

Engineering Bacteria For Bioremediation Intech

Microbial or biological degradation has long been the subject of active concern, and the rapid expansion and growing sophistication of various industries in the last century has significantly increased the volume and complexity of toxic residues of wastes. These can be remediated by plants and microbes, either natural origin or adapted for a specific purpose, in a process known as bioremediation. The interest in microbial biodegradation of pollutants has intensified in recent years in an attempt to find sustainable ways to clean contaminated environments. These bioremediation and biotransformation methods take advantage of the tremendous microbial catabolic diversity to degrade, transform or accumulate a variety of compounds, such as hydrocarbons, polychlorinated biphenyls, polaromatic hydrocarbons pharmaceutical substances, radionuclides and metals. Unlike conventional methods, bioremediation does not physically disturb the site. This book describes the basic principles of biodegradation and shows how these principles are related to bioremediation. Authored by leading, international environmental microbiologists, it discusses topics such as aerobic biodegradation, microbial degradation of pollutants, and microbial community dynamics. It provides valuable insights into how biodegradation processes work and can be utilised for pollution abatement, and as such appeals to researchers and postgraduate students as well as experts in the field of bioremediation.

The book presents a sequential approach for the treatment of dye wastewater, presenting state-of-the-art techniques based on recent findings. The release of these dyes into the environment is a major threat due to their toxicity, mutagenicity and carcinogenicity and their biotransformation products. It has been at least two decades since researchers have been trying to find interactions between dye molecules and water media, and find new purification methods. This book plays an important role in this field by highlighting the cutting edge results in dye removal and remediation, and discusses in detail the application of various physical, chemical, and biological techniques for the removal of pollutants from water.

This book covers the contemporary environmental issues faced by life on the planet and the role planetary microbiomes play in such issues. Providing insights on the net favorable and adverse effect of microbial processes, this volume covers both the spontaneous and anthropocentric events that impact climate change and life on the planet. The book describes the ecological significance of microbiomes associated with the kingdoms Plantae and Animalia with respect to climate change, natural and anthropogenic causes of climate change, microbial interactions in nature, planetary microbiomes and food security, climate change in relation to disease epidemiology and human health and engineering microorganisms to mitigate the consequences of climate change. The individual chapters in the intended book provide both theoretical and practical exposure to the current issues and future challenges of climate change in relation to the microbiomes. This collection should serve as ready reference to the researchers working in the area to reshape their future research in addressing the challenges of global climate change.

This book contains a collection of different research activities where several technologies have been applied to the optimization of biodegradation processes. The book has three main sections: A) Hydrocarbons biodegradation, B) Biodegradation and anaerobic digestion, and C) Biodegradation and sustainability.

Approaches in Bioremediation

Microorganisms in the Deterioration and Preservation of Cultural Heritage

Microbial Rejuvenation of Polluted Environment

Rhizobiont in Bioremediation of Hazardous Waste

Recent Insights in Petroleum Science and Engineering

Bioremediation of Industrial Waste for Environmental Safety

Heavy metals always pose serious ecological risks when released into the environment due to their elemental non-degradable nature, regardless of their chemical form. This calls for the development of efficient and low-cost effluent treatment and metal recuperation technologies for contaminated waste water, not only because regulatory limits need to be met but also because the waste itself can be a resource for certain precious metals. Biosorption is a general property of living and dead biomass to rapidly bind and abiotically concentrate inorganic or organic compounds from even very diluted aqueous solutions. As a specific term, biosorption is a method that utilizes materials of biological origin – biosorbents formulated from non-living biomass - for the removal of target substances from aqueous solutions.

Recent research on biosorption provides a solid understanding of the mechanism underlying microbial biosorption of heavy metals and related elements. This book gathers review articles analyzing current views on the mechanism and (bio)chemistry of biosorption, the performance of bacterial, fungal and algal biomass, and the practical aspects of biosorbent preparation and engineering. It also reviews the physico-chemical evaluations of biosorbents and modelling of the process as well as the importance of biosorption during heavy metal removal using living cells. It is a reference work for scientists, environmental safety engineers and R&D specialists who wish to further promote biosorption research and use the accumulated knowledge to develop and build industrial applications of biosorption in heavy metal separation technologies.

