Nanoparticle Technologies From Lab To Market

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Emerging Technology and Trends

SANCHEZ RILEY

A Guide for their Design, Preparation and Development Elsevier
This volume serves as a valuable handbook for the development of nanomedicines made of polymer nanoparticles because it provides researchers, students, and entrepreneurs with all the material necessary to begin their own projects in this field. Readers will find protocols to prepare polymer nanoparticles using different methods, since these are based on the variety of experiences that experts encounter in the field. In addition, complex topics such as, the optimal characterization of polymer nanoparticles is discussed, as well as practical guidelines on how to formulate polymer nanoparticles into nanomedicines, and how to modify the properties of nanoparticles to give them the different functionalities required to become an efficient nanomedicine for different clinical applications. The book also discusses the translation of technology from research to practice, considering aspects related to industrialization of preparation and aspects of regulatory and clinical development.
Materials and Applications Academic Press
This volume, Nanomaterials-Based Composites for Energy Applications: Emerging Technology and Trends, covers the importance of nanomaterials-based composites for renewable and alternative energy applications. Taking a multidisciplinary approach, it looks at using composites without losing the extraordinary strength of the nanomaterials, preparing new composites with high dielectric permittivity, improving load-carrying capacity, and more. Simulation and experimental work is included, providing a current view of the research that is going on in laboratories all over the world. The book will be a rich reference for professors and instructors, professionals, researchers, and engineering students interested in applying the emerging field of nanoscience and nanotechnology to energy applications.
Targeting Chronic Inflammatory Lung Diseases Using Advanced Drug Delivery Systems National Academies Press
Surface Science of Photocatalysis, Volume 32, summarizes significant findings on the surface science behind various classic and novel photocatalysts for energy and environmental applications, with special emphasis on important surface/interface processes in photocatalysis, such as interfacial charge transfer, function of co-catalysts, and adsorption over photocatalyst surface. This book timely and systematically reviews the state-of-the-art of the surface science in semiconductor-based photocatalysis, serving as a useful reference book for both new and experienced researchers in this field. Provides timely reviews on cutting-edge research on surface science and photocatalysts Comprehensively discusses novel photocatalysts, such as metal oxides, metal sulphides, graphitic carbon nitrides, graphene and metal-organics Presents important surface/interface processes in photocatalysis, like Z-scheme system and surface heterojunctions Investigates the function of co-catalysts and the adsorption on photocatalyst surfaces Edited by world-leading researchers in interface science
Fundamentals and Applications Elsevier
Self-Assembly Processes at Interfaces: Multiscale Phenomena provides the conceptual and unifying view of adsorption, self-assembly, and grafting processes at solid–liquid and liquid–gas interfaces, also describing experimental methods where applicable. An invaluable resource for (post)-graduate students looking to bridge the gap between acquiring the field’s existing knowledge and the creation of new insights, the book recalls fundamental concepts, giving rigorous, but first-principle-based, calculations and exercises, and showing how these concepts have been used in recent research articles. Readers will find guidelines on how best to start research in the field of surface chemistry with biological macromolecules and molecules able to undergo self-assembly process at interfaces in the presence of a liquid, along with discussions on the very fundamental aspects and applications using concepts of biomimetic chemistry. By highlighting the interdisciplinary aspects of the field of self-assembly at interfaces, the book is an ideal resource for chemical engineers, chemists, physicists, and biologists. In addition, important equations are demonstrated on the basis of fundamental concepts, and overly complex mathematical developments are avoided. Presents an interdisciplinary work that is ideal for chemical engineers, chemists, physicists, and biologists Provides a unifying view of the field, from fundamentals, to methods and applications Includes concepts applicable at both solid–liquid and liquid–gas interfaces
Advanced Low-Cost Separation Techniques in Interface Science Academic Press
Nanoparticle technology, which handles the preparation, processing, application and characterisation of nanoparticles, is a new and revolutionary technology. It becomes the core of nanotechnology as an extension of the conventional Fine Particle / Powder Technology. Nanoparticle technology plays an important role in the implementation of nanotechnology in many engineering and industrial fields including electronic devices, advanced ceramics, new batteries, engineered catalysts, functional paint and ink, Drug Delivery System, biotechnology, etc.; and makes use of the unique properties of the nanoparticles which are completely different from those of the bulk materials. This new handbook is the first to explain complete aspects of nanoparticles with many application examples showing their advantages and advanced development. There are handbooks which briefly mention the nanosized particles or their related applications, but no handbook describing the complete aspects of nanoparticles has been published so far. The handbook elucidates of the basic properties of nanoparticles and various nanostructural materials with their characterisation methods in the first part. It also introduces more than 40 examples of practical and potential uses of nanoparticles in the later part dealing with applications. It is intended to give readers a clear picture of nanoparticles as well as new ideas or hints on their applications to create new materials or to improve the performance of the advanced functional materials developed with the nanoparticles. * Introduces all aspects of nanoparticle technology, from the fundamentals to applications. * Includes basic information on the preparation through to the characterization of nanoparticles from various viewpoints * Includes information on nanostructures, which play an important role in practical applications.
Properties and Applications Academic Press

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.

