in the designing of various nanotechnologies based on nucleic acids, polymers, biomaterials, and metals Discusses biomedical nanotechnology in areas such as drug and gene delivery Covers advanced aspects of imaging and diagnostics Includes a chapter on the issue of nanotoxicology Complete with figures and tables, this is a practical, hands-on reference book for researchers in pharmaceutical and biotech industries, biomedical engineers, pharmaceutical scientists, pharmacologists, and materials scientists as well as for the policymakers who need to understand the potential of nanotechnology. It is also an excellent resource book for graduate-level students in pharmaceutical sciences, biomedical engineering, and other fields in which nanotechnology is playing an increasingly important role.

Applications of Nanoscience in Photomedicine - Michael R. Hamblin 2015-02-17

Nanoscience has become one of the key growth areas in recent years. It can be integrated into imaging and therapy to increase the potential for novel applications in the field of photomedicine. In the past commercial applications of nanoscience have been limited to materials science research only, however, in recent years nanoparticles are rapidly being incorporated into industrial and consumer products. This is mainly due to the expansion of biomedical related research and the burgeoning field of nanomedicine. Applications of Nanoscience in Photomedicine covers a wide range of nanomaterials including nanoparticles used for drug delivery and other emerging fields such as optofluidics, imaging and SERS diagnostics. Introductory chapters are followed by a section largely concerned with imaging, and finally a section on nanoscience-enabled therapeutics. Covers a comprehensive up-to-date information on nanoscience Focuses on the combination of photomedicine with nanotechnology to enhance the diversity of applications Pioneers in the field have written their respective chapters Opens a plethora of possibilities for developing future nanomedicine Easy to understand and yet intensive coverage chapter by chapter

Nanoimaging - Beth A. Goins 2011-09-07

The first resource of its kind, this book covers cutting-edge research on the use of nanoparticles for in vivo diagnostic medical imaging and therapy. It discusses a variety of nanoparticles, including quantum dots, carbon nanotubes, dendrimers, gold nanoshells, metal nanorods, micelles, liposomes, polymers, MRI iron oxide particles, and microbubbles. Examples in the book include multifunctional nanoparticles that designed for multimodality imaging and simultaneous diagnostic and therapy (theranostic) applications.

Nanotechnology for Biomedical Imaging and Diagnostics - Mikhail Y. Berezin 2015-02-02

Nanotechnology for Biomedical Imaging and Diagnostics: FromNanoparticle Design to Clinical Applications reflects upon theincreasing role of nanomaterials in biological and medical imaging,presenting a thorough description of current research as wellas future directions. With contributions from experts innanotechnology and imaging from academia, industry, andhealthcare, this book provides a comprehensive coverage of thefield, ranging from the architectural design of nanomaterials totheir broad imaging applications in medicine. Grouped into three sections, the book: Elucidates all major aspects of nanotechnology andbioimaging Provides comprehensive coverage of the field, ranging from thearchitectural design of nanomaterials to their broad imagingapplications in medicine Written by well-recognized experts in academia, industry, andhealthcare, will be an excellence source of reference With a multidisciplinary approach and a balance of research anddiagnostic topics, this book will appeal to students, scientiests,and healthcare professionals alike

Biomedical Chemistry - Nuno Vale 2015-01-01

Biomedical Chemistry provides readers with an understanding of how fundamental chemical concepts are used to combat some diseases. The authors explain the interdisciplinary relationship of chemistry with biology, physics, pharmacy and medicine. The results of chemical research can be applied to understand chemical processes in cells and in the body, and new methods for drug transportation. Also, basic chemical ideas and determination of disease etiology are approached by developing techniques to ensure optimum interaction between drugs and human cells. This Book is an excellent resource for students and researchers in health-related fields with frontier topics in medicinal and pharmaceutical chemistry, organic chemistry and biochemistry.

