

Green Nanotechnology Challenges And Opportunities

Showcasing a selection of new research on nanotechnological applications for environmental protection along with new advanced technologies in nanochemistry, this volume presents an interdisciplinary approach that brings together materials science, chemistry, and nanotechnology. Part I of the volume looks at environmental topics that include an exploration of the challenges of the global water crisis and new technology in nanofiltration and water purification. It provides an informative overview of green nanotechnology, green nanomaterials, and green chemistry. Some of the advanced technologies discussed in Part II include the application of quantum dots, a nanochemical approach to using ICT technology, and new research on polymer nanocomposites as a smart material along with its synthesis, preparation, and properties. Other important topics are included as well.

The use of biological sources such as microbes and plants can help in synthesizing nanoparticles in a reliable and eco-friendly way. The synthesis of nanoparticles by these natural sources is characterized by processes that take place near to ambient temperature and pressures and also near neutral pH. This edited volume authored by subject specialists, provides all the latest research and builds a database of bioreduction agents to various metal nanoparticles using different precursor systems. The book also highlights the different strategies such as simplicity, cost-effectiveness, environment-friendly and easily scalable, and includes parameters for controlling the size and shape of the materials developed from the various greener methods. In order to exploit the utmost potential metal nanoparticles synthesis from the different sources such as agricultural waste, flora and fauna, food waste, microbes and biopolymer systems, it is also crucial to recognize the biochemical and molecular mechanisms of production of nanoparticles and their characterization.

Nanotechnology has developed remarkably in recent years and, applied in the food industry, has allowed new industrial advances, the improvement of conventional technologies, and the commercialization of products with new features and functionalities. This progress offers the potential to increase productivity for producers, food security for consumers and economic growth for industries. Food Applications of Nanotechnology presents the main advances of nanotechnology for food industry development. The fundamental concepts of the technique are presented, followed by examples of application in several sectors, such as the enhancement of flavor, color and sensory characteristics; the description of the general concepts of nano-supplements, antimicrobial nanoparticles and other active compounds into food; and developments in the field of packaging, among others. In addition, this work updates readers on the industrial development and the main regulatory aspects for the safety and commercialization of nanofoods. Features: Provides a general overview of nanotechnology in the food industry Discusses the current status of the production and use of nanomaterials as food additives Covers the technological developments in the areas of flavor, color and sensory characteristics of food and food additives Reviews nanosupplements and how they provide improvements in nutritional functionality Explains the antibacterial properties of nanoparticles for food applications This book will serve food scientists and technologists, food engineers, chemists and innovators working in food or ingredient research and new product development.

Gustavo Molina is associate professor at the UFVJM (Diamantina—Brazil) in Food Engineering and head of the Laboratory of Food Biotechnology and conducts scientific and technical research. His research interests are focused on industrial biotechnology. Dr. Inamuddin is currently working as assistant professor in the chemistry department of Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia. He is also a permanent faculty member (assistant professor) at the Department of Applied Chemistry, Aligarh Muslim University, Aligarh, India. He has extensive research experience in multidisciplinary fields of analytical chemistry, materials chemistry, and electrochemistry and, more specifically, renewable energy and environment. Prof. Abdullah M. Asiri is professor of organic photochemistry and has been the head of the chemistry department at King Abdulaziz University since October 2009, as well as the director of the Center of Excellence for Advanced Materials Research (CEAMR) since 2010. His research interest covers color chemistry, synthesis of novel photochromic and thermochromic systems, synthesis of novel coloring matters and dyeing of textiles, materials chemistry, nanochemistry and nanotechnology, polymers, and plastics. Franciele Maria Pelissari graduated in Food Engineering; earned her master's degree (2009) at the University of Londrina (UEL), Londrina, Brazil; and her PhD (2013) at the University of Campinas (Unicamp), Campinas, Brazil. Since 2013, she has been associate professor at the Institute of Science and Technology program at the Federal University of Jequitinhonha and Mucuri (UFVJM), Diamantina, Brazil, in Food Engineering, and also full professor in the graduate program in Food Science and Technology.