This edited volume focuses on comprehensive state-of-the-art information about the practical aspects of cultivation, harvesting, biomass processing and biofuel production from algae. Chapters cover topics such as synthetic ecological engineering approaches towards sustainable production of biofuel feedstock, and algal biofuel production processes using wastewater. Readers will also discover more about the role of biotechnological engineering in improving ecophysiology, biomass and lipid yields. Particular attention is given to opportunities of commercialization of algal biofuels that provides a realistic assessment of various techno-economical aspects of pilot scale algal biofuel production. The authors also explore the pre-treatment of biomass, catalytic conversion of algal lipids and hydrothermal liquefaction with the biorefinery approach in detail. In a nut shell, this volume will provide a wealth of information based on a realistic evaluation of contemporary developments in algal biofuel research with an emphasis on pilot scale studies. Researchers studying and working in the areas of environmental science, biotechnology, genetic engineering and biochemistry will find this work instructive and informative.

The pollution of soil and groundwater by harmful chemical compounds and heavy metals is becoming very serious in many countries. Although remediation is necessary as soon as possible, the performance of conventional bioremediation processes is not sufficient. This book deals with advances in bioremediation and phytoremediation processes by using excellent strains and a combination of processes. In the chapters of this book, the researchers have introduced the overall status of contamination; the characteristics of bioremediation using halobacteria, Candida yeast, and autochthonous bacteria; and phytoremediation using macrophytes. Moreover, other researchers introduced a process using biochar and electric currents, and this combination of processes and phytoremediation enhances the overall process.

The rapid progression of technology has significantly impacted population growth, urbanization, and industrialization in modern society. These developments, while positive on the surface, have created critical environmental problems in recent years. The Handbook of Research on Inventive Bioremediation Techniques is a comprehensive reference source for the latest scholarly information on optimizing bioremediation technologies and methods to control pollution and enhance sustainability and conservation initiatives for the environment. Highlighting pivotal research perspectives on topics such as biodegradation, microbial tools, and green technology, this publication is ideally designed for academics, professionals, graduate students, and practitioners interested in emerging techniques for environmental decontamination.

Biosorption

Persistent and Recalcitrant Toxic Substances

Application of Microbes in Environmental and Microbial Biotechnology

Bioprocess Engineering for Bioremediation

New Approaches and Recent Advances

Volume 2

Healthy environment is important for any kind of biota on earth. It provides the basic elements of life such as clean water, fresh air, fertile soil and supports ecosystem of the food chain. Pollution drastically alters quality of the environment by changing the physico-chemical and Accordingl, toxic metals, combustible and putrescible substances, hazardous wastes, explosives and petroleum products are all examples of inorganic and organic compounds that cause contaminations. Specifically, pollution of toxic and heavy metal in the environment is a growing rate. Toxic metals threaten the aquatic ecosystems, agriculture and ultimately human health. Traditional treatment techniques offer certain advantages such as rapid processing, ease of operation and control and flexibility. But, they could not maintain the quality of the environment. High energy consumption and handling costs for sludge disposal and overburden of chemical substances which irreversibly affect and destroy biodiversity, which ultimately render the soil useless as a medium for plant growth. Therefore, bioremediation and biotechnology, and restore contaminated ecosystems, have emerged as promising, environmental friendly and affordable approaches. Furthermore, the use of microbes, algae, transgenic plants and weeds adapted to stressful environments could be employed to enhance accumulation efficiency, fast emerging as a viable alternative to conventional remediation methods, and will be most suitable for developing countries. In the current volume, we discuss pollution remediation challenges and how living organisms and the latest biotechnological techniques could be helpful sustainable ways.