Handbook on Nanobiomaterials for Therapeutics and Diagnostic Applications - Krishnan Anand 2021-03-18

Handbook of Nano-biomaterials for Therapeutics and Diagnostic Applications covers in-depth topics on nano-biomaterials and nano drug delivery systems (biosensors and bioimaging) involving polymer nanocomposites, metal nanocomposites, and other carbon family fibers and proteins. The book covers the current application of tiny machines or nanodevices and their use as early detection systems for life threatening diseases, giving detailed literature on the development of nanodevices, their use as diagnostic tools, and their present trend in the industry and market. In addition, their synthesis, potential applications and future of smart nanodevices in diagnosis of diseases and their use as smart clinical devices is covered. Users will find sections on recent advances in interdisciplinary research on the processing, morphology, structure and properties of nanostructured materials and their applications in drug delivery for various diseases such as cancer, tuberculosis, Alzheimer disease, ophthalmic diseases, and more. Offers a comprehensive coverage of the therapeutics and smart nanodevices as diagnostic tools and their potential clinical applications in biosensing and bioimaging Includes a glimpse into the nano-biomaterials that are essential components in nanomedicines Describes nanodevices in the early diagnosis of the diseases Explains the nano-drug delivery system for the treatment of various diseases, including cancer, tuberculosis, Alzheimer disease, and ophthalmic diseases Encompasses all information, starting from the design of nano-biomaterials to their applications in theranostics

Nanotoxicology - Hemant Kumar Daima 2021-07-15

The field of nanomedicine has risen quickly due to the increasing number of designer-made nanomaterials. These nanomaterials have the potential to manage diseases and change the way medicine is currently studied. However, the increased practice of using nanomaterials has shed light on how many concepts of nanomedicine and nanotoxicity have been overlooked. Nanotoxicology: Toxicity Evaluation of Nanomedicine Applications addresses the existing gaps between nanomedicine and nanotoxicity. This book also brings together up-to-date knowledge on advances toward safe-by-design nanomaterials and existing toxicity challenges. This book delivers a comprehensive coverage in the field with fundamental understanding, serving as a platform to convey essential concepts of nanotoxicology and how these concepts can be employed to develop advanced nanomaterials for a range of biomedical applications. This book is an effort to answer some of the thoughtful nanotoxicological complications and their auspicious probable solutions with new approaches and careful toxicity assessment. Key Features: Reveals novel nanoscale approaches, toxicity assessment, and biomedical applications Includes importance of nanotoxicity concepts in developing smart nanomaterials Highlights unique contributions and "A to Z" aspects on

the state-of-the-art from global leaders Offers a complete package to learn fundamentals with recommendations on nanomaterials toxicity and safe-by-design nanomedicines Nanotoxicology: Toxicity Evaluation of Nanomedicine Applications illuminates the high potential of many innovative nanomaterials, ultimately demonstrating them to be promising substitutes for available therapies that can be effectively used in fighting a myriad of biomedical complications. Further, this book reports legal, ethical, safety, and regulatory issues associated with nanomaterials, which have often been neglected, if not overlooked in literature and limiting clinical translation at nanoscale level. It will equip readers with cutting-edge knowledge of promising developments in nanomedicine and nanotoxicology, along with potential future prospects.

BioMEMS and Biomedical Nanotechnology - Mihrimah Ozkan 2007-04-03

Contributions reporting on fundamental and applied investigations of the material science, biochemistry, and physics of biomedical microdevices with applications to Genomics and Proteomics. Topics include gene expression profiling utilizing microarray technology; imaging and sensing for gene detection and use in DNA analysis; and coverage of advanced microfluidic devices and the Humane Genome Project.

Nanomaterials for Medical Diagnosis and Therapy - Challa S. S. R. Kumar 2007-04-16

Following an overview of nanotechnologies for diagnostic purposes, this book goes on to look at nanoparticle-based magnetic resonance, molecular and other imaging applications, as well as the potential roles of carbon nanotubes and bionanoparticles in biomedical applications. The book's main focus is on drug delivery systems based on nonporous and nanosize materials, solid lipid and polymeric nanoparticles, intelligent hydrogels, core-shell nanoparticles, and nanocapsules, rounded off by a discussion of their biomedical applications. The final part of this volume covers such biomedical strategies as gene therapy, synthetic gene-transfer vectors and targeted delivery.

