

Genotoxic Effects Of Zinc Oxide Nanoparticles

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X-Ray Diffraction - A. Guinier 2013-01-17
Exploration of fundamentals of x-ray

diffraction theory using Fourier transforms
applies general results to various atomic

structures, amorphous bodies, crystals, and imperfect crystals. 154 illustrations. 1963 edition.

Nanotechnology in Agriculture and Agroecosystems - Avinash P. Ingle 2023-01-26

Nanotechnology in Agriculture and Agroecosystems presents the latest research on the role of nanotechnology in agriculture and agroecosystems, offering innovations and many potential benefits in terms of plant growth, food production, crop protection and ecosystem management. Sections introduce new perspectives on the use of nanotechnology in agroecosystems and sustainable agriculture. Subsequent chapters focus on specific areas of innovation, covering a wide range of applications, including plant disease and

protection, food processing and packaging, soil quality, precision farming, and groundwater treatment. This is a valuable resource for researchers and advanced students across a range of disciplines, but it is also ideal for industrial scientists, engineers and R&D professionals with an interest in nanotechnology and sustainable technologies for agriculture and agro-industries. Offers new perspectives on nanotechnology and nanoscale materials for sustainable agriculture and agroecosystems Highlights state-of-the-art techniques, such as nanotechnology-mediated gene transfer in plants Addresses challenges relating to plant disease, crop production, processing, soil and ecosystem management

Phytoremediation - Abid

A. Ansari 2017-03-29

This text details the plant-assisted remediation method, "phytoremediation", which involves the interaction of plant roots and associated rhizospheric microorganisms for the remediation of soil contaminated with high levels of metals, pesticides, solvents, radionuclides, explosives, crude oil, organic compounds and various other contaminants. Many chapters highlight and compare the efficiency and economic advantages of phytoremediation to currently practiced soil and water treatment practices. Volume 5 of *Phytoremediation: Management of Environmental Contaminants* provides the capstone of the series. Taken together, the five volumes provide

a broad-based global synopsis of the current applications of phytoremediation using plants and the microbial communities associated with their roots to decontaminate terrestrial and aquatic ecosystems.

Effect of Nanoparticles on Human Cells from Healthy Individuals and Patients with

Respiratory Diseases -

Ilham F. Osman 2011

Ever increasing applications of nanomaterials (materials with one or more dimensionless than 100 nm) has raised awareness of their potential genotoxicity. They have unique physico-chemical properties and so could have unpredictable effects. Zinc oxide (ZnO) and titanium dioxide (TiO₂) are widely used in a number of commercial products. There are published studies indicating that

some forms of these compounds may be photo-clastogenic in mammalian cells. What has not been investigated before is the effect of nanoparticles from these compounds in human germ cells. Thus the present study has examined their effects in the presence and absence of UV light in human sperm and compared responses to those obtained with human lymphocytes using the Comet assay to measure DNA damage. The effect of nanoparticles (40-70nm range) was studied in human sperm and lymphocytes in the dark, after pre-irradiation with UV and simultaneous irradiation with UV. The studies do provide some evidence that there are photo-genotoxic events in sperm and lymphocytes in the absence of overt toxicity. The cytotoxic and genotoxic potentials of ZnO and TiO₂ as well

as their effect on phosphotyrosine expression, were examined in the human epithelial cervical carcinoma cells (Hela cells). This was done to try and determine the underlying molecular events resulting from their exposure to ZnO and TiO₂ nanoparticles occurring at the same time as DNA is damaged. Concentration- and time-dependent cytotoxicity, and an increase in DNA and cytogenetic damage with increasing nanoparticle concentrations were reported in this study. Mainly for zinc oxide, genotoxicity was clearly associated with an increase in tyrosine phosphorylation. Nanotechnology has raced ahead of nanotoxicology and little is known of the effects of nanoparticles in human systems, let alone in diseased individuals.

Therefore, the effects of TiO₂ nanoparticles in peripheral blood lymphocytes from patients with respiratory diseases (lung cancer, chronic obstructive pulmonary disease (COPD) and asthma) were compared with those in healthy individuals using genotoxic end points to determine whether there are any differences in sensitivity to nano-chemical insult between the patient and control groups. The results have shown concentration dependent genotoxic effects of TiO₂ in both respiratory patient and control groups in the Comet assay and an increasing pattern of cytogenetic damage measured in the micronucleus assay without being statistically significant except when compared with the untreated controls of

healthy individuals. Furthermore, modulation of ras p21 expression was investigated. Regardless of TiO₂ treatment, only lung cancer and COPD patients expressed measurable ras p21 levels that showed modulation as the result of nanoparticle treatment. Results have suggested that both ZnO and TiO₂ nanoparticles can be genotoxic over a range of concentrations without either photo-activation or being cytotoxic.