From Laboratory to Point-of-Care Testing Academic Press

Nanoparticle integration remains a very challenging issue for both experimentalists and theoreticians. 1D, 2D, and 3D structures are obtained using a variety of techniques. Depending on the application, nanoparticle-based films are required to be dense, porous, or grainy. Obtaining and controlling nanoparticle assembly is difficult due to contributions from numerous interparticle and nanoparticle substrate forces with relatively similar amplitudes. Besides size distribution and concentration, energy input, temperature, and pressure during deposition are three important parameters used to control film characteristics. Self-assembling monolayer, spray, Langmuir–Blodgett, layer-by-layer, electrophoretic deposition, and evaporation-driven self-assembly are simple and scalable techniques. Depending on the application requirements, numerous other integration methods are available. Templating, dip coating, tape casting, inkjet printing, screen printing, and electrostatic self-assembly have been used in commercial and pre-commercial solutions. The majority of these techniques do not require high capital cost and are quite easily amenable to roll-to-roll processes. Mechanical consolidation techniques are used to produce directly integrated nanoparticle-based material structures.

Protecting Building Occupants and Operations from Biological and Chemical Airborne Threats Springer Science & Business Media

The book covers the entire spectrum of magnetic nanomaterials and their highly interesting properties. It also discusses engineering strategies and current applications of magnetic nanomaterials in analytical chemistry, spintronics, biomedical science, electrochemistry, energy storage and conversion, membranes and fuel cells. Keywords: Magnetic Nanomaterials, Analytical Chemistry, Biomedical Science, Spintronics, Electrochemistry, Energy Storage, Energy Conversion, Membranes, Fuel Cells, Bio-Sensors, Electrocatalysis, Separation Processes, Hydrogen Storage, Supercapacitors, SERS Effect.

Nanoparticle Technologies Academic Press

Advanced Low-Cost Separation Techniques in Interface Science, Volume 30 helps scientists and researchers in academia and industry gain expert knowledge on how to use separation techniques at minimal cost and energy usage. It handles a broad range of highly relevant topics, including modern flotation techniques, low-cost materials in liquid-and gas-phase adsorption, new trends in molecular imprinting, graphenes in separation, nanobubbles and biopolymers in interface science, the reuse of biomaterials, green techniques for wastewaters, and modeling in environmental interfaces. The book shows that these techniques can be both attractive for both research and industrial purposes. It is intended for chemical engineers working in wastewater treatment industries, membrane industries, pharmaceutical industries, textile or tanneries industries, hybrid-topic industries and energy industries. Focuses on cost and energy saving separation techniques in interface science Discusses multiple techniques, including flotation, adsorption, materials synthesis, and more Combines, in a single source, separation techniques, advanced methodologies, and the low-cost potential of the techniques Describes techniques that are attractive for both research and industrial purposes

Magnetochemistry Elsevier

Adsorption: Fundamental Processes and Applications, Volume 33 in the Interface Science and Technology Series, discusses the great technological importance of adsorption and describes how adsorbents are used on a large scale as desiccants, catalysts, catalyst supports, in the separation of gases, the purification of liquids, pollution control, and in respiratory protection. Finally, it explores how adsorption phenomena play a vital role in many solid-state reactions and biological mechanisms, as well as stressing the importance of the widespread use of adsorption techniques in the characterization of surface properties and the texture of fine powders. Covers the fundamental aspects of adsorption process engineering Reviews the environmental impact of key aquatic pollutants Discusses and analyzes the importance of adsorption processes for water treatment Highlights opportunity areas for adsorption process intensification Edited by a world-leading researcher in interface science

Synthesis, Characterization and Applications Elsevier

Nanoparticles may be used in industrial processes, incorporated into consumer products, or applied as biomedical agents. Isotopic (radio)labeling is one of the most powerful methods for nanoparticle tracing in experimental studies. This book presents an introduction to some commonly used nanomaterials, describes various methods with which they may be radiolabeled, and provides illustrative examples of applications of the labeled particles. Finally, it discusses the use of nanomaterials in radiotherapy, the stable isotope labeling technique, and operational health and safety aspects related to the manipulation of nanoparticles in controlled areas. The book will appeal to anyone involved in nanotechnology, molecular imaging, radiochemistry, and nanomedicine.

