Bioremediation

We are proposing this comprehensive volume aimed at bridging and binding of the theory and practical experiences for the elimination of a broad range of pollutants from various types of water and soil utilizing innovative nanotechnologies, biotechnologies and their possible combinations. Nowdays, a broad range of contaminants are emerging from the industry (and also representing old ecological burden). Accidents and improper wastewater treatment requires a fast, efficient and cost-effective approach. Therefore, several innovative technologies of water and soil treatments have been invented and suggested in a number of published papers. Out of these, some nanotechnologies and biotechnologies (possibly also their mutual combinations) turned out to be promising for practical utilization – i.e., based on both extensive laboratory testing and pilot-scale verification. In this book, the diverse character of targeted pollutants, the key remediation technologies covered in this book will include oxidation, reduction, sorption and/or biological degradation. In relation to innovative technologies and new emerging pollutants, mentioned in this proposed book, an important part will also cover the ecotoxicity of selected pollutants and novel nanomaterials used for remediation. Thus, this work will consist of eight sections/chapters with a technical appendix as an integral part of the book, where some technical details and standardized protocols will be clearly presented for their possible implementation at different contaminated sites. Although many previously published papers and books (or book chapters) are devoted to some aspects of nano-/biotechnologies, here we will bring a first complete and comprehensive treatise on the latest progress in innovative technologies with a clear demonstration of the applicability of particular methods based on results of the authors from pilot tests (i.e., based on the data collected within several applied projects, mainly national project “Environmentally-friendly nanotechnologies and biotechnologies in water and soil treatment” of the Technology Agency of the Czech Republic, and 7FP project NANOREM: “Taking Nanotechnological Remediation Processes from Lab Scale to End User Applications for the Restoration of a Clean Environment”). This multidisciplinary book will be suitable for a broad audience including environmental scientists, practitioners, policymakers and toxicologists (and of course graduate students of diverse fields – material science, chemistry, biology, geology, hydrogeology, engineering etc.).

Innovative Bio-Based Technologies for Environmental Remediation

The huge expansion of the chemical and petroleum industries in the twentieth century has resulted in the production of a vast array of chemical compounds and materials that have transformed our lives. The associated large-scale manufacturing, processing and handling activities have caused a serious deterioration in environmental quality and endangering human health. These negative impacts have led to remediation action in support of environmental sustainability. Of biotechnological methods through bioremediation, application has gained prominence as an option for soil remediation methods. Bioremediation is a multidisciplinary approach where biologists, chemists, soil scientists and engineers work as team to develop and implement remediation processes. Bioremediation has now been used successfully to remediate many petroleum-contaminated sites. However, there are as yet no commercial technologies commonly used to remediate the most recalcitrant contaminants. Nevertheless, bioremediation is a rapidly advancing field and new bio-based remedial technologies are continuing to emerge.

Biological Approaches to Controlling Pollutants

Applied Bioremediation and Phytoremediation

Monthly Catalog of United States Government Publications

Environmental Micropollutants

The symposium included 600 presentations in 50 sessions on bioremediation and supporting technologies used for a wide range of contaminants already in, or poised to invade, soil, groundwater, and sediment. Three hundred and fifty-two papers were selected and organized into ten volumes. Volume four treats analytical approaches to remediation, including polymerase chain reaction (PCR) and other molecular monitoring approaches, analysis of isotope ratios for carbon or other environmentally relevant elements, and geochemical analyses for designing and tracking remediation processes. Articles average eight pages, and contain abstracts and references. Annotation copyrighted by Book News Inc., Portland, OR.

An Innovative Role of Biofiltration in Wastewater Treatment Plants (WWTPs)

This book addresses the grave concerns stemming out due to conventional treatment techniques. The main focus of this book revolves round the central kernel of novel techniques of bioremediation and innovative biotechnology which has emerged as an independent warrior to clean up and restore the disturbed environments. Furthermore, this book is a coherent assortment of diverse chapters relevant to the role of biotechnology and bioremediation for restoration of the ecosystems degraded by pesticide and heavy metal pollution. The inaugural chapters deal with the quantification of problem and its magnitude due to pesticides and heavy metals, followed by innovative modern bioremediation treatment techniques for wastewater treatment, including bioremediation and sustainable treatments. It is a detailed comprehensive account for the treatment technologies from unsustainable to sustainable. Academicians, researchers and students shall find it as a complete wrap up regarding biotechnological intervention for sustainable treatment of pollution and shall suffice for the diverse needs of teaching and research.