Achieving environmental sustainability with rapid industrialization is currently a major global challenge. Industries are the key economic drivers, but are also the main polluters as untreated/partially treated effluents from industry are usually discharged into the aquatic environment highly toxic and hazardous pollutants, which cause ecological damage and present and health hazards to living beings. As such, there is a pressing need to find ecofriendly solutions to deal with industrial waste, and to develop sustainable methods for treating/detoxifying waste. cost and eco-friendly clean technology, bioremediation can offer a sustainable alternative to conventional remediation technologies for the treatment and management of industrial wastes. This book (Volume II) describes the role of biological agents in the degradation and detoxification of industrial wastes, and presents recent bioremediation approaches for waste treatment and management, such as constructed wetlands, electro- bioremediation and nano-bioremediation, as well as microbial fuel cells. It appeals to students, researchers, scientists, industry professionals, biotechnology, environmental sciences, eco-toxicology, environmental remediation and waste management and other relevant areas who are interested in biodegradation and bioremediation of industrial wastes for environmental safety.

This book contains a collection of different biodegradation research activities where biological processes take place. The book has two main sections: A) Polymers and Surfactants Biodegradation and B) Biodegradation: Microbial Behaviour.

During the past five years increased awareness of environmental contamination by nitroaromatic compounds has led to a dramatic increase in research on their biodegradation. The resulting discoveries have markedly extended our understanding of degradation mechanisms and new basic knowledge promises the development of field applications of biodegradation systems for nitroaromatic compounds. In May of 1994, an International Symposium on the Biodegradation of Nitro aromatic Compounds was held in Las Vegas, Nevada. This symposium brought research into the biodegradation of nitro aromatic compounds. The invited speakers were asked to review their area of expertise and write a critical, comprehensive synthesis of their work and related work by others. This book is the result of their efforts. The emphasis of the biotransformation. Therefore, the reactions of nitroaromatic compounds in plants, animals, bacteria, fungi, soil, and even nonbiological systems are considered. The goal of the work is to provide the reader with an appreciation of the tremendous range of possibilities for metabolic experimental approaches used to understand them. This volume should be of interest to biochemists, microbiologists, engineers, toxicologists, and anyone interested in the behavior of synthetic chemicals in the environment or in living systems. Furthermore, a variety of commercial reactions described here.

Microbial Diversity, Interventions and Scope

Volume II: Biological Agents and Methods for Industrial Waste Management

Engineering and Technology

Microbial Genomics in Sustainable Agroecosystems

Microbial Biosorption of Metals

Reviews of Environmental Contamination and Toxicology Volume 225

This comprehensive edited book on microbial prospective discusses the innovative approaches and investigation strategies, as well as provides a broad spectrum of the cutting-edge research on the processing, properties and technological developments of microbial products and their applications. Microbes finds very important applications in our lives including industries and food processing. They are widely used in the fermentation of beverages, processing of dairy products, production of pharmaceuticals, chemicals, enzymes, proteins and biomaterials; conversion of biomass into fuel, fuel cell technology, health and environmental sectors. Some of these products are produced commercially, while others are potentially valuable in biotechnology. Microorganisms are considered invaluable in research as model organisms. This is a useful compilation for students and researchers in microbiology, biotechnology and chemical industries.

Bioremediation technologies are gaining immense credibility in the field of waste management because of their eco-compatibility nature. Biomass can interact and confront with water and soil pollutants in both active (live) as well as passive (dead) way, thereby offering numerous opportunities of exploring them for environmental clean-up. In 21st century, wastes are no longer a waste but are recognized as a valuable Resource. Employing novel and integrated strategies for the development of modern bioremediation processes is desperate need of the hour. This edited book on Applied Bioremediation - Active and Passive Approaches contains mix of interesting chapters that will certainly add to the advancement of knowledge and will provide the required valuable resource and stimulus to the researchers worldwide.

This book contains 20 chapters, which are divided into 5 sections. Section 1 covers different aspects of insecticide resistance of selected economically important plant insect pests, whereas section 2 includes chapters about the importance, development and insecticide resistance management in controlling malaria vectors. Section 3 is dedicated to some general questions in insecticide resistance, while the main topic of section 4 is biochemical approaches of insecticide resistance mechanisms. Section 5 covers ecologically acceptable approaches for overcoming insecticide resistance, such as the use of mycoinsecticides, and understanding the role of some plant chemical compounds, which are important in interactions between plants, their pests and biological control agents.

