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-Ettinger 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 will be extremely useful to students, researchers, scientists and professionals in the field of microbiology and biotechnology, Bio (chemical) engineers, environmental researchers, eco-toxicology, and many more.

- 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

Bioremediation
An Innovative Role of Biofiltration in Wastewater Treatment Plants (WWTPs)
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The number of hazardous waste sites across the United States has grown to approximately 217,000, with billions of cubic yards of soil, sediment, and groundwater plumes requiring remediation. Sites contaminated with recalcitrant contaminants or with complex hydrogeological features have proved to be a challenge for traditional remediation methods. In recent years, the development of emerging technologies in environmental remediation has provided new options for addressing these difficult sites.

Bioremediation of Pollutants: From Genetic Engineering to Genome Engineering provides insights into genetic and genome engineering strategies in bioremediation, covering a wide range of microorganisms that are key to the removal of pollutants. The book includes discussions on root engineering, transgenic plants, metagenomics, bioreactors, molecular biology tools, genome editing, synthetic biology, microbial indicators, biosurfactants, biofilms, genetically modified organisms, and engineered fungi and bacteria. Presented by top experts in the field, this resource captures the essence and diversity of bioremediation methodologies in a single source. Students and beginners in environmental science, researchers, soil scientists, genetic and genome engineers, stakeholders and policymakers interested in improving this rapidly growing area of research will find this resource extremely useful.

Draws together research from eminent scientists from across the globe in the areas of phytoremediation and microbial remediation

Covers the genome editing CRISPR-Cas9 system that has been less explored in plants and microorganisms

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A significant challenge to cleanup on every level—technologically, financially, legally, and sociopolitically. Like many federal agencies, the Navy is a responsible party with a large liability in hazardous waste sites. Environmental Cleanup at Navy Facilities applies the concepts of adaptive management to complex, high-risk hazardous waste sites that are typical of the military, EPA, and other responsible parties. The report suggests ways to make forward progress at sites with recalcitrant contamination that have stalled prior to meeting cleanup goals. This encompasses more rigorous data collection and analysis, consideration of alternative treatment technologies, and comprehensive long-term stewardship.

Land Remediation and Pollution Control Division

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/ARG-impacted environment, and bioremediation approaches. Summarizes and updates information on antibiotics and AMR/ARG 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/ARG

Contaminants in the Subsurface

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-Ettinger 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, Bio (chemical) engineers, environmental researchers, eco-toxicology, 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

Bioremediation and Green Technologies

"Advanced Oxidation Processes for Wastewater Treatment: An Innovative Approach: 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 technologies and also suggests new innovative technologies that can be used to minimize the negative impacts of pollution. Advanced oxidation processes are used for the degradation of organic pollutants present in wastewater. These processes are highly efficient and produce relatively harmless by-products. The book covers various advanced oxidation processes such as ozone, UV/ advanced oxidation processes and their combination with other techniques. The book also discusses the role of green technologies in bioremediation, including the use of plant-based technologies and natural processes for wastewater treatment. The book provides an overview of the current state of research in the field of bioremediation and green technologies and highlights the challenges that need to be addressed in order to develop effective and sustainable solutions. The book is a valuable resource for researchers, engineers, and students in the field of environmental engineering and biotechnology, as well as for policymakers and decision-makers who are interested in sustainable solutions for wastewater treatment.

Page 3/11
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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.

Bioremediation and Biotechnology, Vol 2

Environmental remediation technologies to control or prevent pollution from hazardous waste material is a growing research area in academia and industry, and is a matter of utmost concern to public health, to improve ecology and to facilitate the redevelopment of a contaminated site. Recently, in situ and ex situ remediation technologies have been developed to rectify the contaminated sites, utilizing various tools and devices through physical, chemical, biological, electrical, and thermal processes to restrain, remove, extract, and immobilize mechanisms to minimize the contamination effects. This handbook brings altogether classical and emerging techniques for hazardous wastes, municipal solid wastes and contaminated water sites, combining chemical, biological and engineering control methods to provide a one-stop reference. This handbook presents a comprehensive and thorough description of several remediation techniques for contaminated sites resulting from both natural processes and anthropogenic activities. Providing critical insights into a range of treatments from chemical oxidation, thermal treatment, air sparging, electrokinetic remediation, stabilization/solidification, permeable reactive barriers, thermal desorption and incineration, phytoremediation, biostimulation and bioaugmentation, bioventing and biosparging through ultrasound-assisted remediation methods, electrochemical remediation methods, and nanoremediation, this handbook provides the reader an inclusive and detailed overview and then discusses future research directions. Closing chapters on green sustainable remediation, economics, health and safety issues, and environmental regulations around site remediation will make this a must-have handbook for those working in the field.
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Trace Metals in the Environment

Smart Bioremediation Technologies: Microbial Enzymes provides insights into the complex behavior of enzymes and identifies metabolites and their degradation pathways. It will help readers work towards solutions for sustainable medicine and environmental pollution. The book highlights the microbial enzymes that have replaced many plant and animal enzymes, also presenting their applications in varying industries, including pharmaceuticals, genetic engineering, biofuels, diagnostics and therapy. In addition, new methods, including genomics and metagenomics, are being employed for the discovery of new enzymes from microbes. This book brings all of these topics together, representing the first resource on how to solve problems in bioremediation.