A first step in developing a clean and sustainable future is to think differently about everyday products, in particular how they influence energy use. Green Nanotechnology: Solutions for Sustainability and Energy in the Built Environment explores the science and technology of tiny structures that have a huge potential to improve quality of life wh

An Introduction to Green Nanotechnology, Volume 28, provides students, scientists and chemical engineers with an overview of several types of nanostructures, discusses the synthesis and characterization of nanostructures, and provides applications of nanotechnology in daily life. The book offers a foundation to green nanotechnology by explaining why green nanotechnology is important. Covers biological sources in green nanotechnology, antioxidants, green nanostructures, mechanism, synthesis and characterization. The book ends with an evaluation of the risks of nanotechnology in human life and future perspectives. Introduces novel sources of plants having a high potential to be used as bio media to synthesize nanostructures Provides phytochemical properties and antioxidant potential, and their effects on stability, morphology and size of green nanostructures Includes a medicinal and technological comparison of green synthesized nanostructures to nano-products from non-green methods Uses accessible language, avoiding complex concepts of mathematics, biology and chemistry

Catalysis, Green Chemistry and Sustainable Energy: New Technologies for Novel Business Opportunities offers new possibilities for businesses who want to address the current global transition period to adopt low carbon and sustainable energy production. This comprehensive source provides an integrated view of new possibilities within catalysis and green chemistry in an economic context, showing how these potential new technologies may become useful to business. Fundamentals and specific examples are included to guide the transformation of idea to innovation and business. Offering an overview of the new possibilities for creating business in catalysis, energy and green chemistry, this book is a beneficial tool for students, researchers and academics in chemical and biochemical engineering. Discusses new developments in catalysis, energy and green chemistry from the perspective of converting ideas to innovation and business Presents case histories, preparation of business plans, patent protection and IP rights, creation of start-ups, research funds and successful written proposals Offers an interdisciplinary approach combining science and business

Green Technology deals with using science and technology to protect the environment as well as curb the negative impacts of human involvement. The emerging green technologies, covered in this book, will propel our economy in the near future. Their development will lead to global and sustainable powers that will impact our economics, societies, cultures, and the way of life. This book provides researchers, students, and professionals a comprehensive introduction, applications, benefits, and challenges of 15 emerging green technologies. It presents the impact of these cutting-edge technologies on our global economy and its future. The book will help a beginner to have an introductory knowledge about these emerging technologies. The main objective of the author is to provide a concise treatment that is easily digestible. It is a must-read for those graduate students or scholars who consider researching green technologies. It can also serve as a valuable resource for those business professionals who seek ways to green their processes.

This book assesses the current challenges and opportunities for the next generation of agriculture and food science. Examining the role of nanotechnology and the application of related tools and techniques to transform the future of food, it also discusses in detail nanotechnology in food production, processing and packaging, as well as the benefits of and concerns regarding nanofoods (nanotoxicity and food forensics). Considering the potential of IoT to revolutionize agriculture and the food industry by radically reducing costs and improving productivity and profits, the book highlights the necessity of integrating IoT and nanotechnology into the next generation of agriculture and food science. Further, it presents a detailed analysis of IoNT implementation, together with the goals that have to be met in order to achieve significant improvements in the agri-food sector. In addition it explores a range of challenges, risks, and concerns that have a direct or indirect impact on nanotechnology and IoNT implementation in agriculture and the food industry. In closing, it discusses the use of green nanotechnology and green IoNT in order to create smart, safe, and sustainable agriculture and healthy food.

Addresses health and safety issues associated with workplace Nanoparticle exposures • Describes methods to evaluate and control worker exposures to engineered nanoparticles • Provides guidance for concerned EHS professionals on acceptable levels of exposure to nanoparticles • Includes documentation on best practices to be followed by all researchers when working with engineered nanoparticles • Describes current knowledge on toxicity of nanoparticles • Includes coverage on Routes of Exposure for Engineered Nanoparticles

Reviews of Environmental Contamination and Toxicology attempts to provide concise, critical reviews of timely advances, philosophy and significant areas of accomplished or needed endeavor in the total field of xenobiotics, in any segment of the environment, as well as toxicological implications.