An authoritative overview of the ecological activities of microbes in the biosphere Environmental Microbiology and Microbial Ecology presents a broad overview of microbial activity and microbes' interactions with their environments and communities. Adopting an integrative approach, this text covers both conventional ecological issues as well as cross-disciplinary investigations that combine facets of microbiology, ecology, environmental science and engineering, molecular biology, and biochemistry. Focusing primarily on single-cell forms of prokaryotes — and cellular forms of algae, fungi, and protozoans — this book enables readers to gain insight into the fundamental methodologies for the characterization of microorganisms in the biosphere. The authors draw from decades of experience to examine the environmental processes mediated by microorganisms and explore the interactions between microorganisms and higher life forms. Highly relevant to modern readers, this book examines topics including the ecology of microorganisms in engineered environments, microbial phylogeny and interactions, microbial processes in relation to environmental pollution, and many more. Now in its second edition, this book features updated references and major revisions to chapters on assessing microbial communities, community relationships, and their global impact. New content such as effective public communication of research findings and advice on scientific article review equips readers with practical real-world skills. Explores the activities of microorganisms in specific environments with case studies and actual research data Highlights how prominent microbial biologists address significant microbial ecology issues Offers guidance on scientific communication, including scientific presentations and grant preparation Includes plentiful illustrations and examples of microbial interactions, community structures, and human-bacterial connections Provides chapter summaries, review questions, selected reading lists, a complete glossary, and critical thinking exercises Environmental Microbiology and Microbial Ecology is an ideal textbook for graduate and advanced undergraduate courses in biology, microbiology, ecology, and environmental science, while also serving as a current and informative reference for microbiologists, cell and molecular biologists, ecologists, and environmental professionals.

Strategies and Tools for Pollutant Mitigation

Modern Soil Microbiology, Second Edition

Waste to Energy: Prospects and Applications

The New Era of Environmental Microbiology and Nanobiotechnology

Biorefinery of Oil Producing Plants for Value-Added Products

Environmental Pollution and Remediation

The main challenge in biosensor development is their application for various practical tasks to provide a continuous and reliable flow of information about the indicators of natural and industrial processes and the surroundings, so enabling adequate feedback and control.

Biosensors can provide essential information, as the quality of life depends mainly on our knowledge about what we breathe, what we eat and how our bodies are able to metabolize the material, which we contact. This book includes 14 chapters, written by 52 authors and is focused on the applications of biosensors for monitoring the parameters of environment, the quality of food and biomarkers of health.

This volume explores recent research trends and achievements in environmental pollution remediation (e.g. water, air, soil), and compiles critical and constructive papers and reviews with a focus on advances in bioremediation and green technology solutions for waste minimization, waste management and pollution control. The book is timely, as the need for researchers and engineers to develop sustainable and green eco-friendly remediation technologies is increasing with a growing global population, stressed agricultural systems, and an environment impacted by climate change. A key focus of the book is on the efficient use of agricultural waste residues as viable substrates for creating materials for environmental clean-up, and the possible conversion of these pollutants to sustainable bioresources. The volume will be of interest to sustainability researchers, environmental engineers, industry managers and agricultural scientists.

Pollution is one of the most serious issues facing mankind and other life forms on earth. Environmental pollution leads to the degradation of ecosystems, loss of services, economic losses, and various other problems. The eco-friendliest approach to rejuvenating polluted ecosystems is with the help of microorganism-based bioremediation. Microorganisms are characterized by great biodiversity, genetic and metabolic machinery, and by their ability to survive, even in extremely polluted environments. As such, they are and will remain the most important tools for restoring polluted ecosystems / habitats. This three-volume book sheds light on the utilization of microorganisms and the latest technologies for cleaning up polluted sites. It also discusses the remediation or degradation of various important pollutants such as pesticides, wastewater, plastics, PAHs, oil spills etc. The book also explains the latest technologies used for the degradation of pollutants in several niche ecosystems. Given its scope, the book will be of interest to teachers, researchers, bioremediation scientists, capacity builders and policymakers. It also offers valuable additional reading material for undergraduate and graduate students of microbiology, ecology, soil science, and the environmental sciences.