Chapter 4. Nanoparticle Assembling and System Integration Academic Press

Tailored Thin Coatings for Corrosion Inhibition Using a Molecular Approach discusses the fundamentals and applications of various thin coatings for the inhibition of fouling and corrosion from a molecular perspective. It provides the reader with a fundamental understanding of why certain coatings perform better than others in a given environment. Surface analytical and electrochemical techniques in understanding the coating performance are emphasized throughout the book, providing readers with a useful reference on how to pursue a systematic corrosion inhibitor R&D program that involves the testing of coating performance using various, currently available, state-of-the-art laboratory techniques. Wherever relevant, environmental considerations of the discussed coatings' technologies are highlighted and discussed, with current and upcoming regulatory trends put forth by different governmental organizations. Provides atomic and molecular level understanding of tailored thin coatings for corrosion inhibition Discusses key steps in corrosion, including the attachment of harmful substances to surfaces, the fouling of surfaces, and the initiation and propagation of corrosion on surfaces Written by leading experts in the field

Nanomaterials-Based Composites for Energy Applications National Academies Press
Targeting Chronic Inflammatory Lung Diseases Using Advanced Drug Delivery Systems explores the development of novel therapeutics and diagnostics to improve pulmonary disease management, looking down to the nanoscale level for an efficient system of targeting and managing respiratory disease. The book examines numerous nanoparticle-based drug systems such as nanocrystals, dendrimers, polymeric micelles, protein-based, carbon nanotube, and liposomes that can offer advantages over traditional drug delivery systems. Starting with a brief introduction on different types of nanoparticles in respiratory disease conditions, the book then focuses on current trends in disease pathology that use different in vitro and in vivo models. The comprehensive resource is designed for those new to the field and to specialized scientists and researchers involved in pulmonary research and drug development. Explores recent perspectives and challenges regarding the management and diagnosis of chronic respiratory diseases Provides insights into how advanced drug delivery systems can be effectively formulated and delivered for the management of various pulmonary diseases Includes the most recent information on diagnostic methods and treatment strategies using controlled drug delivery systems (including nanotechnology)
Particles at Interfaces Academic Press
This book is a concise but well-organized introduction to nanotechnology (NT) which the upstream oil industry is now vigorously adapting to develop its own unique applications for improved oilfield operations and, oil and gas production. Its reader will learn nanotechnology fundamentals, be introduced to important NT products and applications from other industries and learn about the current state of development of various NT applications in the upstream oil industry, which include innovative use of nanoparticles for enhanced oil recovery; drilling and completions; reservoir sensing; and production operations and flow assurance. Key Features Exclusive title on potential of nanoparticle-based agents and interventions for improving myriad of oilfield operations Unique guide for nanotechnology applications developers and users for oil and gas production Introduces nanotechnology for oil and gas managers and engineers Includes research data discussions relevant to field Offers a practical applications-oriented approach
CRC Press
Nanotechnology is often described as an emerging technology - one that not only holds promise for society, but also is capable of revolutionizing our approaches to common problems. Nanotechnology is not a completely new field; however, it is only recently that discoveries in this field have advanced so far as to warrant examination of their impact upon the world around us. Nanotechnology has direct beneficial applications for medicine and the environment, but like all technologies it may have unintended effects that can adversely impact the environment, both within the human body and within the natural ecosystem. How does the science move forward in a way that best protects the public and gets health and safety right the first time? Implications of Nanotechnology for Environmental Health Research identifies the areas in which additional research is needed and the processes by which changes can occur.
Smart Polymeric Membranes Academic Press
Graphene Surfaces: Particles and Catalysts focuses on the surface chemistry and modification of graphene and its derivatives from a theoretical and electrochemical point-of-view. It provides a comprehensive overview of their electronic structure, synthesis, properties and general applications in catalysis science, including their relevance in alcohols and their derivatives oxidation, oxygen reduction, hydrogen evolution, energy storage, corrosion protection and supercapacitors. The book also covers emerging research on graphene chemistry and its impact. Chemical engineers, materials scientists, electrochemists and engineers will find information that will answer their most pressing questions on the surface aspects of graphene and its effect on catalysis. Serves as a time-saving reference for researchers, graduated students and chemical engineers Equips the reader with catalysis knowledge for practical applications Discusses the physical and electrochemical properties of graphene Provides the most important applications of graphene in electrochemical systems Highlights both experimental and theoretical aspects of graphene
Nanoparticle Technology Handbook CRC Press
Nanostructures for Novel Therapy: Synthesis, Characterization and Applications focuses on the fabrication and characterization of therapeutic nanostructures, in particular, synthesis, design, and in vitro and in vivo therapeutic evaluation. The chapters provide a cogent overview of recent therapeutic applications of nanostructured materials that includes applications of nanostructured materials for wound healing in plastic surgery and stem cell therapy. The book explores the promise for more effective therapy through the use of nanostructured materials, while also assessing the challenges their use might pose from both an economic and medicinal point of view. This innovative look at how nanostructured materials are used in therapeutics will be of great benefit to researchers, providing a greater understanding of the different ways nanomaterials could improve medical treatment, along with a discussion of the obstacles that need to be overcome in order to guarantee widespread availability. Outlines how the characteristics of nanostructures made from different materials gives particular properties that can be successfully used in therapeutics Compares the properties of different nanostructures, allowing medicinal chemists and engineers to select which are most appropriate for their needs Highlights new uses of nanostructures within the therapeutic field, enabling the discovery of new, more effective drugs
Nanoparticles and Occupational Health Academic Press
Nanoparticle Technology Handbook, Third Edition, is an updated and expanded authoritative reference providing both the theory behind nanoparticles and the practical applications of nanotechnology. This third edition features twenty new chapters, providing a reference much broader in scope than the previous edition. Over 140 experts in nanotechnology and/or particle technology contributed to this new edition. The book not only includes the theory behind nanoparticles, but also the practical applications of nanotechnology. It examines future possibilities and new innovations and contains important knowledge on nanoparticle characterization and the effect of nanoparticles on the environment and humans. Nanoparticle technology is a new and revolutionary technology, which is increasingly used in electronic devices and nanomaterials. It handles the preparation, processing, application and characterization of nanoparticles and has become the core of nanotechnology as an extension of conventional fine particle/powder technology. Nanoparticle technology plays an important role in the implementation of nanotechnology in many engineering and industrial fields, including electronic devices, advanced ceramics, new batteries, engineered catalysts, functional paint and ink, drug delivery system,