Green nanomaterials are classed as nanomaterials with no environmentally harmful, toxic, properties. The photocatalysis of nanomaterials involves photo-conduction value in efficient removal/degradation of noxious pollutants. Green nanotechnology has objectives for the development of products and processes which are environmentally friendly, economically sustainable, safe, energy-efficient, and produce little waste or emissions. Such products and processes are based on renewable materials and/or have a low net impact on the environment. Green functionalized nanomaterials, formed by a combination of nanomaterials with natural materials or are derived through a green source, are the new trends in the remediation of pollutants in environmental industries. This has the effect of making photoactive nanomaterials work under UV/sunlight radiation in order to produce reactive radical species that rapidly remove pollutants by redox mechanism. Green Functionalized Nanomaterials for Environmental Applications focuses on recent developments in the area of fabrication of green nanomaterials and their properties. It also looks at ways of lowering the risk of exposure of green functionalized nanomaterials. This needs to be pursued in the future for investigating and assessing health risks, which may be due to exposure to green nanomaterials. It is an important reference source for all those seeking to improve their understanding of how green functionalized nanomaterials are being used in a range of environmental applications, as well as considering potential toxicity implications. Highlights innovative industrial technologies for green functionalized nanomaterials Covers major fabrication techniques for sustainable functionalized nanomaterials Shows how sustainable functionalized nanomaterials are being developed for commercial applications

With its unique focus on specifically addressing the problems for societies and economies associated with corrosion and their solution, this book provides an up-to-date overview of the progress in corrosion chemistry and engineering. International experts actively involved in research and development place particular emphasis on how to counter the economic and environmental consequences of corrosion with the help of science and technology, making this a valuable resource for researchers as well as decision makers in industry and politics. Further major parts of the book are devoted to corrosion prevention in the naval and energy sector as well as to corrosion monitoring and waste management.

This book, Green Nanotechnology - Overview and Further Prospects, is intended to provide an overview and practical examples of the use of nanomaterials in the new scientific challenges of the green nanotechnology world. We aimed to compile information from a diversity of sources into a single volume to give some real examples, extending the concept that green nanotechnology is far from being a scientific conundrum, and instead a real answer to some of the actual problems the whole planet is dealing with.

With the daunting energy challenges faced by Mankind in the 21st century, revolutionary new technologies will be the key to a clean, secure and sustainable energy future. Nanostructures often have surprising and very useful capabilities and are thus paving the way for new methodologies in almost every kind of industry. This exceptional monograph provides an overview of the subject, and presents the current state of the art with regard to different aspects of sustainable production, efficient storage and low-impact use of energy. Comprised of eighteen chapters, the book is divided in three thematic parts: Part I Sustainable Energy Production covers the main developments of nanotechnology in clean energy production and conversion, including photovoltaics, hydrogen production, thermal-electrical energy conversion and fuel cells. Part II Efficient Energy Storage is concerned with the potential use of nanomaterials in more efficient energy storage systems such as advanced batteries, supercapacitors and hydrogen storage. Part III Energy Sustainability shows how nanotechnology helps to use energy more efficiently, and the mitigation of impacts to the environment, with special emphasis on energy savings through green nanofabrication, advanced catalysis, nanostructured light-emitting and electrochromic devices and CO₂ capture by nanoporous materials. An essential addition to any bookshelf, it will be invaluable to a variety of research fields including materials science, chemical engineering, solid state, surface, industrial, and physical chemistry, as this is a subject that is very interdisciplinary.

Phytonanotechnology: Challenges and Prospects consolidates information on the use of phytonanoparticles for biomedical, environmental and agricultural applications, covering recent advances in experimental and theoretical studies on various properties of nanoparticles derived from plant sources. The book deals with various attributes of phytonanoparticles, discussing their current and potential applications. In addition, it explores the development of phytonanoparticles, synthesis techniques, characterization