This book presents state-of-the-art environmental remediation processes. Environmental protection and management is a global concern, especially in the context of industrial regions. Over the years, several conventional, engineering-based physicochemical decontamination methods have used in the remediation of polluted sites. However, these methods are expensive and have limited efficiency. Drawing on research and examples from around the world, this book offers a comprehensive review of and insights into green technologies and sustainable remediation alternatives. It discusses the emerging importance of nanotechnology, chemo and biosensors, indicator species, microbe-based remediation of organic compounds, and ex-situ remediation methods. Addressing the growing global need for a holistic overview of the environmental remediation of polluted sites, it will appeal to teachers, researchers, scientists, capacity builders, and policymakers. It also serves as additional reading material for undergraduate and graduate students of biotechnology and environmental sciences.

Bioremediation and Biotechnology

Biodegradation

From Analysis and Modeling to Technology Applications

Active and Passive Approaches

Advances in Bioremediation and Phytoremediation

Engineering Bacteria for Bioremediation

This open access book offers a comprehensive overview of the role and potential of microorganisms in the degradation and preservation of cultural materials (e.g. stone, metals, graphic documents, textiles, paintings, glass, etc.). Microorganisms are a major cause of deterioration in cultural artefacts, both in the case of outdoor monuments and archaeological finds. This book covers the microorganisms involved in biodeterioration and control methods used to reduce their impact on cultural artefacts. Additionally, the reader will learn more about how microorganisms can be used for the preservation and protection of cultural artefacts through bio-based and eco-friendly materials. New avenues for developing methods and materials for the conservation of cultural artefacts are discussed, together with concrete advances in terms of sustainability, effectiveness and toxicity, making the book essential reading for anyone interested in microbiology and the preservation of cultural heritage.

This book addresses waste generation problems from various sectors, including industries, agriculture, and household. It focuses on how modern biotechnological approaches could help manage waste in an eco-friendly manner and generate precious bioenergy. It discusses the inadequate waste management systems damaging the environment and its adverse impacts on climate change-related problems. This book covers all the essential information regarding various types of waste and their management. It is a comprehensive compilation for understanding the efficient generation of bioenergy. It is a relevant reading material (resource) for anyone who wishes to study waste management as Chemist, Biologist, Biotechnologist, Industrialist, Ecologist, Microbiologist, Economist, and all disciplines related to the environment.

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

In the ten years since the publication of Modern Soil Microbiology, the study of soil microbiology has significantly changed, both in the understanding of the diversity and function of soil microbial communities and in research methods. Ideal for students in a variety of disciplines, this second edition provides a cutting-edge examination of a fascinating discipline that encompasses ecology, physiology, genetics, molecular biology, and biotechnology, and makes use of biochemical and biophysical approaches. The chapters cover topics ranging from the fundamental to the applied and describe the use of advanced methods that have provided a great thrust to the discipline of soil microbiology. Using the latest molecular analyses, they integrate principles of soil microbiology with novel insights into the physiology of soil microorganisms. The authors discuss the soil and rhizosphere as habitats for microorganisms, then go on to describe the different microbial groups, their adaptive responses, and their respective processes in interactive and functional terms. The book highlights a range of applied aspects of soil microbiology, including the nature of disease-suppressive soils, the use of biological control agents, biopesticides and bioremediation agents, and the need for correct statistics and experimentation in the analyses of the data obtained from soil systems.