Catalog of Superfund Program Information Products

The Special Issue "Technological Eco-Innovations for the Quality Control and the Decontamination of Polluted Waters and Soils” deals with the most recent research activities carried out at lab and field scale on eco-sustainable tools for the remediation of contaminated environmental substrates. It is particularly devoted to highlight the relevance of biological organisms (plants, microbes, algae) to assess the chemical contamination in water and soil and to remediate such matrices from the pollution caused by the human activities. Therefore, bioremediation is a primary focus of most of the articles published within the present Special Issue. Bioremediation is a promising environment-friendly nanotechnology to deal with the chemical pollution in different ecosystems in conjunction with the traditional approaches represented by a significant breakthrough for the environmental decontamination. An overview of the potential of the eco-innovative technologies, with nature-based solutions associated with the modern analytical techniques, is offered along the contributions forming the Special Issue. In this volume, different contaminants occurring in various environmental matrices are assessed under defined conditions and available with many interesting outcomes used in research perspectives.

Handbook of Research on Waste Diversion and Minimization Technologies for the Industrial Sector

Road Map to Understanding Innovative Technology Options for Brownfields Investigation and Cleanup

Innovative Bio-Based Technologies for Environmental Remediation explores the recent applications of both the latest and broad practical and theoretical aspects of environmental remediation with an aim to combine various innovative-based biotechnology for waste management, waste minimization, and waste to economy. This book summarizes the recent progress of bio-based technologies for environmental remediation at both an experimental and a theoretical model level. An emphasis has been made on trends and the probable future of sustainable techniques to reduce waste and harmful compounds from the environment. Biological-based technologies have low
operating costs and involve direct degradation of organic pollutants without the release of toxic intermediates. Recent applications covered in this book include process integration, innovative approaches, green technology, phytoremediation, biosolids, biomass for environmental applications, and other bio-based technologies with sustainable design and the future of remediation are also discussed. This book is an important reference source for environmental scientists and engineers who are seeking to improve their understanding of how bio-based technologies are playing an increasingly important role in environmental remediation. It brings together recent innovations and practices of bio-based technologies for environmental remediation, outlines major bio-based technologies, and discusses biopolymers and biosurfactants for environmental management.

Innovative Methods in Support of Bioremediation

The Future of EFFluent Treatment Plants

Cost-Effective Technologies for Solid Waste and Wastewater Treatment synthesizes methods, case studies, and analyses of various state-of-the-art techniques for removing contaminants from wastewater, solid waste, or sewage and converting or reusing the waste with minimum impact on the environment. Focusing on innovative treatment strategies, as well as recent modifications to conventional processes, the book covers methods for a complex variety of emerging pollutants including organic matter, chemicals, and micropollutants resulting from developmental and industrial activities. Serving as a practical guide to state-of-the-art methods, Cost-Effective Technologies for Solid Waste and Wastewater Treatment also delivers foundational information on the practical design of treatment and reuse systems and explains the treatment strategies of scale, efficiency, and effectiveness. It focuses on cost-effective technologies that are particularly applicable to environmental clean-up, such as bioaugmentation and biostimulation of plastics, activated carbon, phytoremediation, crude oil pollution stress, adsorbents, contaminants of emerging concern, anaerobic digestion, in situ chemical oxidation (ISCO), bioremediation, bioremediation, radioactive contaminants, constructed wetlands, nanoremediation, and rainwater. As such, it is a valuable and practical resource for researchers, students, and engineers in the fields of environmental science and technology, as well as wastewater management, chemical engineering, and biotechnology. It presents low-cost treatment technologies for both solid waste and wastewater. Analyzes the efficiency and effectiveness of state-of-the-art technologies. Involves methods and case studies for practical application.