Biomedical Materials and Diagnostic Devices - Ashutosh Tiwari 2012-10-16

The functional materials with the most promising outlook have the ability to precisely adjust the biological phenomenon in a controlled mode. Engineering of advanced bio- materials has found striking applications in used for biomedical and diagnostic device applications, such as cell separation, stem-cell, drug delivery, hyperthermia, automated DNA extraction, gene targeting, resonance imaging, biosensors, tissue engineering and organ regeneration.

Imaging in Stem Cell Transplant and Cell-based Therapy - Tarun Pandey 2017-05-29

This book provides a review of imaging techniques and applications in stem cell transplantation and other cell-based therapies. The basis of different molecular imaging techniques is explained in detail, as is the current state of interventional radiology techniques. While the whole is a comprehensive discussion, each chapter is self-sufficient enough so that each can be reviewed independently. The contributors represent years of international and cross-disciplinary expertise and perspective and are all well known in their fields. comprehensive information on the role of clinical and molecular imaging in stem cell therapy from this book reviewed in detail. Essential reading for radiologists and physicians who are interested in developing a basic understanding of stem cell imaging and applications of stem cells and cell based therapies. However, it will also be of interest to clinical scientists and researchers alike, including those involved in stem cell labeling, tracking & imaging, cancer therapy, angiogenesis and cardiac regeneration.

Nanoparticles in Analytical and Medical Devices - Fang Gang 2020-09-01

Nanoparticles in Analytical and Medical Devices presents the latest information on the use of nanoparticles for a diverse range of analytical and medical applications. Covers basic principles, proper use of nanoparticles in analytical and medical applications, and recent progress in the field. This comprehensive reference helps readers grasp the full potential of nanoparticles in their analytical research or medical practice. Chapters on cutting-edge topics bring readers up to date on the latest research and usage of nanoparticles, and a chapter on commercially available devices that utilize nanoparticles guides readers in overcoming issues with marketing biodevices. Synthesizes nanoparticle conjugation and other critical methods Covers nanoparticles in analytical methods and real analytical devices currently used in the medical field Provides useful new information not covered in the current literature in chapters on surface chemical functionalization for bio-immobilization and nanoparticle production from natural sources

Design and Applications of Nanoparticles in Biomedical Imaging - Jeff W.M. Bulte 2016-11-25

This book covers the most recent advances in using nanoparticles for biomedical imaging, including magnetic resonance imaging (MRI), magnetic particle imaging (MPI), nuclear medicine, ultrasound (US) imaging, computed tomography (CT), and optical imaging. Topics include nanoparticles for MRI and MPI, siRNA delivery, theranostic nanoparticles for PET imaging of drug delivery, US nanoparticles for imaging drug delivery, inorganic nanoparticles for targeted CT imaging, and quantum dots for optical imaging. This book serves as a valuable resource for the fundamental science of diagnostic nanoparticles and their interactions with biological targets, providing a practical handbook for improved detection of disease and its clinical implementation.

Nanotheranostics for Treatment and Diagnosis of Infectious Diseases - Keerti Jain 2022-05-21

Nanotheranostics for Treatment and Diagnosis of Infectious Diseases comprises the latest information on the technological advancements made in the field of nanotechnology for application in therapeutics with diagnostic applications. The book focuses on the theranostic applications of nanomaterials in infectious diseases, highlighting that rapid diagnosis, safe and effective treatment and strong preventive measures like vaccines are urgently needed. It compiles all relevant information to help scientists, researchers and students understand the role of nanomaterials, how nanomaterials could be explored simultaneously for therapeutic and diagnostic applications, and how to ensure safety and efficacy of these nanomaterials. Sections cover fundamental concepts, emerging concerns and challenges to combat infectious diseases, the characterization of nanomaterials for theranostic applications, and the toxicity, biocompatibility and regulatory perspectives in the diagnosis and treatment of infectious diseases. Compiles the latest information on the technological advancements made in the field of nanotechnology for applications in therapeutics Prepares researchers to get ready to fight any emergency which may arise due to the advent of infectious diseases Focuses on the theranostic applications of nanomaterials in infectious diseases Compiles all relevant information to help scientists, researchers and students in understanding the role of nanomaterials and how they could be explored for therapeutic and diagnostic applications

Bio-manufactured Nanomaterials - Kaushik Pal 2021-06-17

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 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.