Bioremediation and Biotechnology, Vol 3

Algal Biofuels
Environmental Microbiology and Microbial Ecology
Environmental Biotechnology
Microbiomes and the Global Climate Change
Wastewater Treatment Engineering

Bioremediation refers to the clean-up of pollution in soil, groundwater, surface water, and air using typically microbiological processes. It uses naturally occurring bacteria and fungi or plants to degrade, transform or detoxify hazardous substances to human health or the environment. For bioremediation to be effective, microorganisms must enzymatically attack the pollutants and convert them to harmless products. As bioremediation can be effective only where environmental conditions permit microbial growth and action, its application often involves the management of ecological factors to allow microbial growth and degradation to continue at a faster rate. Like other technologies, bioremediation has its limitations. Some contaminants, such as chlorinated organic or high aromatic hydrocarbons, are resistant to microbial attack. They are degraded either gradually or not at all, hence, it is not easy to envisage the rates of clean-up for bioremediation implementation. Bioremediation represents a field of great expansion due to the important development of new technologies. Among them, several decades on metagenomics expansion has led to the detection of autochthonous microbiota that plays a key role during transformation. Transcriptomic guides us to know the expression of key genes and proteomics allow the characterization of proteins that conduct specific reactions. In this book we show specific technologies applied in bioremediation of main interest for research in the field, with special attention on fungi, which have been poorly studied microorganisms. Finally, new approaches in the field, such as CRISPR-CAS9, are also discussed. Lastly, it introduces management strategies, such as bioremediation application for managing affected environment and bioremediation approaches. Examples of successful bioremediation applications are illustrated in radionuclide entrapment and retardation, soil stabilization and remediation of polycyclic aromatic hydrocarbons, phenols, plastics or fluorinated compounds. Other emerging bioremediation methods include electro bioremediation, microbe-availed phytoremediation, genetic recombinant technologies in enhancing plants in accumulation of inorganic metals, and metalloids as well as degradation of organic pollutants, protein-metabolic engineering to increase bioremediation efficiency, including nanotechnology applications are also discussed.

Environmental Biotechnology: A Biosystems Approach, Second Edition presents valuable information on how biotechnology has acted as a vital buffer among people, pollution, and the environment. It answers the most important questions on the topic, including how, and why, a knowledge and understanding of the physical, chemical, and biological principles of the environment must be achieved in order to develop biotechnology applications. Most texts address either the applications or the implications of biotechnology. This book addresses both. The applications include biological treatment and other environmental engineering processes. The risks posed by biotechnologies are evaluated from both evidence-based and precautionary perspectives. Using a systems biology approach, the book provides a context for researchers and practitioners in environmental science that complements guidebooks on the necessary specifications and criteria for a wide range of environmental designs and applications. Users will find crucial information on the topics scientific researchers must evaluate in order to develop further technologies. Provides a systems approach to biotechnologies which includes the physical, biological, and chemical processes in context Presents relevant case studies on cutting-edge technologies, such as nanobiotechnologies and green engineering Addresses both the applications and implications of biotechnologies by following the lifecycle of a variety of established and developing biotechnologies Includes crucial information on the topics scientific researchers must evaluate in order to develop further technologies

In recent years, there have been significant advances in the techniques of sampling and analysis, which has allowed the more accurate recording of environmental levels of many substances present in the environment. At the same time, processes for the remediation of contaminated matrices have evolved, through the application and/or combination of biological, physical, and chemical procedures. The purpose of this book is to present new studies aimed at determining levels of environmental pollution in various parts of the world. It also shows new alternatives for the remediation of contaminated matrices.

Toxic substances threatens aquatic and terrestrial ecosystems and ultimately human health. The book is a thoughtful effort in bringing forth the role of biotechnology for bioremediation and restoration of the ecosystems degraded by toxic and heavy metal pollution. The introductory chapters of the book deal with the understanding of the issues concerned with the pollution caused by toxic elements and heavy metals and their impacts on the different ecosystems followed by the techniques involved in monitoring of the pollution. These techniques include use of bio-indicators as well as modern techniques for the assessment and monitoring of toxicants in the environment. Detailed chapters discussing the role of microbial biota, aquatic plants, terrestrial plants to enhance the accumulation efficiency of these toxic and heavy metals are followed by remediation techniques involving myco-remediation, bio-pesticides, bio-fertilizers, phyto-remediation and rhizo-filtration. A sizable portion of the book has been dedicated to the advanced bio-remediation techniques which are finding their way from the laboratory to the field for revival of the degraded ecosystems. These involve bio-films, micro-algae, genetically modified plants and filter feeders. Furthermore, the book is a detailed comprehensive account for the treatment technologies from unsustainable to sustainable. We believe academicians, researchers and students will find this book informative as a complete reference for biotechnological intervention for sustainable treatment of pollution.