biotechnology, etc., making use of the unique properties of nanoparticles, which are completely different from those of bulk materials. Introduces all aspects of nanoparticle technology, from the fundamentals to applications Cover basic information on preparation through to the characterization of nanoparticles in a systematic way Features information on nanostructures, which play an important role in practical applications Includes the effects of nanoparticles on human health and the environment Includes applications of nanoparticles in diverse fields, including applications in new areas, such as electronics cosmetics, etc. Offers up-to-date information given by specialists in each field

Phytotoxicity of Nanoparticles Springer

Photocatalysis: Fundamental Processes and Applications, Volume 32 in the Interface Science and Technology Series, discusses the fundamental aspects of photocatalysis and its process and applications to the decontamination of wastewater, hydrogen production via water splitting, and photo reduction of carbon dioxide to hydrocarbon. The book discusses the fundamental aspects of all applications together with their proper mechanisms, thus providing essential information for deep research in the area of clean environment and green energy production. Provides background on the fundamental and experimental processes of photocatalysis Covers photocatalysis and its impact on creating a clean environment and energy sources Applies photocatalysis to the decontamination of wastewater, hydrogen production via water splitting, and photo reduction of carbon dioxide to hydrocarbon Edited by a world-leading researcher in interface science

Select Proceedings ICABET 2020 Springer Nature

Magnetic Nanostructured Materials: From Lab to Fab presents a complete overview of the translation of nanostructured materials into realistic applications, drawing on the most recent research in the field to discuss the fundamentals, synthesis and characterization of nanomagnetics. A wide spectrum of nanomagnetic applications is included, covering industrial, environmental and biomedical fields, and using chemical, physical and biological methods. Materials such as Fe, Co, CoxC, MnGa, GdSi, ferrite nanoparticles and thin films are highlighted, with their potential applications discussed, such as magnetic refrigeration, energy harvesting, magnetic sensors, hyperthermia, MRI, drug delivery, permanent magnets, and data storage devices. Offering interdisciplinary knowledge on the materials science of nanostructured materials and magnetics, this book will be of interest to researchers in materials science, engineering, physics and chemistry with interest in magnetic nanomaterials, as well as postgraduate students and professionals in industry and government. Provides interdisciplinary knowledge on the materials science of nanostructured materials and magnetics Aids in the understanding of complex fundamentals and synthesis methods for magnetic nanomaterials Includes examples of real applications Shows how laboratory work on magnetic nanoparticles connects to industrial implementation and applications