

emerging applications of colloidal noble metals in cancer nanomedicine

[#colloidal noble metals](#) [#cancer nanomedicine](#) [#gold nanoparticles](#) [#drug delivery systems](#) [#biomedical applications](#)

Explore the cutting-edge developments in cancer nanomedicine leveraging colloidal noble metals. This field showcases emerging applications of materials like gold nanoparticles for targeted drug delivery, diagnostics, and innovative therapeutic strategies, promising significant advancements in oncology.

Each syllabus includes objectives, reading lists, and course assessments.

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Nanotechnology in Medicine

This book will describe some of the most recent breakthroughs and promising developments in the search for improved diagnostics and therapies at the very small scales of living biological systems. While still very much a technology in the research and development stage, nanotechnology is already transforming today's medicine. This book, written by a general science author, provides a general overview of medical treatment potentials of nanotechnology in new, more effective drug delivery systems, in less invasive, ultra-small scale medical tools, and in new materials that can mimic or enhance natural materials like living tissue.

Nanostructured Materials based on Noble Metals for Advanced Biological Applications

The Special Issue "Nanostructured Materials Based on Noble Metals for Advanced Biological Applications" highlights the recent progress in gold and silver nanomaterials preparation/synthesis as well as their innovative applications in advanced applications, such as in nanomedicine and nanosensors. It is nowadays generally accepted that nanostructured noble metals allow the production of highly competitive materials. In fact, a specific design and rather simple and reliable preparation techniques can be used to obtain optimized material uses and possibilities for their reusability. One expects amazing future developments for these nanotechnologies from research laboratories to key industrial areas. The Guest Editor and the MDPI staff are therefore pleased to offer this Special Issue to interested readers, including researchers, graduate and PhD students as well as postdoctoral researchers, but also to the entire community interested in the wide world of nanomaterials.

Role of Nanotechnology in Cancer Therapy

The role of Nanotechnology in Cancer Therapy gives an overview of the innovative nanocarrier-based approaches for managing various cancers such as gastric, skin, lung, and prostate cancers. The book also explores the evolving targeting approaches specific to cancer and the immunotherapy-based nanomedicine approach. Several drug-delivery systems that reduce the overall toxicity of cytotoxic

drugs and increase their effectiveness and selectivity are also discussed in this book. Key Features- Discusses the potential benefits and therapeutic applications of nanoparticles in cancer management - Provides information about therapy in a range of cancers- Discusses recent developments in cancer nanomedicine including targeted therapy, immunotherapy nanoparticles and dual drug delivery- Includes safety and toxicity considerations- Provides references for advanced readers This book will inform a broad range of readers including undergraduate and postgraduate students, oncologists, pharmacists, and researchers involved in nanomedicine and nano-drug delivery about current advancements in cancer nanomedicine.

Gold Nanoparticles

Gold nanoparticles provide a platform for the development of new and efficient diagnostic and therapeutic tools. This book offers a general guide to the synthesis and coating of gold nanoparticles. It describes the links between optical features and geometries of gold nanoparticles and provides a readily comprehensible connection in all the chapters between the geometry of gold nanoparticles and their final applications.

Application of Nanotechnology in Biomedical Sciences

This book highlights the wide applications of nanomaterials in healthcare and environmental remediation. Presenting nano-based materials that positively influence the growth and proliferation of cells present in soft and hard tissue and are used for the regeneration bone tissue and/or suppression of cancer cells, it also discusses the natural products that can be incorporated in nanofibers for the treatment of cancer. Further, it describes the use of blending and functionalization to produce chitosan nanofibers for biomedical applications, and reviews the role of plasma-enhanced gold nanoparticles in diagnostics and therapeutics. Lastly, the book also introduces various nanotechnology approaches for the removal of waste metabolites in drinking water, and explores the emerging applications of nanorobotics in medicine. Given its scope, this book is a valuable resource for scientists, clinicians, engineers and researchers aiming to gain a better understanding of the various applications of nanotechnology.

Cancer Nanotechnology

Advances in Cancer Research, Volume 139, provides invaluable information on the exciting and fast-moving field of cancer research. Original reviews are presented on a variety of topics relating to the rapidly developing intersection between nanotechnology and cancer research, with unique sections in the new release focusing on Exosomes as a theranostic for lung cancer, Nanotechnology and cancer immunotherapy, Ultrasound imaging agents and delivery systems, Dendronized systems for the delivery of chemotherapeutics, Thermosensitive liposomes for image-guided drug delivery, Supramolecular Chemistry in Tumor Analysis and Drug Delivery, Gold nanoparticles for delivery of cancer therapeutics, and Single cell barcode microchip for cancer research and therapy. Provides the latest information on cancer research Offers outstanding and original reviews on a range of cancer research topics Serves as an indispensable reference for researchers and students alike

Nanotheranostics

This book is specifically designed to provide information about various nanocarriers currently developed under the emerging field of nanotheranostics for a sustained, controlled, and targeted co-delivery of diagnostic and therapeutic agents. Diverse theranostic applications of nanotechnology and their limitations are also addressed. It integrates nanobiotechnology with theranostic applications. The combined term nanotheranostics has diverse application particularly in chemotherapy and other infectious diseases. Among other topics addressed are antimicrobial resistance, targeting intra-cellular pathogens, viruses and bacteria, chemotherapy, cancer therapeutics, and inflammatory disorders. This interdisciplinary volume is essential for a diverse group of readers including nanotechnologists, microbiologists, biotechnologists, bioengineering and bioprocess industry.