Nanotoxicology - Vineet Kumar 2018-03-12

As the application of nanotechnology in the myriad disciplines of science and engineering--from agriculture, pharmaceuticals, material science, and biotechnology to sensors, electronics, and mechanical and electrical engineering--brings benefits it also can produce serious

threats to human health and the environment that must be evaluated. The unique properties of nanomaterials make them different from their bulk counterparts. In addition to such unique properties, the nanometric size of nanomaterials can invite some detrimental effects on the health and well-being of living organisms and the environment. Thus, it is important to distinguish nanomaterials with such ill effects from nanomaterials with no or minimum toxicity. Nanotoxicology: Toxicity Evaluation, Risk Assessment and Management covers issues such as the basic principles of nanotoxicity, methods used for nanotoxicity evaluation, risk assessment and its management for nanomaterial toxicity with a focus on current

trends, limitations, challenges, and future directions of nanotoxicity evaluation. Various experts from different countries discuss these issues in detail in this book. This will be helpful to researchers, educators, and students who are interested in research opportunities for avoiding the environmental and health hazards of nanomaterials. This book will also be useful for industrial practitioners, policy makers, and other professionals in the fields of toxicology, medicine, pharmacology, food, drugs, and other regulatory sciences.

Toxicity of Nanoparticles in Plants
- Vishnu D. Rajput
2022-04-22
Toxicity of Nanoparticles in Plants: An Evaluation of Cyto/Morpho-

physiological, Biochemical and Molecular Responses, Volume Five in the Nanomaterial-Plant Interactions series, reviews the latest research on toxicological effects of using nanotechnology in plants. Key themes include analyzing plant exposure to nanomaterials, mechanisms of toxicity of nanoparticles to plants, and effects, uptake and translocation of various different nanoparticles. This will be an essential read for any scientist or researcher looking to assess and understand the potential toxicological risks associated with plant nanotechnology. To date, nanotechnology is considered one of the most promising areas of research due to the widespread applications of nanomaterials in

plant science and agriculture. However, extensive use of nano-based products raises concerns regarding their toxicity in crop plants, their environmental impact and potential consequences to humans via the food chain. Discusses environmental concerns raised by the extensive use of nanotechnology Highlights the impact of plants treated with nanoparticles on nutritional status Reviews major challenges for assessing the toxicity of nanomaterials in plants

Zinc-Based Nanostructures for Environmental and Agricultural Applications - Kamel A. Abd-Elsalam 2021-05-22

Zinc-Based Nanostructures for Environmental and Agricultural Applications shows how zinc nanostructures are

being used in agriculture, food and the environment. The book has been divided into two parts: Part I deals with the synthesis and characterization of zinc-based nanostructures such as biogenic, plant, microbial, and actinobacteria mediated synthesis of zinc nanoparticles, Part II is focused on agri-food applications such as antibacterial, antifungal, antimicrobial, plant disease management, controlling post-harvest diseases, pesticide sensing and degradations, plant promotions, ZnO nanostructure for food packaging application, safe animal food and feed supplement, elimination of mycotoxins, and veterinary applications. Part III reviews technological

developments in environmental applications such as risks and benefits for aquatic organisms and the marine environment, antiseptic activity and toxicity mechanisms, wastewater treatment, and zinc oxide-based nanomaterials for photocatalytic degradation of environmental and agricultural pollutants. The book discusses various aspects, including the application of zinc-based nanostructures to enhance plant health and growth, the effect on soil microbial activity, antimicrobial mechanism, phytotoxicity and accumulation in plants, the possible impact of zinc-based nanostructures in the agricultural sector as nanofertilizer, enhancing crop productivity, and other possible antimicrobial

mechanisms of ZnO nanomaterials. Explores the impact of a large variety of zinc-based nanostructures on agri-food and environment sectors Outlines how the properties of zinc-based nanostructures mean they are particularly efficient in environmental and agricultural application areas Assesses the major challenges of synthesizing and processing zinc-based nanostructured materials

Toxicology - Marcelo Larramendy 2016-10-26
This edited book, Toxicology - New Aspects to This Scientific Conundrum, is intended to provide an overview on the different xenobiotics employed every day in our anthropogenic activities. We hope that this book will continue to meet the expectations and needs of all interested in the

implications for the living species of known and new toxicants and to guide them in the future investigations.

Nanotechnology in Textiles - Rajesh Mishra 2018-11-14

Nanotechnology in Textiles: Theory and Application explains how conventional methods for treating fabrics for specific functions can be improved upon with the use of nanotechnology.

Overviews of relevant, fundamental nanophysics and nanochemistry theory are provided, along with explanations of their application in textile finishing, providing a crucial resource for readers exploring this expanding frontier in textiles. The book draws on research from around the globe to address the latest nanotechnological developments that are all examined with references to industrial

applications. Provides a complete, theoretical overview of nanotechnology and nanofibers for those with materials science or engineering backgrounds. Covers a broad range of topics, including aerogels, polymer nanocomposites, nanohazards, and electrospinning. Looks ahead to emerging applications of nanotechnology in textiles to point the way for further research and innovation.

Environmental Toxicity of Nanomaterials -

Vineet Kumar 2018-04-17
Environmental Toxicity of Nanomaterials focuses on causes and prevention of environmental toxicity induced by various nanomaterials. In sixteen chapters it describes the basic principles, trends, challenges, and future directions of nanoecotoxicity. The

future acceptance of nanomaterials in various industries depends on the impacts of nanomaterials on the environment and ecosystem. This book analyzes the safe utilization of nanotechnology so the tremendous prospect of nanotechnology can be achieved without harming either living beings or the environment.