Bioremediation in the Field

Catalog of Superfund Program Information Products 1994

Environmental pollution increases day by day due to increases in population, industrialization, and urbanization, posing a threat to human health. The risk of adverse effects on health and on the environment caused by pollution has driven international efforts to combat pollutants. Bioremediation is the most effective innovative technology that uses live naturally-occurring microorganisms to degrade environmental pollutants and prevent contamination. Emerging Technologies in Environmental Bioremediation introduces emerging bioremediation technologies for the treatment and management of industrial wastes and other environmental pollutants for the sake of environmental sustainability. Emerging bioremediation approaches such as nano-bioremediation technology, electro-bioremediation technology, microbial fuel cell technology, Modified Ludzack-Ettlinger Process, Modified Activated Sludge Process, and phytotechnologies for the remediation of industrial wastes/pollutants are discussed in a comprehensive manner not found in other books. Furthermore, the book includes updated information as well as future directions for research in the field of bioremediation of industrial wastes. This book is useful to students, researchers, scientists, and professionals in the field of microbiology and biotechnology, biochemical engineers, and their potential researchers, ecotoxicology, environmental remediation and waste managers, who aspire to work on the biodegradation and bioremediation of industrial wastes/environmental pollutants for environmental sustainability. Includes the recovery of resources from wastewater. Describes the importance of microorganisms in environmental bioremediation technologies. Points out the reuse of treated wastewater through emerging technologies. Pays attention to the occurrence of novel micro-pollutants. Emphasizes the role of nanotechnology in pollutant bioremediation.

Innovative Technologies For Cleaning The Environment: Air, Water And Soil - 14th International Seminar On Nuclear War And Planetary Emergencies

Water pollution is a matter of concern for both developing and developed parts of the world. This book presents an overview on water pollution and its sustainable management. It discusses the fundamentals of water pollution control and introduces advanced sustainable technologies for abating water pollution. It is a comprehensive collection of information related with water pollutants which are extremely harmful to man, other living organisms and to the ecosystems. It is an all-inclusive coverage of technical, socio-political, scientific as well as social issues revolving around water pollution and management. The book brings out innovative ideas promoting sustainable technologies and extensively covers the diversity of modern technologies related to prevention of water pollution. Book also covers social aspects of water related issues. It is an essential reading for upper level graduates and undergraduates pursuing environmental studies and researchers in the field of water management.

Technological Eco-Innovations for the Quality Control and the Decontamination of Polluted Waters and Soils

The Future of EFFluent Treatment Plants: Biological Treatment Systems is an advanced and updated version of existing biological technologies that includes their limitations, challenges, and potential application to remove pollution demand (COD), refractory chemical oxygen demand, biochemical oxygen demand (BOD), color removal and environmental pollutants through advancements in microbial bioremediation. The book introduces new trends and advances in environmental bioremediation with thorough discussions of recent developments. In addition, it illustrates that the application of these new emerging innovative technologies can lead to energy savings and environmental protection. The importance of denitrification, biological phosphorus removal processes in the development of a fruitful and applicable solution for the removal of toxic pollutants from wastewater treatment plants is highlighted. Equally important is the knowledge and theoretical modeling of water movement through wastewater ecosystems. Finally, emphasis is given to the function of constructed wetlands and activated sludge processes. Considers different types of industrial wastewater. Focuses on biological wastewater treatments. Introduces new trends in bioremediation. Addresses the future of WWTPs.

Advances in Wastewater Pollution Control and Remediation

Many physico-chemical and operational factors influence the performance, treatment costs, and longterm stability of biotifiers for the treatment of wastewater. An innovative role of biotification in wastewater treatment plants (WWTPs) focuses on identifying the factors that affect biotification, such as the hydraulic retention time of the biotification system, the type and characteristics of the filter, and the attached biomass, explains their influence and provides guidelines on how to control these factors to optimize better operation with respect to pollutant control present in (WWTPs). The fundamental basis of the treatment in biotifiers is the action of pollutant-degrading microorganisms and consequently the book also discusses in depth about the microbial ecology of biotification. In addition, it explores the applications of biotification including the removal of emerging pollutants. Describes the microbial ecology of biotification. Includes modeling of biotification. Describes the controlling and operational factors of biotification.