Nanomaterial - Based Biomedical Applications in Molecular Imaging, Diagnostics and Therapy - Amitabha Acharya 2021-05-24

This book comprehensively reviews the recent advances in nanomaterial-based molecular imaging, diagnostics, and personalized therapy. It discusses the novel biocompatible fluorescent nanomaterials, their synthesis, and modern state of art characterization, as well as the various strategies for immobilization of biomacromolecules on the nanomaterial surface and approaches for increasing their stability. In addition, the book describes the synthesis of lectin nanoconjugates using different types of biocompatible raw materials and their systematic characterization. Lastly, it presents our current understanding of the biomolecular carona, which affects nanoparticle-based targeted drug delivery, and examines the conceptual approaches to improve the in-vivo efficacy of targeted drug delivery.

BioMEMS and Biomedical Nanotechnology - Abraham Lee 2014-11-05

blends materials, fabrication, and structure issues of developing nanobio devices in a single volume. treats major nanobio application areas such as drug delivery, molecular diagnostics, and imaging. chapters written by the leading researchers in the field.

Nanomaterials in Bionanotechnology - Ravindra Pratap Singh 2021-08-18

Nanomaterials in Bionanotechnology: Fundamentals and Applications offers a comprehensive treatment of nanomaterials in biotechnology from fundamentals to applications, along with their prospects. This book explains the basics of nanomaterial properties, synthesis, biological synthesis, and chemistry and demonstrates how to use nanomaterials to overcome problems in agricultural, environmental, and biomedical

applications. Features Covers nanomaterials for environmental analysis and monitoring for heavy metals, chemical toxins, and water pollutant detection Describes nanomaterials-based biosensors and instrumentation and use in disease diagnosis and therapeutics Discusses nanomaterials for food processing and packaging and agricultural waste management Identifies challenges in nanomaterials-based technology and how to solve them This work serves as a reference for industry professionals, advanced students, and researchers working in the discipline of bionanotechnology.

Diverse Applications of Nanotechnology in the Biological Sciences - Khalid Rehman Hakeem 2022-06-30

Diverse Applications of Nanotechnology in the Biological Sciences: An Essential Tool in Agri-Business and Health Care Systems explores the diverse roles that nanobiotechnology plays in the medical sciences, pharmacy, healthcare, and in plants and agriculture. Looking at the diverse applications of nanotechnology in the healthcare field, the chapter authors discuss its importance in drug delivery, biomedical imaging and medical diagnostics, and healthcare management. The volume emphasizes how nanomedicine can treat different types of cancers and can improve medical imaging for the diagnosis of different kinds of diseases, resulting in quicker and more accurate diagnosis and better treatment options. The volume delves into nanobiotechnology in plants and its application in nanofertilizers and nano-pesticides in agriculture. It also documents how agri-nanobiotechnology can be a tool for innovative green technology that can be applied for global food security, biodiversity, and climate change solutions. The themes of nanobiotechnology in medicine and in plants are merged in the chapter on the types and therapeutic effects of plant product-based nanomedicine for malignancies. The potential toxicity of nanoparticles in plants is also elucidated. This volume provides an insightful overview of nanobiotechnology in medicine and in plants and agriculture that will be valuable for researchers and scientists and faculty and students in the areas of nanobiotechnology, agriculture, plant molecular biology, and medicine and healthcare.