Avenues to a Cleaner Environment
Insecticides Resistance

Environmental Chemistry and Recent Pollution Control Approaches
Advanced Removal Techniques for Dye-containing Wastewaters
Handbook of Research on Inventive Bioremediation Techniques
Sustainable Approaches to Pollution Degradation

Biorefinery of Oil Producing Plants for Value-Added Products An instructive and up-to-date pretreatment and industrial applications of oil producing plants Biorefinery of Oil Producing Plants for Value-Added Products is a two-volume set that delivers a comprehensive exploration of oil producing plants, from their availability to their pretreatment, bioenergy generation, chemical generation, bioproduct generation, and economic impact. The distinguished team of editors has included a wide variety of highly instructive resources written by leading contributors to the field. This set explores the current and future potential of bioenergy production to address the energy and climate crisis, as well as the technologies used to produce materials like biogas, biodiesel, bioethanol, biobutanol, biochar, fuel pellets, and biohydrogen. It also discusses the production of biobased chemicals, including bio-oil, biosurfactants, cationic surfactants, glycerol, biovanillin, bioplastic, and plant-oil based polyurethanes. Concluding with an insightful analysis of the economic effects of oil producing plants, the set also offers readers: A thorough introduction to the availability of oil producing plants, including palm oil, castor oil, jatropha, nyamplung, and coconut A comprehensive exploration of the pretreatment of oil producing plants, including the physical, chemical and biological pretreatment of lignocellulosic biomass Practical discussion of the generation of bioenergy, including biogas generation in the palm oil mill and biodiesel production techniques using jatropha In-depth examinations of the generation of biobased chemicals, including those produced from the tobacco plant Perfect for researchers and industry practitioners involved with the biorefinery of oil producing plants, Biorefinery of Oil Producing Plants for Value-Added Products also belongs in the libraries of undergraduate and graduate students studying agriculture, chemistry, engineering, and microbiology.

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.

This book provides an example of the successful and rapid expansion of bioengineering within the world of the science. It includes a core of studies on bioengineering technology applications so important that their progress is expected to improve both human health and ecosystem. These studies provide an important update on technology and achievements in molecular and cellular engineering as well as in the relatively new field of environmental bioengineering. The book will hopefully attract the interest of not only the bioengineers, researchers or professionals, but also of everyone who appreciates life and environmental sciences.

Progress in Molecular and Environmental Bioengineering From Analysis and Modeling to Technology Applications BoD - Books on Demand
Life of Science
Recent Advances and Future Prospects
State of the Art in Biosensors
Valorization and Management Techniques

A Biosystems Approach

This volume provides an overview of recent trends in bioremediation techniques. Gathering contributions by a multi-disciplinary team of authors, it reviews the available methodologies for the remediation of various types of waste, e.g. e-waste, wastewater, municipal solid waste and algal blooms. Bioprocessing techniques are not only used for environmental cleanup but also for the production of valuable added products from waste biomass. Accordingly, this book provides the reader with an update on current valorization techniques for biofuels, algal biorefineries, and the hydrothermal conversion of biomass. Given its interdisciplinary scope, the book offers a valuable asset for students, researchers and engineers working in biotechnology, environmental engineering, wastewater management, chemical engineering and related areas.

Municipal and industrial wastewaters contain a wide spectrum of pollutants. Their effective removal presents a challenge for water treatment technology. Biosorption of nutrients and pollutants has been used in sewage treatment since the discovery of the activated sludge process. It is a passive uptake process by which pollutants are adsorbed on the surface of cell walls and/or dissolved in structures of microorganism cells that are present in sludge. Sorbed pollutants remain in the sludge and can be potentially released back into the environment depending on their condition and the reversibility of the pollutant-sludge interaction. An overview of typical biosorption applications for the removal of nutrients, organic pollutants, and metals in wastewater treatment is provided in different areas of their use for the protection of aquatic ecosystems and human health. This book will be of interest to operators of wastewater treatment plants and sludge treatment and disposal facilities as well as to researchers and university students in the field of environmental engineering.