Environmental Toxicity of Nanomaterials introduces nanoecotoxicity, describes various factors affecting the toxicity of nanomaterials, discusses various factors that can impart nanoecotoxicity, reviews various studies in the area of nanoecotoxicity evaluation, and describes the safety and risk assessment of nanomaterials. In addition, the book discusses strategies for

mitigating nanoecotoxicity. Lastly, the authors provide guidelines and protocols for nanotoxicity evaluation and discuss regulations for safety assessment of nanomaterials. In addition to environmental toxicologists, this book is aimed at policy makers, industry personnel, and doctoral and postdoctoral scholars.

Bioactivity of Engineered Nanoparticles

- Bing Yan 2017-08-17

This book brings together reviews from international experts who are exploring the biological activities of nanomaterials for medical applications or to better understand nanotoxicity. Topics include but are not limited to the following: 1) mechanistic understanding of

nanostructure-bioactivity relationships; 2) the regulation of nanoparticles' bioactivity by means of chemical modification; 3) the new methodologies and standard methods used to assess nanoparticles' bioactivity; 4) the mechanisms involved in nanoparticle-biomolecule interactions and nanoparticle-cell interactions; and 5) biomedical applications of nanotechnology. The book will be a valuable resource for a broad readership in various subfields of chemical science, engineering, biology, environment, and medicine.

Nanotoxicology - Hemant Kumar Daima 2021-07-15

The field of nanomedicine has risen quickly due to the increasing number of designer-made nanomaterials. These

nanomaterials have the potential to manage diseases and change the way medicine is currently studied. However, the increased practice of using nanomaterials has shed light on how many concepts of nanomedicine and nanotoxicity have been overlooked. Nanotoxicology: Toxicity Evaluation of Nanomedicine Applications addresses the existing gaps between nanomedicine and nanotoxicity. This book also brings together up-to-date knowledge on advances toward safe-by-design nanomaterials and existing toxicity challenges. This book delivers a comprehensive coverage in the field with fundamental understanding, serving as a platform to convey essential concepts of nanotoxicology and how these concepts can be employed to develop

advanced nanomaterials for a range of biomedical applications. This book is an effort to answer some of the thoughtful nanotoxicological complications and their auspicious probable solutions with new approaches and careful toxicity assessment. Key Features: Reveals novel nanoscale approaches, toxicity assessment, and biomedical applications Includes importance of nanotoxicity concepts in developing smart nanomaterials Highlights unique contributions and "A to Z" aspects on the state-of-the-art from global leaders Offers a complete package to learn fundamentals with recommendations on nanomaterials toxicity and safe-by-design nanomedicines Nanotoxicology: Toxicity Evaluation of Nanomedicine Applications illuminates

the high potential of many innovative nanomaterials, ultimately demonstrating them to be promising substitutes for available therapies that can be effectively used in fighting a myriad of biomedical complications. Further, this book reports legal, ethical, safety, and regulatory issues associated with nanomaterials, which have often been neglected, if not overlooked in literature and limiting clinical translation at nanoscale level. It will equip readers with cutting-edge knowledge of promising developments in nanomedicine and nanotoxicology, along with potential future prospects.

Nanomaterials Safety -

Shyamasree Ghosh

2018-11-19

This monograph summarizes the current

knowledge on potential health hazards induced by nanomaterials from different sources and sort such as food, drugs and silver nanoparticles. Methods to assess toxicity as well as known effects on the genome, neuronal and respiratory system are discussed. Besides the impact on human and animal life the books also addresses aquatic toxicity.

Plant Nanotechnology -

Chittaranjan Kole

2016-10-13

This book highlights the implications of nanotechnology in plant sciences, particularly its potential to improve food and agricultural systems, through innovative, eco-friendly approaches, and as a result to increase plant productivity. Topics include various aspects of nanomaterials: biophysical and biochemical properties;

methods of treatment, detection and quantification; methods of quantifying the uptake of nanomaterials and their translocation and accumulation in plants. In addition, the effects on plant growth and development, the role of nanoparticles in changes in gene and protein expression, and delivery of genetic materials for genetic improvement are discussed. It also explores how nanotechnology can improve plant protection and plant nutrition, and addresses concerns about using nanoparticles and their compliances. This book provides a comprehensive overview of the application potential of nanoparticles in plant science and serves as a valuable resource for students, teachers, researchers and professionals working on

nanotechnology. Nanometal Oxides in Horticulture and Agronomy - Li Xinghui 2023-01-19 Nanometal Oxides in Horticulture and Agronomy, a volume in the Nanomaterial-Plant Interactions series, summarizes the physiological, morphological, biochemical, and molecular regulation of metal oxide nanoparticles in plants under normal conditions as well as during different stresses. With a focus on impact and applications, it presents the latest advances in the roles of metal oxide nanoparticles in both horticulture and agriculture. Metal oxide nanoparticles have been reported as beneficial inorganic materials for the growth and development of plants, playing a protective

role against the abiotic and biotic stresses. Researchers need to understand the different regulatory pathways of metal oxide nanoparticles, including their mechanisms of operation under different stressful conditions. This volume presents the physiological, morphological, biochemical, and molecular regulation of metal oxide nanoparticles in plants in normal conditions as well as during different stresses. It also discusses tolerance mechanisms and the variety of roles and applications that metal oxide nanoparticles have within plant biology. Beginning with an introductory overview to metal oxide nanomaterials, chapters discuss the effect of metal oxide nanomaterials on