ORD Publications Announcement

Development in Wastewater Treatment Research and Processes

"Advanced Oxidation Processes for Wastewater Treatment" This book highlights the importance of various innovative advanced oxidation technology to clean up the environment from pollution caused by human activities. It assesses the potential application of several existing bioremediation techniques and introduces new emerging-technologies. This book is an updated vision of the existing advanced oxidation strategies with their limitations and challenges and their potential application to remove environmental pollutants. It also introduces the new trends and advances in environmental bioremediation technology with thorough discussion of recent developments in this field. This book highlights the importance of different innovative advanced oxidation process to deal with the ever-increasing number of environmental pollutants. Features: Illustrates the importance of various advanced oxidation processes in effluent treatment plant. Points out the reuse of treated wastewater through emerging advance oxidation technologies for effluent treatment plant. Highlights the recovery of resources from wastewater. Pays attention to the occurrence of novel micro-pollutants. Emphasizes the role of nanotechnology in pollutant bioremediation. Introduces new trends in environmental bioremediation.

Hazardous Waste Management

Introduces the most up-date techniques for soil remediation, including chemical fixation/stabilization, soil vapor extraction, thermally enhanced vapor stripping, biodegradation, and air sparging/wet in a style accessible to nonspecialists. Describes the ex-situ technique of thermal desorption of soil pollutants. a low-cost alternative to incineration for the removal of organics.

Proceedings of the 2007 National Conference on Environmental Science and Technology
Bioresmediation

Development in Waste Water Treatment Research and Processes: Innovative Microbe-Based Applications for Removal of Chemicals and Metals in Wastewater Treatment
Plants focus on the exploitation of various biological treatment technologies and their use to treat toxic and hazardous contaminants present in industrial effluent and remove the contaminated sites, a topic which lacks discussion in existing titles on the global market. This book encompasses advanced technologies and updated information as well as future directions for young researchers and scientists who are working in the field of wastewater treatment or effluent treatment plants and biodegradation of environmental contaminants for environmental safety and sustainable development. Provides wide information to readers on state-of-the-art applications of microbes for wastewater/industrial effluent treatment and environmental protection. Summarizes our current knowledge on the use of various microbes, even the use of dead biomass for dye decolorization and degradation. Explores different aspects of biological methods for contaminant removal and better advanced biotechnological applications.

EPA 200-B.

Water Pollution and Management Practices

This volume focuses on innovative bioremediation techniques and applications for the cleanup of contaminated media and sites. It includes quantitative and design methods that elucidate the relationships among various operational parameters, and waste chemistry that defines the cost effectiveness of bioremediation projects. It also presents numerical models.

Monthly Catalogue, United States Public Documents

It is necessary to understand the extent of pollution in the environment in terms of the air, water, and soil in order for both humans and animals to live healthier lives. Poor waste treatment or pollution monitoring can lead to massive environmental issues, such as diminishing valuable resources, and cause a significant negative impact on society. Solutions, such as reuse of waste and sustainable waste management, must be explored to prevent these adverse effects. The Handbook of Research on Resource Management for Pollution and Waste Treatment is a collection of innovative research that examines waste and pollution treatment methods that can be adopted at local and international levels and evaluates appropriate resource management strategies for environmentally related issues. Featuring coverage on a wide range of topics such as soil washing, bioremediation, and runoff handling, this book is ideally designed for environmentalists, engineers, waste management professionals, natural resource regulators, environmental policymakers, scientists, academic researchers, and students seeking current research on viable resource management methods for the regeneration of their immediate environment.