Introduction to Bionanotechnology - Young-Chul Lee 2020-03-11

This is a comprehensive overview of bionanotechnology to students in nanotechnology, biotechnology, bionanotechnology, related fields such as biology, chemistry, physics, and materials science and also everyone who is interested in this research area. It describes the definition of bionanomaterials, how they can be synthesized, characterized and applied in different fields. The current status and future of bionanotechnology, as well as its advantages and limitations, are comprehensively discussed throughout the book. This is an entry-level book which is easy for readers to understand its contents. In this book, we tried to identify the definition of bionanotechnology. Briefly, Bionanotechnology is the emerging research field that comes from the intersection of nanotechnology and biotechnology. Nanotechnology is referring to the design, development, and application of materials which at least one dimension at nanometer scale meanwhile biotechnology is developed based on knowledge about living systems and organisms to create or improve different products. The association of nanotechnology and biotechnology pave a way to develop a hybrid technology with unique features. Thus, this novel technology will be used to improve our living standard in different aspects from developing new medicine, food, and functional cosmetics, introducing new methods to analyze and treat cancer to protect environmental problems.

Medical Imaging: Concepts, Methodologies, Tools, and Applications - Management Association, Information Resources 2016-07-18

Medical imaging has transformed the ways in which various conditions, injuries, and diseases are identified, monitored, and treated. As various types of digital visual representations continue to advance and improve, new opportunities for their use in medical practice will likewise evolve. Medical Imaging: Concepts, Methodologies, Tools, and Applications presents a compendium of research on digital imaging technologies in a variety of healthcare settings. This multi-volume work contains practical examples of implementation, emerging trends, case studies, and technological innovations essential for using imaging technologies for making medical decisions. This comprehensive publication is an essential resource for medical practitioners, digital imaging technologists, researchers, and medical students.

Biosensors and Nanotechnology - Zeynep Altintas 2017-12-18

Provides a broad range of information from basic principles to advanced applications of biosensors and nanomaterials in health care diagnostics This book utilizes a multidisciplinary approach to provide a wide range of information on biosensors and the impact of nanotechnology on the development of biosensors for health care. It offers a solid background on biosensors, recognition receptors, biomarkers, and disease diagnostics. An overview of biosensor-based health care applications is addressed. Nanomaterial applications in biosensors and diagnostics are included, covering the application of nanoparticles, magnetic nanomaterials, quantum dots, carbon nanotubes, graphene, and molecularly imprinted nanostructures. The topic of organ-specific health care systems utilizing biosensors is also incorporated to provide deep insight into the very recent advances in disease diagnostics. Biosensors and Nanotechnology: Applications in Health Care Diagnostics is comprised of 15 chapters that are presented in four sections and written by 33 researchers who are actively working in Germany, the United Kingdom, Italy, Turkey, Denmark, Finland, Romania, Malaysia and Brazil. It covers biomarkers in healthcare; microfluidics in medical diagnostics; SPR-based biosensor techniques; piezoelectric-based biosensor technologies; MEMS-based cell counting methods; lab-on-chip platforms; optical applications for cancer cases; and more. Discusses the latest technology and advances in the field of biosensors and their applications for healthcare diagnostics Particular focus on biosensors for cancer Summarizes research of the last 30 years, relating it to state-of-the-art technologies Biosensors and Nanotechnology: Applications in Health Care Diagnostics is an excellent book for researchers, scientists, regulators, consultants, and engineers in the field, as well as for graduate students studying the subject.

Principles of Nanomedicine - Sourav Bhattacharjee 2019-10-18

The scope of nanotechnology in medical applications has expanded fast in the last two decades. With their unprecedented material properties, nanoscale materials present with unorthodox opportunities in a wide range of domains, including drug delivery and medical imaging. This book assembles the various facets of nanomedicine while discussing key issues such as physicochemical properties that enhance the appeal of nanomedicine. The book is an excellent resource for physicians, PhDs, and postdocs involved in nanomedicine research to learn and understand the scope and complexity of the subject. It begins with a short history of nanotechnology, followed by a discussion on the fundamental concepts and extraordinary properties of nanoscale materials, and then slowly unfolds into multiple chapters illustrating the uses of various nanomaterials in drug delivery, sensing, and imaging.