biochemical pathways within the plant, highlighting key applications such as fertilizers, weed control systems and pest control systems. It describes the impact of metal oxide nanoparticles in different challenging environmental conditions. Concluding with a discussion of the strengths and weaknesses of metal oxide nanoparticles in agriculture, *Nanometal Oxides in Horticulture and Agronomy* provides inspiration for further research and advancement. This book is an essential read for researchers and students interested in horticulture, agronomy, and plant nanomaterials. Bridges the interdisciplinary knowledge gap between metal oxide nanoparticle synthesis and biological relevance in agriculture

and horticulture
Evaluates why metal
oxide nanoparticles are
superior to other
nanomaterials for
horticultural and
agricultural
applications Interprets
the impact of metal
oxide nanoparticles
against a variety of
different stressors,
including drought,
salinity and heavy metal
contamination

*Phytotoxicity of
Nanoparticles* - Mohammad
Faisal 2018-06-28

This book provides
relevant findings on
nanoparticles' toxicity,
their uptake,
translocation and
mechanisms of
interaction with plants
at cellular and sub-
cellular level. The
small size and large
specific surface area of
nanoparticles endow them
with high chemical
reactivity and intrinsic
toxicity. Such unique
physicochemical

properties draw global
attention of scientists
to study potential risks
and adverse effects of
nanoparticles in the
environment. Their
toxicity has pronounced
effects and consequences
for plants and
ultimately the whole
ecosystem. Plants
growing in
nanomaterials-polluted
sites may exhibit
altered metabolism,
growth reduction, and
lower biomass
production.

Nanoparticles can adhere
to plant roots and exert
physicochemical toxicity
and subsequently cell
death in plants. On the
other hand, plants have
developed various
defense mechanisms
against this induced
toxicity. This books
discusses recent
findings as well as
several unresolved
issues and challenges
regarding the
interaction and

biological effects of nanoparticles. Only detailed studies of these processes and mechanisms will allow researchers to understand the complex plant-nanomaterial interactions.

From Basic Research to New Tools and Challenges for the Genotoxicity Testing of Nanomaterials

- Valérie Fessard

2021-03-24

This Special Issue presents studies on the genotoxicity of nanomaterials. Although nanomaterials provide multiple benefits in a wide range of applications, challenges remain in addressing strong concerns about their risks to the environment and human health. As a result of inconsistencies among published results and diverging conclusions, the understanding of nanomaterial exposure and toxicity remains

unclear. Determining whether these materials cause DNA damage—the first step in carcinogenesis—must be a priority in testing. In this book, readers will find recent publications on the genotoxic response to a broad range of nanomaterials, the impact of physico-chemical characteristics, safe-by-design and new developed tools.

Free Radical Biology and Environmental Toxicity -

Kavindra Kumar Kesari

2022-03-11

The main aim of this book is to collect a series of research articles and reviews from a diverse group of scientists to share their research work on the role of free radical research and environmental toxicity. This book presents various state-of-the-art chapters of recent progress in the field of

cellular toxicology and clinical manifestations of various disorders. Topics include cell signaling, various risk factors, the pathophysiology of disease instigation and distribution, mechanistic insights into metal and nanoparticle toxicity, neural toxicity, nongenotoxic carcinogenicity, immune and idiosyncratic toxicity, prevention, biomarkers related to disease progression and therapeutic strategies. In particular, this book provides valuable insight for researchers, pathologists, and clinicians with an interest in toxicological research and cellular impairments with special emphasis on therapeutic advancement. Sustainable Agriculture Reviews 41 - Shamsul Hayat 2020-02-06
This book presents

recent developments involving the role of nanoparticles on plant physiology and growth. Nanotechnology applications include improvement of agricultural production using bio-conjugated NPs (encapsulation), transfer of DNA in plants for development of insect pest-resistant varieties, nanoformulations of agrochemicals such as pesticides and fertilizers for crop improvement, and nanosensors/nanobiosensors in crop protection for identification of diseases and residues of agrochemicals. Recent findings on the increased use of nanotechnology in agriculture by densely populated countries such as China and India indicate that this technology may impart a substantial impact on reducing hunger,

malnutrition, and child mortality.

Zinc Oxide

Nanostructures:

Synthesis and Characterization -

Sotirios Baskoutas

2018-12-04

This book is a printed edition of the Special Issue "Zinc Oxide Nanostructures: Synthesis and Characterization" that was published in *Materials*

Drosophila Cytogenetics Protocols - Daryl S.

Henderson 2008-02-03

Leading drosophilists describe in step-by-step detail all the essential techniques for studying *Drosophila* chromosomes and suggest new avenues for scientific exploration. The chapters emphasize specimen preparation (from dissection to mounting) and cover both polytene and mitotic/meiotic chromosomes in depth.

Each fully tested and readily reproducible protocol offers a background introduction, equipment and reagent lists, and tips on troubleshooting and avoiding pitfalls. A cutting-edge FISH and immunolocalization technique will be important for discovering how DNA sequence influences higher-order chromosome architecture and ultimately gene expression.

The Role of Nanoparticles in Plant Nutrition under Soil Pollution - Vishnu D.