Colloid Science in Pharmaceutical Nanotechnology

This book presents studies on colloidal particle/nanoparticle systems and their applications. Some of the topics covered are include nanoparticle-based drug design, theranostic nanoparticles for cancer therapy, market perspectives of colloidal particles, and stability of nanoparticles. The authors focus on

recent findings, applications, and new technological developments of the fundamental properties of colloidal particle systems.

Advances and Challenges in Nanomedicine

Nanotechnology is a multidisciplinary field that is revolutionizing the way we detect and treat damage to the human body. Nanomedicine applies nanotechnology to highly specific medical interventions for the prevention, diagnosis, and treatment of diseases. They are increasingly being used to overcome biological barriers in the body to improve the way we deliver compounds to specific tissues and organs. In particular, nanomedicines have been shown to be beneficial for stabilizing therapeutic compounds, overcoming obstacles to cellular and tissue uptake, and improving biodistribution of compounds to target sites in vivo. Nanomedicines have demonstrated significant therapeutic advantages for a multitude of biomedical applications, however the clinical translation of these nanotechnology platforms has not progressed as quickly as the plethora of positive results would have suggested. Understanding the advances in nanomedicine to date and the challenges that still need to be overcome, will allow future research to improve on existing platforms and to address the current translational and regulatory limitations. This eBook "Advances and Challenges in Nanomedicine" has brought together experts in the fields of nanomedicine, nanotechnology, nanotoxicology, pharmaceuticals, manufacturing, and translation to discuss the application of nanotechnology to drug delivery. This information is presented as original research, opinion, perspective, and review articles. The goal of this eBook is to generate collaborative discussion on the current status, general trends, challenges, strategies, and future direction of pharmaceutical nanotechnology, as well as highlight current and emerging nanoparticulate platforms with potential medical applications.

Cancer Nanotheranostics

Nanotechnology is an interdisciplinary research field that integrates chemistry, engineering, biology, and medicine. Nanomaterials offer tremendous opportunity as well as challenges for researchers. Of course, cancer is one of the world's most common health problems, responsible for many deaths. Exploring efficient anticancer drugs could revolutionize treatment options and help manage cancer mortality. Nanomedicine plays a significant role in developing alternative and more effective treatment strategies for cancer theranostics. This book mainly focuses on the emerging trends using nanomaterials and nanocomposites as alternative anticancer materials. The book is divided into three main topic areas: how to overcome existing traditional approaches to combat cancer, applying multiple mechanisms to target the cancer cells, and how nanomaterials can be used as effective carriers. The contents highlight recent advances in interdisciplinary research on processing, morphology, structure, and properties of nanostructured materials and their applications to combat cancer. Cancer Nanotheranostics is comprehensive in that it discusses all aspects of cancer nanotechnology. Because of the vast amount of information, it was decided to split this material into two volumes. In the first volume of Cancer Nanotheranostics, we discuss the role of different nanomaterials for cancer therapy, including lipid-based nanomaterials, protein and peptide-based nanomaterials, polymer-based nanomaterials, metal-organic nanomaterials, porphyrin-based nanomaterials, metal-based nanomaterials, silica-based nanomaterials, exosome-based nanomaterials and nano-antibodies. In the second volume, we discuss the nano-based diagnosis of cancer, nano-oncology for clinical applications, nano-immunotherapy, nano-based photothermal cancer therapy, nano-erythrocytes for cancer drug delivery, regulatory perspectives of nanomaterials, limitations of cancer nanotheranostics, the safety of nano-biomaterials for cancer nanotheranostics, multifunctional nanomaterials for targeting cancer nanotheranostics, and the role of artificial intelligence in cancer nanotheranostics.

Colloidal Synthesis of Plasmonic Nanometals

Noble metal nanoparticles have attracted enormous scientific and technological interest because of their unique optical properties, which are related to surface plasmon resonances. The interest in nanosized metal particles dates back to ancient societies, when metals were used in various forms as decorative elements. From the famous Lycurgus cup, made by the Romans in the 4th century AD, through thousands of stained glasses in churches and cathedrals all over medieval Europe, bright-yellow, green, or red colors have been obtained by a touch of metallic additions during glass blowing. This peculiar interaction of light with nanometals can be widely tuned through the morphology and assembly of nanoparticles, thereby expanding the range of potential applications, from energy and information storage to biomedicine, including novel diagnostic and therapeutic methods. This book

compiles recent developments that clearly illustrate the state of the art in this cutting-edge research field. It comprises different review articles written by the teams of Prof. Luis Liz-Marzán, an international leader in chemical nanotechnology who has made seminal contributions to the use of colloid chemistry methods to understand and tailor the growth of metal particles at the nanoscale. Apart from synthesis, the book also describes in detail the plasmonic properties of nanomaterials and illustrates some representative applications. This book will appeal to anyone involved in nanotechnology, nanocrystal growth, nanoplasmonics, and surface-enhanced spectroscopies.