Today, microbiology is a rapidly growing discipline in the life sciences, and the technologies are evolving on a virtually daily basis. Next-generation sequencing technologies have revolutionized microbial analysis, and can help us understand the biology and genomic diversity of various bacterial species with significant impacts on agro-ecosystems. In addition, advances in molecular biology and microbiology techniques hold the potential to improve the productivity and sustainability of agriculture and forestry. This new volume addresses the role of microbial genomics in understanding the living systems that exist in the soil and their interactions with plants, an aspect that is also important for crop improvement. The topics covered focus on a deeper and clearer understanding of how microbes cause diseases, the genome-based development of novel antibacterial agents and vaccines, and the role of microbial genomics in crop improvement and agroforestry. Given its scope, the book offers a valuable resource for researchers and students of agriculture and infectious biology.

This book describes many novel approaches of microbial bioremediation including conventional and modern approaches, metagenomics, biosurfactants and nano-based bioremediation. Also presents up-to-date knowledge about biodegradation of solid and liquid contaminants in the rhizospheric zone by plant (rhizo)-microbiome interface. It also illustrates communication pathways based on evolving methodologies, bioinformatic tools which provides insights into the functional dynamics of bioremediation process by the host-microbiome interface. The different chapters explain the mechanism and outcomes during the process of bioremediation. The book broadly depicts the following: Advances in bioremediation through nanoremediation, rhizo-remediation, bioremediation of different ecosystems like polluted waters, industrial effluents, bioremediation of metal and organic pollutants, toxic dyes etc. The book is very useful for researchers and students in the fields of applied and environmental microbiology. It is also meant for industry experts and professionals working in the field of bioremediation and waste management.

Microbial Bioremediation & Biodegradation
Progress in Molecular and Environmental Bioengineering
Advances in Bioremediation of Wastewater and Polluted Soil
Environmental and Medical Applications
Biodegradation of Nitroaromatic Compounds
Applied Bioremediation

This book focuses on the application of microbes in all fields of biology. There is an urgent need to understand and explore new microbes, their biological activities, genetic makeup and further opportunities for utilizing them. The book is divided into sections, highlighting the application of microbes in agriculture, nanotechnology, genetic engineering, bioremediation, industry, medicine and forensic sciences, and describing potential future advances in these fields. It also explores the potential role of microbes in space and how they might support life on a different planet.

This book presents new insights into the development of different aspects of petroleum science and engineering. The book contains 19 chapters divided into two main sections: (i) Exploration and Production and (ii) Environmental Solutions. There are 11 chapters in the first section, and the focus is on the topics related to exploration and production of oil and gas, such as characterization of petroleum source rocks, drilling technology, characterization of reservoir fluids, and enhanced oil recovery. In the second section, the special emphasis is on waste technologies and environmental cleanup in the downstream sector. The book written by numerous prominent scholars clearly shows the necessity of the multidisciplinary approach to sustainable development in the petroleum industry and stresses the most updated topics such as EOR and environmental cleanup of fossil fuel wastes.

This book provides useful information about bioremediation, phytoremediation, and mycoremediation of wastewater and some aspects of the chemical wastewater treatment processes, including ion exchange, neutralization, adsorption, and disinfection. Additionally, this book elucidates and illustrates the wastewater treatment plants in terms of plant sizing, plant layout, plant design, and plant location. Cutting-edge topics include wet air oxidation of aqueous wastes, biodegradation of nitroaromatic compounds, biological treatment of sanitary landfill leachate, bacterial strains for the bioremediation of olive mill wastewater, gelation of arabinoxylans from maize wastewater, and modeling wastewater evolution.

Trace Metals in the Environment