techniques, environmental remediation applications, anti-microbial properties, miscellaneous applications, and multi-functional applications. Risks associated with nanoparticles are also discussed. This book is an important reference for materials scientists, engineers, environmental scientists, food scientists and biomedical scientists who want to learn more about the applications of nanoparticles derived from plant sources. Explores synthesis methods of phytonanoparticles from a variety of plant groups Discusses the major biological reactions of phytonanoparticles Outlines the major opportunities and challenges of using phytonanoparticles in biomedical, environmental and agricultural applications Nanotechnology Environmental Health and Safety, Second Edition focuses not only on the impact of nanotechnology and the discipline of nanotoxicity, but also explains each of these disciplines through in the context of management requirements and via risk scenarios — providing an overview of regulation, risk management, and exposure. Contributors thoroughly explain environmental health and safety (EHS) issues, financial implications, foreseeable risks (e.g., exposure, dose, hazards of nanomaterials), occupational hygiene, and consumer protection. Key new chapters have been included covering eco-toxicity, nanomedicine, informatics, and future threats. New case studies have also been added, including a chapter on the impact of nanosilver on the environment, as well as an assessment of how well lessons have been learned from the past, such as in the case of asbestos. The book also makes a business case for the importance of proactive EHS management - essential reading for existing or prospective producers of nanoscale products. Practical guidance on risk management and mitigation across different legislative frameworks worldwide Reviews toxicological studies and industrial initiatives, supported by numerous case studies Includes extensive new material on the implications of nanotechnology for medicine, energy and food, as well as assessing future threats.

This volume presents the proceedings of the International Conference on Medical and Biological Engineering held from 16 to 18 March 2017 in Sarajevo, Bosnia and Herzegovina. Focusing on the theme of 'Pursuing innovation. Shaping the future', it highlights the latest advancements in Biomedical Engineering and also presents the latest findings, innovative solutions and emerging challenges in this field.

Topics include: - Biomedical Signal Processing - Biomedical Imaging and Image Processing - Biosensors and Bioinstrumentation - Bio-Micro/Nano Technologies - Biomaterials - Biomechanics, Robotics and Minimally Invasive Surgery - Cardiovascular, Respiratory and Endocrine Systems Engineering - Neural and Rehabilitation Engineering - Molecular, Cellular and Tissue Engineering - Bioinformatics and Computational Biology - Clinical Engineering and Health Technology Assessment - Health Informatics, E-Health and Telemedicine - Biomedical Engineering Education - Pharmaceutical Engineering

This volume gathers the proceedings of the International Conference on Medical and Biological Engineering, which was held from 16 to 18 May 2019 in Banja Luka, Bosnia and Herzegovina. Focusing on the goal to 'Share the Vision', it highlights the latest findings, innovative solutions and emerging challenges in the field of Biomedical Engineering. The book covers a wide range of topics, including: biomedical signal processing, medical physics, biomedical imaging and radiation protection, biosensors and bioinstrumentation, bio-micro/nano technologies, biomaterials, biomechanics, robotics and minimally invasive surgery, and cardiovascular, respiratory and endocrine systems engineering. Further topics include bioinformatics and computational biology, clinical engineering and health technology assessment, health informatics, e-health and telemedicine, artificial intelligence and machine learning in healthcare, as well as pharmaceutical and genetic engineering. Given its scope, the book provides academic researchers, clinical researchers and professionals alike with a timely reference guide to measures for improving the quality of life and healthcare.

Unique in providing an overview of the subject on the scientific level, this book presents the current state of the art with regard to different aspects of sustainable energy production and its efficient storage.

The broad scope ranges from nanomaterials for energy production, via fuel cells and nanostructured materials for fuel production, right up to supercapacitors and climate change. Edited by a rising star within the community, this is an invaluable work on a hot topic for materials scientists, solid state, surface and physical chemists, as well as those chemists working in industry and chemical engineers.

This book introduces the latest methods for the controlled growth of nanomaterial systems. The coverage includes simple and complex nanomaterial systems, ordered nanostructures and complex nanostructure arrays, and the essential conditions for the controlled growth of nanostructures with different morphologies, sizes, compositions, and microstructures. The book also discusses the dynamics of controlled growth and thermodynamic characteristics of two-dimensional nanorestricted systems. The authors introduce various novel synthesis methods for nanomaterials and nanostructures, such as hierarchical growth, heterostructures growth, doping growth and some developing template synthesis methods. In addition to discussing applications, the book reviews developing trends in nanomaterials and nanostructures.