Nanotechnology-Based Precision Tools for the Detection and Treatment of Cancer

This book discusses emerging nanotechnology-based tools that have the potential to dramatically impact cancer research, diagnostics, and treatment. Cancer is a complex, devastating, and debilitating disease and, although much progress has been made, novel, more effective diagnostic and treatment options are still needed, especially for advanced cancers. The ultimate goal is to detect cancer early and non-invasively and to provide efficacious and targeted precision treatments that cause fewer harmful side effects. This book explains how nanotechnology can exploit the size-, shape-, and composition-dependent properties of nanomaterials to provide novel tools for precision cancer medicine. It will be of interest to researchers and professionals working in the fields of chemistry, biology, materials science and engineering, and medicine who want to learn more about this fascinating and fast-paced area of research.

Metal Nanoparticles

A much-needed summary of the importance, synthesis and applications of metal nanoparticles in pharmaceutical sciences, with a focus on gold, silver, copper and platinum nanoparticles. After a brief introduction to the history of metal complexes in medicine and fundamentals of nanotechnology, the chapters continue to describe different methods for preparation of metal nanoparticles. This section is followed by representative presentations of current biomedical applications, such as drug delivery, chemotherapy, and diagnostic imaging. Aimed at stimulating further research in this field, the book serves as an reference guide for academics and professionals working in the field of chemistry and nanotechnology.

Integrative Nanomedicine for New Therapies

This book presents current laboratory, scientific and clinical aspects of nanomaterials used for medical applications in the fields of regenerative medicine, dentistry and pharmacy. It gives a broad overview of the in vitro compatibility assessment of nanostructured materials implemented in the medical field by the combination of classical biological protocols. The chapters cover all aspects of integrative medicine, such as green derived nanomaterials for biological applications; synthetic and nature-derived lipid nanoparticles and polymer nanoparticles.

Engineered Nanomaterials for Innovative Therapies and Biomedicine

Research on biomedical applications of nanomaterials has exhibited the rapidly evolving field of biomedical sciences by showing how effective they are in treatment. These particles hold considerable potential for biomedical applications. Work is ongoing, and the results suggest a possibility for a sustainable future for nanomaterials in both therapeutic and biomedical fields. This book highlights current and emerging applications, taking global research findings into consideration. We believe the focus on the identification and role of nanomaterial applications in therapeutic and biomedical sciences can lead to novel solutions in the fields. The chapters of this book are disseminated in a manner that can be readily adopted as sources for new and further study. The editors integrate advanced texts in their research that help graduate students, researchers and professors. Additionally, we believe that international readers will be able to make use of this book for reference purposes.

Emerging Trends in Immunomodulatory Nanomaterials Toward Cancer Therapy

Recently, immunomodulatory nanomaterials have gained immense attention due to their involvement in the modulation of the body's immune response to cancer therapy. This book highlights various immunomodulatory nanomaterials (including organic, polymer, inorganic, liposomes, viral, and protein nanoparticles) and their role in cancer therapy. Additionally, the mechanism of immunomodulation is reviewed in detail. Finally, the challenges of these therapies and their future outlook are discussed. We

believe this book will be helpful to a broad community including students, researchers, educators, and industrialists.

Metal Nanoparticles for Drug Delivery and Diagnostic Applications

Metal Nanoparticles for Drug Delivery and Diagnostic Applications addresses the lifecycle of metal nanoparticles, from synthesis and characterization, to applications in drug delivery and targeting. It is an important resource for those in biomaterials, nanomedicine and pharmaceutical sciences, exploring gold, silver and iron-based drug delivery systems for controlled and targeted delivery of potential drugs and genes for enhanced clinical efficacy. Nanotechnology is widely used in drug delivery due to its ability to reduce plasma fluctuation of drugs, high solubility, and efficiency, the relatively low cost of nanoscale products, and enhancement of patient comfort, hence this resource is a welcome edition to the science. Illustrates the progression of nanoparticle therapeutics from basic research to applications Explores new opportunities and ideas for developing and improving technologies in nanomedicine and nanobiology Discusses the toxicity of different types of metal nanoparticles and how to ensure their safe use

Nanomedicine for Cancer Diagnosis and Therapy

This book reviews the current applications and future prospects of nanomaterials in cancer diagnostics and therapy. Nanomaterials have recently emerged as a remarkable and promising tool for cancer therapy and diagnosis, due to their broad range of intrinsic molecular properties. To overcome the current limitations of nanoparticles in drug delivery systems, attempts have been made to synthesize nanoparticles from biological materials for targeted cancer therapy. This book provides concise evaluations of various potential bio-inspired platforms that mimic natural components of the body and offer effective and versatile drug delivery systems for cancer therapy. It also assesses the potential of nanoparticles to enhance the outcomes of cancer immunotherapy via immune cell activation and tumor microenvironment modulation. The book also summarizes in the applications of nanomaterials for the detection, prevention, and treatment of solid tumors and in the treatment of leukemia and lymphomas. In closing, it discusses ethical issues in nanomedicine, including risk assessment, risk management, and risk communication during clinical trials. The book offers a valuable source of information for students, academics, researchers, scientists, clinicians, and healthcare professionals working in nanotechnology and cancer research.