Rajput 2022-06-01

Nanotechnology has shown great potential in all spheres of life. With the increasing pressure to meet the food demands of rapidly increasing population, thus, novel innovation and research are required in agriculture. The principles of

nanotechnology can be implemented to meet the challenges faced by agricultural demands. Major challenges include the loss of nutrients in the soil and nutrient-deficient plants, which result in a lower crop yield and quality. Subsequently, consumption of such crops leads to malnourishment in humans, especially in underprivileged and rural populations. One convenient approach to tackle nutrient deficiency in plants is via the use of fertilizers; however, this method suffers from lower uptake efficiency in plants. Another approach to combat nutrient deficiency in humans is via the use of supplements and diet modifications; however, these approaches are less affordably viable in economically challenged communities

and in rural areas. Therefore, the use of nano-fertilizers to combat this problem holds the greatest potential. Additionally, nanotechnology can be used to meet other challenges in agriculture including enhancing crop yield, protection from insect pests and animals, and by use of nano-pesticides and nano-biosensors to carry out the remediation of polluted soils. The future use of nanomaterials in soil ecosystems will be influenced by their capability to interact with soil constituents and the route of nanoparticles into the environment includes both natural and anthropogenic sources. The last decade has provided increasing research on the impact and use of nanoparticles in plants, animals,

microbes, and soils, and yet these studies often lacked data involving the impact of nanoparticles on biotic and abiotic stress factors. This book provides significant recent research on the use of nano-fertilizers, which can have a major impact on components of an ecosystem. This work should provide a basis to further study these potential key areas in order to achieve sustainable and safe application of nanoparticles in agriculture.

Advances in

Phytonanotechnology -

Mansour Ghorbanpour

2019-05-21

Advances in

Phytonanotechnology:

From Synthesis to

Application guides

readers through various

applications of

nanomaterials on plants

by presenting the latest

research related to

nanotechnology and nanomaterials on plant systems. The book focuses on the effects of these applications on plant morphology, physiology, biochemistry, ecology and genetics. Sections cover the impact on plant yield, techniques, a review of positive and negative impacts, and an overview of current policies regarding the use of nanotechnology on plants. Additionally, the book offers insights into the appropriate application of nanoscience to plants and crops for improved outcome and an exploration of their bioavailability and toxicity in the environment. Discusses the morphological, physiological and biochemical responses of plants to nanomaterials and the ability of the nanomaterials in modifying the genetic

constitution of plants
Emphasizes new
applications of
nanomaterials, including
nanosensors technology
and nanomaterials as
nanocarriers based
antimicrobial
phytochemicals Presents
the role of
nanotechnology as a
novel technique for the
remediation of heavy
metals by plants

Nanomaterials and Their
Biomedical Applications

- Tuhin Subhra Santra
2021-04-16

This book highlights the
evolution of, and novel
challenges currently
facing, nanomaterials
science,
nanoengineering, and
nanotechnology, and
their applications and
development in the
biological and
biomedical fields. It
details different
nanoscale and
nanostructured materials
syntheses, processing,
characterization, and

applications, and
considers improvements
that can be made in
nanostructured materials
with their different
biomedical applications.
The book also briefly
covers the state of the
art of different
nanomaterials design,
synthesis, fabrication
and their potential
biomedical applications.
It will be particularly
useful for reading and
research purposes,
especially for science
and engineering
students, academics, and
industrial researchers.
*Nanotechnology and Plant
Sciences* - Manzer H.
Siddiqui 2015-01-27
This book presents a
holistic view of the
complex and dynamic
responses of plants to
nanoparticles, the
signal transduction
mechanisms involved, and
the regulation of gene
expression. Further, it
addresses the
phytosynthesis of

nanoparticles, the role of nanoparticles in the antioxidant systems of plants and agriculture, the beneficial and harmful effects of nanoparticles on plants, and the application of nanoparticles and nanotubes to mass spectrometry, aiming ultimately at an analysis of the metabolomics of plants. The growing numbers of inventions in the field of nanotechnology are producing novel applications in the fields of biotechnology and agriculture. Nanoparticles have received much attention because of the unique physico-chemical properties of these compounds. In the life sciences, nanoparticles are used as “smart” delivery systems, prompting the Nobel Prize winner P. Ehrlich to refer to these compounds as “magic

bullets.” Nanoparticles also play an important role in agriculture as compound fertilizers and nano-pesticides, acting as chemical delivery agents that target molecules to specific cellular organelles in plants. The influence of nanoparticles on plant growth and development, however, remains to be investigated. Lastly, this book reveals the research gaps that must be bridged in the years to come in order to achieve larger goals concerning the applications of nanotechnology in the plants sciences. In the 21st century, nanotechnology has become a rapidly emerging branch of science. In the world of physical sciences, nanotechnological tools have been exploited for a broad range of applications. In recent years, nanoparticles

have also proven useful in several branches of the life sciences. In particular, nanotechnology has been employed in drug delivery and related applications in medicine.