Biogenic Nanoparticles for Cancer Theranostics outlines the synthesis of biogenic nanoparticles to become cancer theranostic agents. The book also discusses their cellular interaction and uptake, pharmacokinetics, biodistribution, drug delivery efficiency, and other biological effects. Additionally, the book explores the mechanism of their penetration in cancerous tissue, its clearance, and its metabolism. Moreover, the in vitro and in vivo toxicological effects of biogenic nanoparticles are discussed. This book is an important reference source for materials scientists and biomedical scientists who are looking to increase their understanding of how biogenic nanoparticles are being used for a range of cancer treatment types. Metal nanoparticles have traditionally been synthesized by classical physico-chemical methods which have many drawbacks, such as high energy demand, high cost and potential ecotoxicity. As a result, the biosynthesis of metal nanoparticles is gaining increasing prominence. Biosynthesis approaches to metal nanoparticles are clean, safe, energy efficient and environment friendly. Explains the synthesis methods and applications of biogenic nanoparticles for cancer theranostics Outlines the distinctive features of biogenic nanoparticles that make them effective cancer treatment agents Assesses the major challenges of using biogenic nanoparticles on a mass scale

This book presents latest research results on synthesis and application of metallic nanomaterials. Fabrication techniques, analytic properties, as well as theoretical aspects are discussed. Size- and shape-controlled synthesis of silver, gold, copper, ruthenium, tellurium, selenium and palladium nanoparticles are reviewed. Further topics are the synthesis from microplasma and shape-control for electrocatalytic applications.

This Handbook focuses on the recent advancements in Safety, Risk, Ethical Society and Legal Implications (ESLI) as well as its commercialization of nanotechnology, such as manufacturing. Nano is moving out of its relaxation phase of scientific route, and as new products go to market, organizations all over the world, as well as the general public, are discussing the environmental and health issues associated with nanotechnology. Nongovernmental science organizations have long since reacted; however, now the social sciences have begun to study the cultural portent of nanotechnology. Societal concerns and their newly constructed concepts, show nanoscience interconnected with the economy, ecology, health, and governance. This handbook addresses these new challenges and is divided into 7 sections:

Nanomaterials and the Environment; Life Cycle Environmental Implications of Nanomanufacturing; Bioavailability and Toxicity of Manufactured Nanoparticles in Terrestrial Environments; Occupational Health Hazards of Nanoparticles; Ethical Issues in Nanotechnology; Commercialization of Nanotechnology; Legalization of Nanotechnology.

This volume focuses on technological advances relevant to establishing biofuels as a viable alternative to fossil fuels by overcoming current limitations. The progressive depletion of fossil fuels due to their

large-scale utilization and their environmental consequences, notably global warming, increase the need for sustainable and cleaner energy options. Renewable biofuels – like biohydrogen, biomethane, biogas, ethanol and butanol – represent attractive energy sources to meet the growing global demand, thanks to sustainable and cost-efficient production approaches based on cellulosic biomass. Currently, the commercialization of these technologies is hindered by technical and economic limitations, such as biomass complexity and pre-treatment, enzyme hydrolysis, production efficiency as well as storage and cost. As such, this book presents economically viable and sustainable approaches to improve existing biofuel technologies and appeals to anyone with an interest in biofuels as renewable energy options and their practical implementation.

Nanotechnology offers great potential to revolutionize conventional food science and the food industry. The use of nanotechnology in the food industry promises improved taste, flavor, color, texture, and consistency of foodstuffs and increased absorption and bioavailability of nutraceuticals. *Food Nanotechnology: Principles and Applications* examines the current state of nanoscale phenomena and processes, benefits and risks of nanotechnology. This work contains 18 chapters particularly focused on the design, production, and utilization of nanoparticles, with specific applications for the food industry. Through several studies, it has been proven that nanotechnology can offer distinct advantages over conventional methods in terms of functionality, targeted delivery of food bioactive compounds, improved food quality characteristics like texture, taste, sensory attributes and improved stability in the gastrointestinal tract, and controlled release profiles. Features Offers clear and concise coverage on application of nanotechnology in nutrient delivery, food packaging, and pathogen/pesticide detection Addresses both the technological aspects of delivering nano-based food products and the societal implications that affect take-up Covers broad range of topics including nanoemulsification, electrospraying, nanocomposites, plasma processing, and nanosensors Discusses different formulation and preparation methods for loading food bioactive compounds Exploratory in nature, this book presents the latest of such data on all aspects of applications of nanotechnology in food systems. With its practical focus on the fabrication and application of nanotechnology in food, this book is a valuable resource for students, researchers, food process engineers.