Nano-Oncologicals

This authoritative volume focuses on emerging technologies in cancer nano medicine, characterized by their multi-functionality and potential to address simultaneously diverse issues of clinical relevance in the treatment of cancer. The book consists of sixteen chapters divided into six sections: 1) Biological Barriers in Cancer; 2) Tumor Targeting; 3) Targeting the Immune System; 4) Gene Therapy; 5) Nano theranostics and 6) Translational Aspects of Nano-Oncologicals. The volume starts with an introduction describing the biological barriers associated with cancer therapy and highlighting ways to overcome such barriers through the use of nanotechnology. This is followed by an analysis of the two major targeting strategies currently under investigation in cancer therapy: namely, the targeting of cancer cells and the targeting of the immune system. In the first case, the book presents liposomal and polymer-based therapies, including photodynamic approaches. In the second case, it analyzes in detail the possibility of either improving the efficiency of the immune system toward preventing cancer progression (cancer immunomodulation) or generating responses against specific cancer antigens (cancer vaccines). Beyond these targeting options, Nano-Oncologicals: New Targeting and Delivery Approaches presents the most recent technological advances in the area of nucleic acid-based therapies, along with those in the area of theranostics, where the design of multifunctional nano carriers becomes vital. Following the study of the most promising nanotechnologies around the development of nano-oncologicals, the book ends with an overview of regulatory and toxicological issues, which are critical in their translational pathway, and the presentation of a nucleic acid-based therapy case-study. This book is an important resource for scientists interested in the design and development of anticancer nanotechnologies and also to those aiming to push their technology through clinical development.

Nanobiotechnology

Nanotechnology is considered the next big revolution in medicine and biology. For the past 20 years, research groups have been involved in the development of new applications of novel nanomaterials

for biotechnological applications. Nanomaterials are also becoming increasingly important in medical applications, with new drugs and diagnostic tools based on nanotechnology. Every year, hundreds of new ideas using nanomaterials are applied in the development of biosensors. An increasing number of new enterprises are also searching for market opportunities using these technologies. Nanomaterials for biotechnological applications is a very complex field. Thousands of different nanoparticles could potentially be used for these purposes. Some of them are very different; their synthesis, characterization and potentiality are very diverse. This book aims to establish a route guide for non-erudite researchers in the field, showing the advantages and disadvantages of the different kind of nanomaterials. Particular attention is given to the differences, advantages and disadvantages of inorganic nanoparticles versus organic nanoparticles when used for biotechnological applications. A tutorial introduction provides the basis for understanding the subsequent specialized chapters. Provides an overview of the main advantages and disadvantages of the use of organic and inorganic nanoparticles for use in biotechnology and nanomedicine Provides an excellent starting point for research groups looking for solutions in nanotechnology who do not know which kind of materials will best suit their needs Includes a tutorial introduction that provides a basis for understanding the subsequent specialized chapters

Clinical Applications of Magnetic Nanoparticles

Offering the latest information in magnetic nanoparticle (MNP) research, this book builds upon the success of the first volume and provides an updated and comprehensive review, from synthesis, characterization, and biofunctionalization to clinical applications of MNPs, including the diagnosis and treatment of cancers. The book captures some of emerging research area which was not available in the first volume. Good Manufacturing Practices and Commercialization of MNPs are also included. This volume, also written by some of the most qualified experts in the field, incorporates new developments in the literature, and continues to bridge the gaps between the different areas in this field.

Nanomaterial

The rapidly developing field of nanomaterials has expanded in many commercial areas. More recent studies have begun to provide a foundation for understanding how nanomaterials influence cells and how they also can serve as methodological tools for studies in medicine and cell biology, including research into stem cells. Recent investigations have shown affects of nanomaterials on specific subcellular structures, such as the actin-based brush border network in cells with an increasing emphasis on the barrier function of epithelial tissues. While other studies have shown involvement of nanoparticles in specific cytoplasmic signal transduction events such as the rise in intracellular free calcium, a signaling event known to regulate many changes in cell architecture and function. In parallel, nanomaterials are increasingly used in medicine for drug delivery, treatment of cancer and an increasing number of new applications. This book investigates these areas and also includes new methods for assessment in cell biology and medicine.