Nanomaterials in the Battle Against Pathogens and Disease Vectors -

Kaushik Pal 2022-02-24

Nanomaterials in the Battle Against Pathogens and Disease Vectors

presents an overview of the use of

nanotechnology to mitigate pathogens of concern, and is the

first book to discuss applications of

nanotechnology in the fight against all three

major domains of disease-causing

pathogens. Bacteria, viruses, and parasites

constitute the list of emerging and re-emerging

pathogens of high priority. Nanotechnology

has proven to be a

groundbreaking success in the elimination, targeted toxicity, precise immunogenicity, diagnosis, and imaging of these major pathogens and disease vectors.

This text discusses basic concepts and

advanced applications for bacteria, viruses, and parasites. It

describes the use of metallic and non-

metallic nanoparticles and nanotoxicity, as

well as presents future applications of

nanotechnology in biological applications.

This work is ideal for engineers and scientists

across the interdisciplinary fields

of materials science, biomedical engineering,

biotechnology, and others concerned with

mitigating the risk and effect of pathogens.

Analysis, Fate, and Toxicity of Engineered

Nanomaterials in Plants

- 2019-05-30

Analysis, Fate, and Toxicity of Engineered Nanomaterials in Plants, Volume 84 in the Comprehensive Analytical Chemistry series, highlights new advances in the field, with this new volume presenting interesting chapters on the Current status of environmental monitoring, Physical principles of infrared, Chemical principles of infrared, Instrumentation and hardware, Data analysis, Sampling, Applications in water, Application in soil and sediments, Applications in ecology of animals and plants, Applications in air monitoring, Applications in contamination, Applications in marine environments, Advantages and pitfalls, and more. Provides the authority and expertise of leading contributors from an international board of authors Presents the

latest release in the Comprehensive Analytical Chemistry series Updated release includes the latest information on the field of engineered nanomaterials in plants **Plant Responses to Nanomaterials** - Vijay Pratap Singh 2021-04-01 The population of the world continues to increase at an alarming rate. The trouble linked with overpopulation ranges from food and water scarcity to inadequacy of space for organisms. Overpopulation is also linked with several other demographic hazards, for instance, population blooming will not only result in exhaustion of natural repositories, but it will also induce intense pressure on the world economy. Today nanotechnology is often discussed as a key discipline of research but it has positive and

negative aspects. Also, due to industrialization and ever-increasing population, nano-pollution has been an emerging topic among scientists for investigation and debate. Nanotechnology measures any substance on a macromolecular scale, molecular scale, and even atomic scale. More importantly, nanotechnology deals with the manipulation and control of any matter at the dimension of a single nanometer. Nanotechnology and nanoparticles (NPs) play important roles in sustainable development and environmental challenges as well. NPs possess both harmful and beneficial effects on the environment and its harboring components, such as microbes, plants, and humans. There are many beneficial impacts exerted by

nanoparticles, however, including their role in the management of waste water and soil treatment, cosmetics, food packaging, agriculture, biomedicines, pharmaceuticals, renewable energies, and environmental remedies. Conversely, NPs also show some toxic effects on microbes, plants, as well as human beings. It has been reported that use of nanotechnological products leads to the more accumulation of NPs in soil and aquatic ecosystems, which may be detrimental for living organisms. Further, toxic effects of NPs on microbes, invertebrates, and aquatic organisms including algae, has been measured. Scientists have also reported on the negative impact of NPs on plants by discussing the delivery of NPs in plants. Additionally,

scientists have also showed that NPs interact with plant cells, which results in alterations in growth, biological function, gene expression, and development. Thus, there has been much investigated and reported on NPs and plant interactions in the last decade. This book discusses the most recent work on NPs and plant interaction, which should be useful for scientists working in nanotechnology across a wide variety of disciplines.

Nanomaterials and Plant Potential - Azamal Husen
2019-03-01

This book discusses the latest developments in plant-mediated fabrication of metal and metal-oxide nanoparticles, and their characterization by using a variety of modern techniques. It explores in detail the

application of nanoparticles in drug delivery, cancer treatment, catalysis, and as antimicrobial agent, antioxidant and the promoter of plant production and protection. Application of these nanoparticles in plant systems has started only recently and information is still scanty about their possible effects on plant growth and development.

Accumulation and translocation of nanoparticles in plants, and the consequent growth response and stress modulation are not well understood. Plants exposed to these particles exhibit both positive and negative effects, depending on the concentration, size, and shape of the nanoparticles. The impact on plant growth and yield is often positive at lower

concentrations and negative at higher ones. Exposure to some nanoparticles may improve the free-radical scavenging potential and antioxidant enzymatic activities in plants and alter the micro-RNAs expression that regulate the different morphological, physiological and metabolic processes in plant system, leading to improved plant growth and yields. The nanoparticles also carry out genetic reforms by efficient transfer of DNA or complete plastid genome into the respective plant genome due to their miniscule size and improved site-specific penetration. Moreover, controlled application of nanomaterials in the form of nanofertilizer offers a more synchronized nutrient fluidity with the uptake by the plant exposed,

ensuring an increased nutrient availability. This book addresses these issues and many more. It covers fabrication of different/specific nanomaterials and their wide-range application in agriculture sector, encompassing the controlled release of nutrients, nutrient-use efficiency, genetic exchange, production of secondary metabolites, defense mechanisms, and the growth and productivity of plants exposed to different manufactured nanomaterials. The role of nanofertilizers and nano-biosensors for improving plant production and protection and the possible toxicities caused by certain nanomaterials, the aspects that are little explored by now, have also been generously elucidated.