A first step in developing a clean and sustainable future is to think differently about everyday products, in particular how they influence energy use. *Green Nanotechnology: Solutions for Sustainability and Energy in the Built Environment* explores the science and technology of tiny structures that have a huge potential to improve quality of life while simultaneously achieving reductions in the use of fossil fuels. This book examines energy flows in nature and how the optical properties of materials can be designed to harmonize with those flows. It then discusses the properties that can be achieved in real materials to take advantage of nature's energy flows. The authors cohesively examine a number of topics, highlighting their applications and the significance of their nano features. They provide a cursory discussion of well-reviewed subjects such as nanostructured solar cells and turn their attention to timely topics such as methods for preventing excessive temperature and approaches to passive cooling. The book identifies key materials and elucidates how their properties can be understood in terms of contemporary materials physics and chemistry. It concludes with a detailed description of a scenario for future buildings that use much less energy while also providing better comfort. A valuable side effect of most nanotechnologies is that they inherently put us in closer touch with the natural world. With broad coverage of how nanoparticles impact energy use in the built environment, this book opens readers' eyes to a fascinating vision of how technology and nanoscience can merge and lead to commodity-scale products that help preserve our planet.

This book focuses on the use of bio-inspired and biomimetic methods for the fabrication and activation of nanomaterials. This includes studies concerning the binding of the biomolecules to the surface of inorganic structures, structure/function relationships of the final materials and extensive discussions on the final applications of such biomimetic materials in unique applications including energy harvesting/storage, biomedical diagnostics and materials assembly.

This book reviews health hazards associated with wastewater use and water pollutants. Chapters present applications of green materials made of agricultural waste, activated carbon and magnetic materials for wastewater treatment. The removal of toxic metals using algal biomass and the removal of toxic dyes using chitosan composite materials are also discussed. The book includes reviews on the removal of phenols, pesticides, and on the use of ionic liquid-modified activated carbon for the treatment of textile wastewater. This up-to-date reference is the most comprehensive summary of the field of nanoscience and its applications. It begins with fundamental properties at the nanoscale and then goes well beyond into the practical aspects of the design, synthesis, and use of nanomaterials in various industries. It emphasizes the vast strides made in the field over the past decade – the chapters focus on new, promising directions as well as emerging theoretical and experimental methods. The contents incorporate experimental data and graphs where appropriate, as well as supporting tables and figures with a tutorial approach.

This book provides the state-of-the-art survey of green techniques in preparation of different classes of nanomaterials, with an emphasis on the use of renewable sources. Key topics covered include fabrication of nanomaterials using green techniques as well as their properties and applications, the use of renewable sources to obtain nanomaterials of different classes, from simple metal and metal oxide nanoparticles to complex bioinspired nanomaterials, economic contributions of nanotechnology to green and sustainable growth, and more. This is an ideal book for students, lecturers, researchers and engineers dealing with versatile (mainly chemical, biological, and medical) aspects of nanotechnology, including fabrication of nanomaterials using green techniques and their properties and applications.

Rhodococcus are metabolically versatile actinobacteria frequently found in the environment with potential applications in bioremediation, biotransformations and biocatalysis, among other biotechnological processes. These microorganisms are currently the subject of research in many countries of the world. The number of publications and patents on

rhodococci has intensified significantly within the last years. In this context, the knowledge acquired during the last decade about basic aspects of Rhodococcus biology is significant and promising about their future prospects. Several genomic projects of Rhodococcus members are now available and in progress through public and private efforts due to the increasing interest in their use for biotechnology. The large Rhodococcus genomes containing a multiplicity of catabolic genes, a high genetic redundancy of biosynthetic pathways and a sophisticated regulatory network reflect the complexity of Rhodococcus biology. The combination of functional genomics studies with biochemical and physiological knowledge is providing new insights, which will enable the biotechnological use of rhodococci. This Microbiology Monographs volume provides a thorough review of many aspects of biochemistry, physiology and genetics of Rhodococcus, in the context of new genomic information. Expert international scientists contributed with reviews on the extraordinary capability of Rhodococcus genus for biodegradation of diverse compounds and bioremediation, biosynthesis of lipids and biosurfactants, adaptation and tolerance to solvents, interaction with metals and biotechnological applications. Chapters dealing with taxonomy, genomes and plasmids, and oligotrophic and central metabolism are also included in this volume. Moreover, the book includes basic aspects of the phytopathogenic *R. fascians*.