Cancer Nanotechnology

Rapid advances in nanotechnology have enabled the fabrication of nanoparticles from various materials with different shapes, sizes, and properties, and efforts are ongoing to exploit these materials for practical clinical applications. Nanotechnology is particularly relevant in the field of oncology, as the leaky and chaotic vasculature of tumors—a hallmark of unrestrained growth—results in the passive accumulation of nanoparticles within tumors. Cancer Nanotechnology: Principles and Applications in Radiation Oncology is a compilation of research in the arena of nanoparticles and radiation oncology, which lies at the intersection of disciplines as diverse as clinical radiation oncology, radiation physics and biology, nanotechnology, materials science, and biomedical engineering. The book provides a comprehensive, cross-disciplinary survey of basic principles, research techniques, and outcomes with the goals of eventual clinical translation. Coverage includes A general introduction to fabrication, preferential tumor targeting, and imaging of nanoparticles The specific applications of nanomaterials in the realms of radiation therapy, hyperthermia, thermal therapy, and normal tissue protection from radiation exposure Outlooks for future research and clinical translation including regulatory issues for ultimate use of nanomaterials in humans Reflecting profound advances in the application of nanotechnology to radiation oncology, this comprehensive volume demonstrates how the unique physicochemical properties of nanoparticles lead to novel strategies for cancer treatment and detection. Along with various computational and experimental techniques, each chapter highlights the most promising approaches to the use of nanoparticles for radiation response modulation.

Current Advances in the Medical Application of Nanotechnology

Nanotechnology promises new medical therapies, more rapid and sensitive diagnostic and investigative tools for normal and diseased tissues, and new materials for tissue engineering. This e-book highlights the major current uses, new technologies and future perspectives of nanotechnology in relation to medical applications. Sections in this e-book include nanobiological approaches to imaging, diagnosis and treatment of disease using targeted monoclonal antibodies and siRNA, the medical use of nano-materials, to nanoelectronic biosensors, and possible future applications of molecular nanotechnology.

Cancer Nanotechnology

Cancer nanotechnology is a growing, emerging area of cross-disciplinary research that aims to develop efficient, specific and noninvasive approaches to restore the health and well-being of all cancer patients through more effective diagnosis and treatment. This new volume serves as a fundamental guide to cutting-edge topics in cancer nanotechnology, including advances in therapy, the use of nanoparticles and nanomaterials, future directions for nanocarriers in cancer therapy, and the application of DNA and RNA nanovaccines. Organized into four sections, the volume presents an overview of research and innovation in the emerging field of nanotechnology as a powerful tool in the diagnosis, imaging and treatment of cancer. International experts author chapters addressing targets of cancer therapy, materials for cancer nanotechnology, strategies for cancer therapy using nanotechnology, and innovative nanotechnologies for cancer diagnosis and treatment. The volume will be useful for a broad audience, including cross-disciplinary researchers, trainees, health professionals, and experts in industry.

Nanomedicine for Drug Delivery and Therapeutics

This book describes a broad area of nanomedicine which involves mainly applications, diseases, and diagnostics. The comprehensive coverage provides researchers, academics, and health specialists with a great tool, that includes techniques applicable to various uses.

Nano-Bioremediation: Fundamentals and Applications

Nano-Bioremediation: Fundamentals and Applications explores how nano-bioremediation is used to remedy environmental pollutants. The book's chapters focus on the design, fabrication and application of advanced nanomaterials and their integration with biotechnological processes for the monitoring and treatment of pollutants in environmental matrices. It is an important reference source for materials scientists, engineers and environmental scientists who are looking to increase their understanding of bioremediation at the nanoscale. The mitigation of environmental pollution is the biggest challenge to researchers and the scientific community, hence this book provides answers to some important questions. As an advanced hybrid technology, nano-bioremediation refers to the integration of nanomaterials and bioremediation for the remediation of pollutants. The rapid pace of urbanization, massive development of industrial sectors, and modern agricultural practices all cause a controlled or uncontrolled release of environmentally-related hazardous contaminants that are seriously threatening every key sphere, including the atmosphere, hydrosphere, biosphere, lithosphere, and anthroposphere. Explores the current and potential applications of nano-bioremediation in the remediation of hazardous pollutants. Outlines the major properties and classes of nanomaterials that make them efficient bioremediation agents. Assesses the major challenges of effectively implementing bioremediation techniques at the nanoscale.

New Nanomaterials and Techniques for Tumor-targeted Systems

This book summarizes the latest advances in nanomaterials and techniques in the field of tumor-targeted diagnosis and therapy. It provides valuable information for beginners and senior researchers, and stimulates new research directions by offering novel and provocative insights into the properties and technical principles of nanomaterials. The book systemically discusses the challenges in tumor treatment, current tumor-targeted strategies, drug-release strategies, diagnosis and therapeutic patterns, and also explores newly developed multifunctional nanomaterials and related systems.