Hazardous Waste Site Soil Remediation

Due to various issues in the world including rapid urbanization and industrial processes, waste generation has reached levels that are becoming detrimental to the environment and the global population. Waste management has remained a challenging issue for many professional sectors as it is directly linked to an organization’s performance; however, the implementation of efficient and cost-effective waste minimization plans is the first step in improving the global environment. Innovative technologies in waste management are emerging and can help professionals looking to implement more efficient methods of pollution control. The Handbook of Research on Waste Diversion and Minimization Technologies for the Industrial Sector is a pivotal reference source that provides vital research on the application of modern pollution-control methodologies in industrialized environments. While highlighting topics such as life cycle assessment, bioremediation, and thermal waste treatment, this publication explores environmental risk reduction scenarios as well as sustainable waste-collecting solutions. This book is ideally designed for researchers, industrialists, environmentalists, practitioners, policymakers, scientists, students, and academic researchers seeking current research on innovative advancements in waste minimization techniques.

Handbook of Research on Resource Management for Pollution and Waste Treatment

Hazardous waste management is a complex, interdisciplinary field that continues to grow and change as global conditions change. Mastering this evolving and multifaceted field of study requires knowledge of the sources and generation of hazardous wastes, the scientific and engineering principles necessary to eliminate the threats they pose to people and the environment, the laws regulating their disposal, and the best or most cost-effective methods for dealing with them. Written for students with some background in engineering, this comprehensive, highly acclaimed text does not only provide detailed instructions on how to solve hazardous waste problems, but also guides students to think about ways to approach these problems. Each richly detailed, self-contained chapter ends with a set of discussion topics and problems. Case studies, with equations and design examples, are provided throughout the book to give students the chance to evaluate the effectiveness of different treatment and containment technologies.

Decay and Renewal

Advanced Nano-Bio Technologies for Water and Soil Treatment

In the past decades, environmental scientists, economists and physicists have been juggling critical issues within environmental strategies and environmental management styles in order to find a feasible medium between limited resources, long term demands and objectives, and interest groups. In the search for best management alternatives, practice has undergone a pendulum swing between stages that can be characterised as frontier economics, radical environmentalism, resource management/allocation, selective environmentalism and sustainable environmental management. The next stage of management must answer such questions as: ‘Can there be a global - uniform environmental strategy?’ or ‘Based on their characteristics, can different issues, different regions and different applications have unique environmental strategies?’ Based on this premise, the next stage of management may be identified as risk based sustainable environmental management. The goal of this style will be the risk based, long term, harmonious management of economic resources and environmental preservation for health, safety and prosperity of sustainable populations. When evaluation of risk or risk based ranking of management alternatives enter the picture as part of the overall puzzle, then social policy, ethics and health issues assume a very important role in the management strategy. Economic incentives and environmental constraints have to be considered harmoniously, the main emphasis being placed on protection and preservation of human health and the long term sustaining of populations.

Bioresmediation of Contaminated Soils

This book offers insights into the recent research focusing on green solutions to address environmental pollution and its impacts. Bioremediation is a vast area that encompasses numerous innovative and cost-effective experimental and research methods involving numerous technologies, such as biotechnological, biochemical, microbial, marine, chemical and engineering approaches. Featuring original research and review articles by leading experts, the book explores potential solutions to the growing issues of waste management and environmental pollution and their impacts, and suggests future research directions. As such, it is a valuable resource for professionals and general readers alike.

Antibiotics and Antimicrobial Resistance Genes in the Environment

EPA National Publications Catalog

The aim of this volume is to offer a set of high quality contributions on recent advances in Differential Geometry and Topology, with some emphasis on their application in physics. A broad range of themes is covered, including convex sets, Kaehler manifolds and moment map, combinatorial Morse theory and 3-manifolds, knot theory and statistical mechanics.

Technological Eco-Innovations for the Quality Control and the Decontamination of Polluted Waters and Soils

Handbook of Advanced Approaches towards Pollution Prevention and Control, Volume One: Conventional and Innovative Technology, and Assessment Techniques for Pollution Prevention and Control condenses all relevant information on pollution prevention and control in a single source. This handbook (Volume One of Two) covers the principal of pollution prevention and control technologies and their sustainability, modernization in pollution prevention, control methodologies in industrialized environments. While highlighting topics such as life cycle assessment, bioremediation, and thermal waste treatment, this publication explores environmental risk reduction scenarios as well as sustainable waste-collecting solutions. This book is ideally designed for researchers, industrialists, environmentalists, practitioners, policymakers, scientists, students, and academic researchers seeking current research on innovative advancements in waste minimization techniques.
fundamentals, state-of-the-art, and future trends Edited by expert team of world-class editors