An overview of the current state of nanotechnology-based devices with applications in environmental science, focusing on nanomaterials and polymer nanocomposites. The handbook pays special attention to those nanotechnology-based approaches that promise easier, faster and cheaper processes in environmental monitoring and remediation. Furthermore, it presents up-to-date information on the economics, toxicity and regulations related to nanotechnology in detail. The book closes with a look at the role of nanotechnology for a green and sustainable future. With its coverage of existing and soon-to-be-realized devices this is an indispensable reference for both academic and corporate R&D.

Around the world, the production and use of nanomaterials, as well as carcinogenic, mutagenic, reprotoxic substances (CMR) and endocrine disruptors has systematically increased. The increase in production has exposed workers to hazardous substances in practically all branches of the world economy. Readers will have access to up-to-date and comprehensive knowledge on emerging risks related to nanomaterials, endocrine disruptors, reprotoxic, carcinogenic and mutagenic substances, which are related to the development of technologies and workplaces. The book will provide the tools for occupational risk assessment of chemical substances for which there are no safety levels of exposure as well as an indication of methods and measurements to protect human health and reduce chemical risks at the workplace. This book creates awareness for employers, employees and safety experts about emerging risks related to chemical agents resulting in the reduction of cancer, reproductive system diseases, cases of abnormal child development, hormonal system disorders leading to abnormal metabolism, obesity, and diabetes. Features: Comprehensive information on emerging and newly identified chemical hazards Delivers the latest data on methods and tools for identification, assessing and reducing health risks Provides practical occupational safety advice and recommendations Real life examples from measurements carried out in the workplaces "The monograph, due to the high universality of its considerations, can be addressed to a very wide audience. It is an important compendium of knowledge, which can be used by health and safety services, employers, people designing new technologies and those interested in this issue. It is a valuable and up-to-date study, among others because it uses the latest literature and quotes current legal acts." —Sławomir Czerczak, Nofer Institute of Occupational Medicine, Poland

The 3rd International Symposium on Nanotechnology in Construction (NICOM 3) follows the highly successful NICOM 1 (Paisley, UK 2003) and NICOM 2 (Bilbao, Spain 2005) Symposia. The NICOM3 symposium was held in Prague, Czech Republic from May 31 to June 2, 2009 under the auspices of the Czech Technical University in Prague. It was a cross-disciplinary event, bringing together R&D experts and users from different fields all with interest in nanotechnology and construction. The conference was aimed at: Understanding of internal structures of existing construction materials at nano-scale Modification at nano-scale of existing construction materials. Production and properties of nanoparticulate materials, nanotubes and novel polymers. Modeling and simulation of nanostructures. Instrumentation, techniques and metrology at nano-scale. Health and safety issues and environmental impacts related to nanotechnology during research, manufacture and product use. Review of current legislation. Societal and commercial impacts of nanotechnology in construction, their predictions and analysis.

Fungal nanobiotechnology has emerged as one of the key technologies, and an eco-friendly, as a source of food and harnessed to ferment and preserve foods and beverages, as well as applications in human health (antibiotics, anti-cholesterol statins, and immunosuppressive agents), while industry has used fungi for large-scale production of enzymes, acids, biosurfactants, and to manage fungal disease in crops and pest control. With the harnessing of nanotechnology, fungi have grown increasingly important by providing a greener alternative to chemically synthesized nanoparticles.

This book comprises a collection of chapters on advances in green nanomaterials. The book looks at ways to establish long-term safe and sustainable forms of nanotechnology through implementation of nanoparticle biosynthesis with minimum impact on the ecosystem. The book looks at synthesis, processing, and applications of metal and metal oxide nanomaterials and also at bio-nanomaterials. The contents of this book will prove useful for researchers and professionals working in the field of nanomaterials and green technology.

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