Provides the most novel approaches in enzyme studies
Gives insights in real-time enzymology that are correlated with bioremediation
Serves as a valuable resource on the use of genomes, transcriptomes and proteomes with bioremediation
Refers to enzymes as diagnostic tools

Bioremediation Handbook of Advanced Approaches Towards Pollution Prevention and Control

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 innovation-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 intensification in bio-based approaches, green technology, phytoremediation, biopolymers, biosurfactants 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.

Advances in Biodegradation and Bioremediation of Industrial Waste

Bioremediation Technology

This book addresses the grave concerns stemming out due to conventional treatment techniques. The main focus of this book revolves around the central kernel of novel technology (bioremediation and biotechnology) which has emerged as an independent warrior to clean up and restore the disturbed environs. 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...
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Heavy metals, followed by innovative modern biotechnological and bioremediation treatment technologies and sustainable techniques to remediate the persistent pollutants. 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.

Development in Wastewater Treatment Research and Processes

Many physico-chemical and operational factors influence the performance, treatment costs, and long-term stability of biofilters for the treatment of wastewater. An innovative role of biofiltration in wastewater treatment plants (WWTPs) focuses on identifying the factors that affect biofiltration, such as the hydraulic retention time of the biofiltration 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 biofilters is the action of pollutant-degrading microorganisms and consequently the book also discusses in depth about the microbial ecology of biofiltration. In addition, it explores the applications of biofiltration including the removal of emerging pollutants.

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

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 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 focused, both in controlled conditions and on site, with many interesting outcomes useful from research perspectives.

Biological Approaches to Controlling Pollutants

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.

Environmental Cleanup at Navy Facilities
The book describes hazardous waste industries, sources of waste generation, characterization and treatment processes/methods and techniques to deal with the treated waste as per the prescribed standard. Advanced treatment based on the microbial remediation, plant-based decontamination, rhizoremediation and nano-based remediation is also explained. Advances in treatment technology using biotechnological tools/bionanotechnology for removal of contaminants are described. This volume will help readers to develop biotechnological and nanotechnological approaches for the remediation of hazardous waste and the developed technology that can be transferred from laboratory to land and piloting to commercial scenarios.

Prof. M. H. Fulekar is a Professor and Joint Director (R&D), Centre of Research for Development, Parul University. Dr. Bhawana Pathak is working as an Associate Professor and Dean in School of Environment and Sustainable Development, Central University of Gujarat.

Toxicity and Waste Management Using Bioremediation

The pollution of soil and groundwater by heavy metals and other chemicals is becoming a serious issue in many countries. However, the current bioremediation processes do not often achieve sufficient remediation, and more effective processes are desired. This book deals with advances in the bioremediation of polluted soil and groundwater. In the former chapters of this book, respected researchers in this field describe how the optimization of microorganisms, enzymes, absorbents, additives and injection procedures can help to realize excellent bioremediation. In the latter chapters, other researchers introduce bioremediation processes that have been performed in the field and novel bioremediation processes. Thus, the readers will be able to obtain new ideas about effective bioremediation as well as important information about recent advances in bioremediation.

Cost Effective Technologies for Solid Waste and Wastewater Treatment

ORD Publications Announcement

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 principles of pollution prevention and control technologies, recent advances in pollution prevention, control technologies and their sustainability, modernization in pollution prevention, and control technologies for future and next generation pollution prevention. This book is an indispensable resource for researchers and academic staff in chemical and process engineering, safety engineering, environmental engineering, biotechnology and materials engineering. Provides in-depth information on the principles and advances in pollution prevention and control practices Discusses emerging technologies and processes for advanced pollution prevention and control Presents developments on the use of the assessment models as tools to support the research and applications of different technologies and processes Provides history, fundamentals, state-of-the-art, and future trends Edited by expert team of world-class editors
Read Free Bioremediation Innovative Pollution Treatment Technology A

Soil is an irreplaceable resource that sustains life on the planet, challenged by food and energy demands of an increasing population. Therefore, soil contamination constitutes a critical issue to be addressed if we are to secure the life quality of present and future generations. Integrated efforts from researchers and policy makers are required to develop sound risk assessment procedures, remediation strategies and sustainable soil management policies. Environmental Risk Assessment of Soil Contamination provides a wide depiction of current research in soil contamination and risk assessment, encompassing reviews and case studies on soil pollution by heavy metals and organic pollutants. The book introduces several innovative approaches for soil remediation and risk assessment, including advances in phytoremediation and implementation of metabolomics in soil sciences.

Advances in Bioremediation of Wastewater and Polluted Soil

At hundreds of thousands of commercial, industrial, and military sites across the country, subsurface materials including groundwater are contaminated with chemical waste. The last decade has seen growing interest in using aggressive source remediation technologies to remove contaminants from the subsurface, but there is limited understanding of (1) the effectiveness of these technologies and (2) the overall effect of mass removal on groundwater quality. This report reviews the suite of technologies available for source remediation and their ability to reach a variety of cleanup goals, from meeting regulatory standards for groundwater to reducing costs. The report proposes elements of a protocol for accomplishing source remediation that should enable project managers to decide whether and how to pursue source remediation at their sites.

Innovative Bio-Based Technologies for Environmental Remediation

This book is a compilation of detailed and latest knowledge on the various types of environmental pollutants released from various natural as well as anthropogenic sources, their toxicological effects in environments, humans, animals and plants as well as various bioremediation approaches for their safe disposal into the environments. In this book, an extensive focus has been made on the various types of environmental pollutants discharged from various...