**Emerging Technologies in Environmental Bioremediation**

**Advanced Oxidation Processes for Wastewater Treatment**

Biological Approaches to Controlling Pollutants, the latest release in the Advances in Pollution Research series, is a comprehensive guide on the most up-to-date biological methods for remediation of pollutants across a variety of industries, with consideration for the advantages, disadvantages and applications of each method. Considering the increasing levels of pollution and contaminated sites worldwide from high population growths and industrial expansion, the most recent advances in biological remediation techniques is an important field of study and one in which researchers need the most cutting-edge methodologies. This book is a necessary read for environmental scientists, along with postgraduates, academics and researchers working in the area of environmental pollution. It will also be of interest to environmental engineers and any other practitioners who need to evaluate the latest advances in biotechnological control of pollutants. Presents the most cutting-edge advances in a variety of fields relevant to the use of biotechnology and biological techniques in pollutant control Provides in-depth information and methodologies for applying bioremediation to a variety of pollutants Written by a worldwide team of authors to provide a global perspective on the advances in bioremediation

**Cost Effective Technologies for Solid Waste and Wastewater Treatment**

Antibiotics and Antimicrobial Resistance Genes (AMR) in the Environment summarizes and updates information on antibiotic producing organisms and their resistance and entry routes in soil, air, water and sediment. As antibiotic use continues to rise in healthcare, their fate, bioavailability and biomonitoring, and impacts on environment and public health are becoming increasingly important. The book addresses the impact of antibiotics and AMR to environment and public health and risk assessment. Moreover, it focused on the metagenomics and molecular techniques for the detection of antibiotics and antimicrobial genes. Lastly, it introduces management strategies, such as treatment technologies for managing antibiotics and AMR/ARGs-impacted environment, and bioremediation approaches. Summarizes and updates information on antibiotics and AMR/ARGs production and its fate and transport in the environment Includes phytoremediation and bioremediation technologies for environmental management Provides analysis of risk assessment of antibiotic resistance genes to help understand the environmental and socioeconomic impacts of antibiotics and AMR/ARGs

**Handbook of Advanced Approaches Towards Pollution Prevention and Control**

The Teacher Edition explains how to guide student research and engineering design projects. It contains the complete text of the Student Edition. Decay and Renewal is the third volume in the four-part Cornell Scientific Inquiry Series.

**Bioremediation and Green Technologies**

**Bioremediation and Biotechnology, Vol 2**

Environmental Micropolutants, the latest volume in the Advances in Environmental Pollution Research series, presents the latest research on various environmental micropolutants, as well as their impacts on health and the economy, also addressing the best possible solutions to address the risks presented by these pollutants. The book covers solutions for dusts, infectious particles, heavy metals, organophosphates, atmospheric toxic organic micropolutants, fungal spores, pollutants from E-waste, and antibiotics threats, providing researchers working in environmental science and management with key knowledge to address this increasingly important concern. These types of micropolutants can be present in water, air and soil and can harm health even in low quantities, hence this book covers the challenges these pollutants pose to the environment and human health, presenting practical solutions. Identifies key micropolutants in the environment and examines their impacts on human health and the economy Presents methods and treatment technologies for addressing the problem of micropolutants Offers the latest research on a variety of micropolutants and the best solutions for each

**Land Remediation and Pollution Control Division**

The Special Issue "Technological Eco-Innovations for the Quality Control and the Decontamination of Polluted Waters and Soils" deals with the most recent research activities carried out at lab and field scale on eco-sustainable tools for the remediation of contaminated environmental substrates. It is particularly devoted to highlight the relevance of biological organisms (plants, microbes, algae) to assess the chemical contamination in water and soil and to remediate such matrices from the pollution caused by the human activities. Therefore, bioremediation is a primary focus of most of the articles published within the present Special Issue. Bioremediation is a promising environmentally friendly technology to deal with the chemical pollution in different ecosystem compartments and its integration with the traditional approaches might represent a