Noble Metal-Metal Oxide Hybrid Nanoparticles

Noble Metal-Metal Oxide Hybrid Nanoparticles: Fundamentals and Applications sets out concepts and emerging applications of hybrid nanoparticles in biomedicine, antibacterial, energy storage and electronics. The hybridization of noble metals (Gold, Silver, Palladium and Platinum) with metal-oxide nanoparticles exhibits superior features when compared to individual nanoparticles. In some cases,

metal oxides act as semiconductors, such as nano zinc oxide or titanium oxide nanoparticles, where their hybridization with silver nanoparticles, enhanced significantly their photocatalytic efficiency. The book highlights how such nanomaterials are used for practical applications. Examines the properties of metal-metal oxide hybrid nanoparticles that make them so adaptable Explores the mechanisms by which nanoparticles interact with each other, showing how these can be exploited for practical applications Shows how metal oxide hybrid nanomaterials are used in a range of industry sectors, including energy, the environment and healthcare

Nanomedicine

Increasing demand for and awareness of the applications of nanotechnology in medicine has resulted in the emergence of a new fast-growing multidisciplinary area - nanomedicine. This book offers comprehensive knowledge of and diverse perspectives on nanomedicine through two independent volumes. It aims to bridge the gap between nanotechnology and medicine through contributions by world-renowned experts from wide range of backgrounds including academia, industry, professional consultancy, and government agencies. Each contribution integrates knowledge from a wide range of areas to present the fundamentals of new applications and products of nanomedicine, as well as an outlook for the future. This book can well serve as a reference and guide for students, academics, researchers, scientists, engineers, clinicians, government researchers, and healthcare professionals.

Nanoparticles in Medicine

This book describes the medical applications of inorganic nanoparticles. Nanomedicine is a relatively advanced field, which enhances the treatment of various diseases, offering new options for overcoming the problems associated with the use of conventional medicines. Discussing the toxicological and safety aspects associated with medical applications of nanoparticles, the book presents the latest research on topics such as emerging nanomaterials for cancer therapy, applications of nanoparticles in dentistry, and fluoride nanoparticles for biomedical applications, and also includes chapters on the use of nanoparticles such as silver and gold. /div

Magnetic Nanoparticles in Human Health and Medicine

Magnetic Nanoparticles in Human Health and Medicine Explores the application of magnetic nanoparticles in drug delivery, magnetic resonance imaging, and alternative cancer therapy Magnetic Nanoparticles in Human Health and Medicine addresses recent progress in improving diagnosis by magnetic resonance imaging (MRI) and using non-invasive and non-toxic magnetic nanoparticles for targeted drug delivery and magnetic hyperthermia. Focusing on cancer diagnosis and alternative therapy, the book covers both fundamental principles and advanced theoretical and experimental research on the magnetic properties, biocompatibilization, biofunctionalization, and application of magnetic nanoparticles in nanobiotechnology and nanomedicine. Chapters written by a panel of international specialists in the field of magnetic nanoparticles and their applications in biomedicine cover magnetic hyperthermia (MHT), MRI contrast agents, -biomedical imaging, modeling and simulation, nanobiotechnology, toxicity issues, and more. Readers are provided with accurate information on the use of magnetic nanoparticles in diagnosis, drug delivery, and alternative cancer -therapeutics—featuring discussion of current problems , -proposed solutions, and future research directions. Topics include current applications of magnetic iron oxide nanoparticles in nanomedicine and alternative cancer therapy: drug delivery, magnetic resonance imaging, superparamagnetic hyperthermia as alternative cancer therapy, magnetic hyperthermia in clinical trials, and simulating the physics of magnetic particle heating for cancer therapy. This comprehensive volume: Covers both general research on magnetic nanoparticles in medicine and specific applications in cancer therapeutics Discusses the use of magnetic nanoparticles in alternative cancer therapy by magnetic and superparamagnetic hyperthermia Explores targeted medication delivery using magnetic nanoparticles as a future replacement of conventional techniques Reviews the use of MRI with magnetic nanoparticles to increase the diagnostic accuracy of medical imaging Magnetic Nanoparticles in Human Health and Medicine is a valuable resource for researchers in the fields of nanomagnetism, magnetic nanoparticles, nanobiomaterials, nanobioengineering, biopharmaceuticals nanobiotechnologies, nanomedicine, and biopharmaceuticals, particularly those focused on alternative cancer diagnosis and therapeutics