Recent Advances in Novel Drug Carrier Systems -

Ali Demir Sezer

2012-10-31

This contribution book collects reviews and original articles from eminent experts working in the interdisciplinary arena of novel drug delivery systems and their uses. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of different drug delivery systems. Since the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. On the other hand, this reference discusses advances in the design, optimization, and adaptation of gene

delivery systems for the treatment of cancer, cardiovascular, pulmonary, genetic, and infectious diseases, and considers assessment and review procedures involved in the development of gene-based pharmaceuticals.

Green synthesis of nanomaterials: cytotoxicity and drug delivery - Mina Sarani
2023-01-06

Nanobiotechnology Applications in Plant Protection - Kamel A. Abd-Elsalam 2019-10-04
Nanobiotechnology Applications in Plant Protection: Volume 2 continues the important and timely discussion of nanotechnology applications in plant pathology, filling a gap in the literature for nano applications in crop protection. Nanobiopesticides and nanobioformulations are

examined in detail and presented as powerful alternatives for eco-friendly management of plant pathogens and nematodes. Leading scholars discuss the applications of nanobiomaterials as antimicrobials, plant growth enhancers and plant nutrition management, as well as nanodiagnostic tools in phytopathology and magnetic and supramagnetic nanostructure applications for plant protection. This second volume includes exciting new content on the roles of biologically synthesized nanoparticles in seed germination and zinc-based nanostructures in protecting against toxigenic fungi. Also included is new research in phytotoxicity, nano-scale fertilizers and nanomaterial applications in

nematology and discussions on Botrytis grey mold and nanobiocontrol. This book also explores the potential effects on the environment, ecosystems and consumers and addresses the implications of intellectual property for nanobiopesticides. Further discussed are nanotoxicity effects on the plant ecosystem and nano-applications for the detection, degradation and removal of pesticides.

Engineered Antimicrobial Surfaces - S. Snigdha
2020-05-11

This volume looks at the different aspects involved in controlling microbial growth and the techniques employed in obtaining sterile surfaces. It covers research on coatings, nano-materials, herbal materials, naturally occurring antimicrobials in designing

antimicrobial surfaces. It discusses issues of antibiotic resistance, synthesis techniques, toxicity, and current and potential applications of antimicrobial surfaces, and this book will serve as a useful reference to a broad range of scientists, industrial practitioners, graduate and undergraduate students, and other professionals in the fields of polymer science and engineering, materials science, surface science, bioengineering and chemical engineering.

Nano-Antimicrobials - Nicola Cioffi 2012-02-24

There is a high demand for antimicrobials for the treatment of new and emerging microbial diseases. In particular, microbes developing multidrug resistance have created a pressing need to search for a new generation of

antimicrobial agents, which are effective, safe and can be used for the cure of multidrug-resistant microbial infections. Nano-antimicrobials offer effective solutions for these challenges; the details of these new technologies are presented here. The book includes chapters by an international team of experts. Chemical, physical, electrochemical, photochemical and mechanical methods of synthesis are covered. Moreover, biological synthesis using microbes, an option that is both eco-friendly and economically viable, is presented. The antimicrobial potential of different nanoparticles is also covered, bioactivity mechanisms are elaborated on, and several applications are reviewed in separate

sections. Lastly, the toxicology of nano-antimicrobials is briefly assessed. Nanostructured Zinc Oxide - Kamlendra Awasthi 2021-08-10 Nanostructured Zinc Oxide covers the various routes for the synthesis of different types of nanostructured zinc oxide including; 1D (nanorods, nanowires etc.), 2D and 3D (nanosheets, nanoparticles, nanospheres etc.). This comprehensive overview provides readers with a clear understanding of the various parameters controlling morphologies. The book also reviews key properties of ZnO including optical, electronic, thermal, piezoelectric and surface properties and techniques in order to tailor key properties. There is a large emphasis in the book on

ZnO nanostructures and their role in optoelectronics. ZnO is very interesting and widely investigated material for a number of applications. This book presents up-to-date information about the ZnO nanostructures-based applications such as gas sensing, pH sensing, photocatalysis, antibacterial activity, drug delivery, and electrodes for optoelectronics. Reviews methods to synthesize, tailor, and characterize 1D, 2D, and 3D zinc oxide nanostructured materials Discusses key properties of zinc oxide nanostructured materials including optical, electronic, thermal, piezoelectric, and surface properties Addresses most relevant zinc oxide applications in optoelectronics such as light-emitting diodes, solar cells, and sensors

Adverse Effects of Engineered Nanomaterials

- Bengt Fadeel

2017-02-14

Adverse Effects of Engineered Nanomaterials: Exposure, Toxicology, and Impact on Human Health, Second Edition, provides a systematic evaluation of representative engineered nanomaterials (ENM) of high volume production and their high economic importance. Each class of nanomaterials discussed includes information on what scientists, industry, regulatory agencies, and the general public need to know about nanosafety. Written by leading international experts in nanotoxicology and nanomedicine, this book gives a comprehensive view of the health impact of ENM, focusing on their potential adverse effects in

exposed workers, consumers, and patients. All chapters have been updated with new sections on the endocrine system and other organ systems. In addition, other newly added sections include introductory chapters on the physio-chemical characterization of nanomaterials and interactions between nanomaterials and biological systems, as well as a new chapter that explores risk assessment and management of nanomaterials. This book fills an important need in terms of bridging the gap between experimental findings and human exposure to ENM, also detailing the clinical and pathological consequences of such exposure in the human population. Uses a schematic, non-exhaustive approach to summarize the most

important research data in this field Discusses the health implications of experimental data in nanotoxicology Presents a completely revised edition that focuses on the human health impacts of engineered nanomaterials, including many organ-specific chapters