Update on Gold Nanoparticles

In the last decade, gold nanoparticles have provided a suitable platform for the development of novel and efficient diagnostic and therapeutic tools, which avoid the typical drawbacks of the old systems. They are biocompatible and they can be easily synthesised, encapsulated and functionalised with (bio)molecules. Nanoparticles produced by a wet chemistry synthesis have the geometry, which enables the complete control of their optical and physical properties. It is also possible to influence the targeting and stability/release behaviour by coating the nanoparticle surface. In this Update the reader can find in a single volume the methods used most often for the synthesis and coating of gold nanoparticles (spheres, cages, cubes, rods), the links between optical features and geometries of gold nanoparticles, and the novel applications in nanomedicine of gold nanoparticles determined by their geometry. One of the main objectives of this Update is to provide, a readily comprehensible connection in all the chapters between the geometry of gold nanoparticles and their final applications. Another target of this book is to provide information about efficient processes for the synthesis and the coating of gold nanoparticles, all of which have been directly tested by the author. This Update offers comprehensive information on the whole topic from the synthesis of the gold nanoparticles to their medical applications; this is accompanied by a complete and recent bibliography, in order to give to the readers the opportunity to research further the topics addressed in the book. In this way, students and researchers from academia and industry can have a complete picture of gold nanostructures, physicians and biologists can develop ideas and applications for the new nano-tools, and chemists can have a general guide to the synthesis of gold nanoparticles. This is a state-of-the-art guide for the synthesis and uses of gold nanoparticles.

Nanoparticles in Diagnosis, Drug Delivery and Nanotherapeutics

The integration of nanotechnology with biomaterials, diagnostic tools, analytical equipment, physiotherapy kits, and drug delivery agents has resulted in nanotherapeutics illustrated as a class of medicine with potential of research and development. This book illustrates synthesis, properties, and applications of nanotherapeutics in various healthcare-related issues including treatment of cancer, Alzheimer's disease, targeted drug delivery, anti-HIV-1 nanotherapeutics, antibacterial/antiviral agents, skin therapy, and hyperthermia. Features: Consolidates different aspects of nanoparticles such as synthesis and types of nanotherapeutics in a detailed manner. Presents categorical classification of nanoparticles as therapeutics. Covers the sustainability of nanotherapeutics. Reviews fabrication and advancement of all categories of nanotherapeutics. Discusses specific applications such as in cancer therapy, skin treatments, and targeted drug delivery. This book is aimed at researchers, professionals, and senior undergraduate students in materials and medical science, biomedical engineering, and nanotechnology

Emerging Trends in Nanomedicine

This book illustrates the significance of nanotechnology in the delivery of anticancer and antimicrobial drugs, biomimetic technologies, tissue engineering, sensing, diagnostics, and artificial enzymes. It first briefly discusses the use of nanotechnology for the delivery of anticancer medications, and the concept and applications of catalytically active nanomaterial-based artificial enzymes for sensing and diagnostic applications. It then explores the use of silver nanoparticle-based novel antimicrobials, and comprehensively reviews the role of nanomaterials in developing biomedical implants and tissue engineering applications. Lastly, it offers a detailed description of nanotherapeutics for combating human protozoan parasitic infections. Cutting across the disciplines, this book serves as a guide for researchers and scientists in biotechnology, medical science and material science.

Biomedical Applications of Metals

Focused more specifically on the recent advances in applications of various metals and their complexes used in biomedicine, particularly in the diagnosis and treatment of chronic diseases. The editors give equal importance to other key aspects such as toxicological issues and safety concerns. The application of metals in the biomedical field is highly interdisciplinary and has a broad appeal across all biomedical specialties. Biomedical Applications of Metals is particularly focused on covering the role of metals in medicine and the development of novel therapeutic products and solutions in the form of alternative medicines, and some topics on Indian traditional medicine i.e., "Ayurveda". In Section I, the book discusses the role of metals in medicines and include chapters on nanoparticles, noble metals, medical devices, copper, selenium, silver, and microbial pathogens; while Section II includes topics on metals toxicity including heavy metals, carcinogens, cancer therapy, Bhasma's and chelating agents used in

Ayurveda, and biochemical and molecular targets including actions of metals. These new and emerging concepts of applications of metals in medicine, their crucial role in management of microbial resistance, and their use in the treatment of various chronic diseases is essential information for toxicologists, and clinical and biomedical researchers.

Smart Nanomaterials in Biomedical Applications

With the start of 2020, the wrath of pandemic challenged the scientific community to develop more advanced drug delivery approaches for biomedical applications, endowing conventional drugs with additional therapeutic benefits and minimum side effects. Although significant advancements have been done in the field of drug delivery, there is a need to focus towards strategizing novel and improved drug delivery systems that should be convenient and cost-effective to the patients, and simultaneously they should also provide financial benefits to pharmaceutical companies. Controlled drug delivery technology offers ample opportunities and scope for improvising the therapeutic efficacy of drugs via optimizing the drug release rate and time. For this endeavour, smart nanomaterials have served as remarkable candidates for biomedical applications, owing to their ground-breaking properties and design. The development of such nanomaterials requires a broad knowledge related to their physio-chemical properties, molecular structure, mechanisms by which the nanomaterials interact with the cells, and methods by which drugs are released at the site of action. This knowledge must also be allied with the knowledge of signaling crosstalk mechanisms that are modulated by the nanomaterial-drugs composite. It can be anticipated that these emerging drug delivery technologies can facilitate the world to successfully encounter such pandemic outbursts in the future in a cost-effective and time-effective manner. The chapters in this book deal with the advanced technologies and approaches that can benefit advanced students, researchers, and industry experts in developing smart and intelligent nanomaterials for future biomedical applications, and development, manufacturing, and commercialization for controlled and targeted drug delivery.