Nanomaterials in Plants, Algae and Microorganisms

- Durgesh Kumar Tripathi
2018-09-14

Nanomaterials in Plants, Algae and

Microorganisms: Concepts and Controversies:

Volume 2 not only covers all the new technologies used in the synthesis of nanoparticles, it also tests their response on plants, algae and microorganisms in aquatic ecosystems. Unlike most works in the field, the book doesn't focus exclusively on the higher organisms.

Instead, it explores the smaller life forms on

which they feed. Topics include the impacts of plant development, how different nanoparticles are absorbed by biota, the impact different metals—including silver and rare earth metals—have on living organisms, and the effects nanoparticles have on aquatic ecosystems as a whole.

As nanotechnology based products have become a trillion-dollar

industry, there is a need to understand the implications to the health of our biota and ecosystems as the earth is increasingly

inundated with these materials. Covers the issues of nanoparticles on more simple organisms and their ecosystems

Draws upon global experts to help increase understanding of the interface mechanisms at the physiological, biochemical, molecular, and even genomic and

proteomic level between ENPs and biological systems Provides a critical assessment of the progress taking place on this topic Sheds light on future research needs and scientific challenges that still exist in nanoparticle and living organism interactions

Nano-enabled

Agrochemicals in

Agriculture - Mansour Ghorbanpour 2022-03-12

Nano-enabled

Agrochemicals in

Agriculture presents a targeted overview of the safe implementation of nanotechnologies within horticultural and agricultural settings with the purpose of achieving enhanced production while maintaining ecological integrity. The growing global request for agricultural crops/products requires high standards of quality and safety,

which has stimulated the search for new technologies that preserve their quality and delay their decomposition. It includes sections on the use of nano-chemicals in insect pest management, as nano-fungicides, nano-herbicides, micro-nutrient supply, and nano-sensors to monitor crop/soil health conditions. This book will be of interest to a wide range of plant scientists who have concerns about nanomaterial interactions with terrestrial and aquatic plants. Focuses on emerging important topics related to nanotechnology and nanomaterials on agricultural systems Emphasizes new applications of nanomaterials in the agricultural sciences, from fertilizers to irrigation systems

Addresses concerns about nanomaterial interactions with terrestrial and aquatic plants

Zinc Compounds—Advances in Research and

Application: 2013

Edition - 2013-06-21

Zinc Compounds—Advances in Research and Application: 2013

Edition is a ScholarlyBrief™ that delivers timely, authoritative, comprehensive, and specialized information about ZZZAdditional Research in a concise format. The editors have built Zinc

Compounds—Advances in Research and

Application: 2013

Edition on the vast information databases of ScholarlyNews.™ You can expect the information about ZZZAdditional Research in this book to be deeper than what you can access anywhere else, as well as

consistently reliable, authoritative, informed, and relevant. The

content of Zinc Compounds—Advances in Research and

Application: 2013

Edition has been produced by the world's leading scientists,

engineers, analysts, research institutions, and companies. All of

the content is from peer-reviewed sources, and all of it is

written, assembled, and edited by the editors at ScholarlyEditions™ and

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at <http://www.ScholarlyEditions.com/>.

Cellular and Molecular Toxicology of

Nanoparticles - Quaiser Saquib 2018-02-16

This edited book is a compilation of findings

on the molecular and cellular toxicity of nanoparticles (NPs) in animal cell, human cells, invertebrates. The varied selection of test models will provide better understanding about the horizon of NPs toxicity. Interaction of NPs with cells and its organelles can induce toxicological consequences, including transcriptional and translational alterations, DNA damage, cytotoxicity, oxidative stress, mitochondrial dysfunction and cell death. NPs can get internalized in cells through phagocytosis, macropinocytosis, receptor-mediated endocytosis and passive penetration, which can affect varied cell types. Readers will be benefited with the compilations on basic and molecular facet of NPs toxicity. The chapters will provide a

comprehensive information on the state-of-the-art methodologies. The application of toxicogenomic approaches, which is already established in nanotoxicology, has been given special consideration to unravel the toxicodynamics of nanomaterials. Among these approaches, the high-throughput RNA sequencing (RNA-Seq), which is able to build a complete map of transcriptome across different cell types and perturbations upon NPs exposure has been included. The readers are also introduced to the less studied topic on the adsorption of biomolecules (mainly proteins) on the NPs surface, constituting the so-called "biomolecular corona". The book has been designed for scientists engaged in NPs toxicity

research. Nonetheless, it should be of interest to a variety of scientific disciplines including marine biology, environmental pollution, genetics, pharmacology, medicine, drug and food material

sciences, consumer products. Also, the compilations will be of interest to the environmental watchdogs, federal regulators, risk assessors and the policy makers.