Hybrid Nanomaterials

Over the last decade, an unprecedented expansion in the field of nanomedicine has resulted in the development of new nanomaterials for diagnosis and therapy of various diseases such as cancer. This book covers the design, synthesis and applications of various functionally-hybridized nanomaterials for biomedical applications. It includes strategies for design and synthesis of hybrid nanomaterials, surface engineering of various nanoparticle-based hybrid nanosystems for cancer imaging and therapy, toxicity aspects of nanomaterials and the challenges in translation research of hybrid nanomaterials.

Handbook of Nanobiomedical Research

This book consists of 4 volumes containing about 70 chapters covering all the major aspects of the growing area of nanomedicine. Leading scientists from 15 countries cover all major areas of nanobiomedical research materials for nanomedicine, application of nanomedicine in therapy of various diseases, use of nanomedicines for diagnostic purposes, technology of nanomedicines, and new trends in nanobiomedical research. This is the first detailed handbook specifically addressing various aspects of nanobiomedicine. Readers are treated to cutting-edge research and the newest data from leading researchers in this area. Contents: "Materials for Nanomedicine: "Liposomal Nanomedicines "(Amr S Abu Lila, Tatsuhiro Ishida and Theresa M Allen)"Solid Lipid Nanoparticles for Biomedical Applications "(Karsten Mader)"Micellar Nanopreparations for Medicine "(Rupa Sawant and Aditi Jhaveri)"Nanoemulsions in Medicine "(William B Tucker and Sandro Mecozzi)"Drug Nanocrystals and Nanosuspensions in Medicine "(Leena Peltonen, Jouni Hirvonen and Timo Laaksonen)"Polymeric Nanosystems for Integrated Image-Guided Cancer Therapy "(Amit Singh, Arun K Iyer and Mansoor M Amiji)"Polysaccharide-Based Nanocarriers for Drug Delivery "(Carmen Teijeiro, Adam McGlone, Noemi Csaba, Marcos Garcia-Fuentes and Maria J Alonso)"Dendrimers for Biomedical Applications "(Lisa M Kaminskis, Victoria M McLeod, Seth A Jones, Ben J Boyd and Christopher J H Porter)"Layer-by-Layer Nanopreparations for Medicine Smart Polyelectrolyte Multilayer Capsules and Coatings "(Rawil F Fakhrullin, Gleb B Sukhorukov and Yuri M Lvov)"Inorganic Nanopreparations for Nanomedicine "(James Ramos and Kaushal Rege)"Silica-Based Nanoparticles for Biomedical Imaging and Drug Delivery Applications "(Stephanie A Kramer and Wenbin Lin)"Carbon Nanotubes in Biomedical Applications "(Krunal K Mehta, Elena E Paskaleva, Jonathan S Dordick and Ravi S Kane)"Core-Shell Nanoparticles for Biomedical Applications "(Mahmoud Elsabahy and Karen L Wooley)"Structure Activity Relationships for Tumor-Targeting Gold Nanoparticles "(Erik C Dreaden, Ivan H El-Sayed

and Mostafa A El-Sayed)"Silver Nanoparticles as Novel Antibacterial and Antiviral Agents "(Stefania Galdiero, Annarita Falanga, Marco Cantisani, Avinash Ingle, Massimiliano Galdiero and Mahendra Rai)"Magnetic Nanoparticles for Drug Delivery "(Rainer Tietze, Harald Unterweger and Christoph Alexiou)"Quantum Dots as a Platform Nanomaterial for Biomedical Applications "(Eleonora Petryayeva, Roza Bidshahri, Kate Liu, Charles A Haynes, Igor L Medintz, and W Russ Algar)""Applications in Therapy: "The Application of Nanomedicine to Cardiovascular Diseases "(Kevin M Bardon, Olivier Kister and Jason R McCarthy)"Nanomedicines for Restenosis Therapy "(J E Tengood, I Fishbein, R J Levy and M Chorny)"Nanopreparations for Cancer Treatment and Diagnostics "(Jayant Khandare, Shashwat Banerjee and Tamara Minko)"Nanoparticles in the Gastrointestinal Tract "(Abraham Rubinstein)"Nanopreparations for Oral Administration "(D Hubbard, D J Brayden and H Ghandehari)"Nanopreparations for Central Nervous System Diseases "(Leyuan Xu and Hu Yang)"Nanoparticles for Dermal and Transdermal Delivery: Permeation Pathways and Applications "(Marianna Foldvari, Marjan Gharagozloo and Christine Li)"Lysosomes and Nanotherapeutics: Diseases, Treatments, and Side Effects "(Rachel L Manthe and Silvia Muro)"Nanostructured Biomaterials for Inhibiting Cancer Cell Functions "(Lijuan Zhang and Thomas J Webster)"Nanomedicine in Otorhinolaryngology"

Nanocolloids for Nanomedicine and Drug Delivery

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