

Microbial Applications

Biosurfactants are the surface-active biomolecules produced by microorganisms. Biosurfactants have gained commercial significance due to their unique properties, such as high surface activity, high specificity, low toxicity, tolerance to pH, temperature and ionic strength, biodegradability, excellent emulsifying and demulsifying ability, antimicrobial activity, ability to work under extreme conditions, and relative ease of preparation. Biosurfactants are used in several industries, including organic chemicals, petroleum, petrochemicals, mining, metallurgy (mainly bioleaching), agrochemicals, fertilizers, foods, beverages, cosmetics, pharmaceuticals and many others. The aim of this book is to highlight key aspects from basics to advanced concepts, classifications, production and applications in various fields such as agriculture, health, bioremediation, industries, pharmaceutical, oil recovery, environment, and nanotechnology. It also serves as an excellent and expansive literature on fermentation, recovery, genomics, and metagenomics of biosurfactant production. The book focuses on the biosurfactant production from bacteria, the diversity of biosurfactant producing bacteria, and industrial need of biosurfactant.

Updated Edition Includes a New Chapter and Enhanced Study Material The second edition of Environmental Microbiology for Engineers explores the role that microorganisms play in the engineered protection and enhancement of an environment. Offering a perfect balance of microbiological knowledge and environmental biotechnology principles, it provides a practical understanding of microorganisms and their functions in the environment and in the environmental engineering systems. The book also presents a quantitative description of applied microbiological processes and their engineering design. This updated edition adds a new chapter on construction biotechnology, and offers new end-of-chapter exam questions with solutions to aid readers with performing the design calculations needed and to enhance understanding of the material. The book covers essential topics that include: Diversity and functions of microorganisms in environmental engineering systems Environmental bioengineering processes Applied microbial genetics and molecular biology Microbiology of water and wastewater treatment Biotreatment of solid waste and soil bioremediation Microbial monitoring of environmental engineering systems Biocorrosion and biodeterioration of materials Biocementation and bioclogging of soil Biopollution of indoor environment Biofouling of facilities, and more Environmental Microbiology for Engineers provides a practical understanding of microorganisms in the civil engineering process and their functions in the environmental engineering systems, and is designed for practicing environmental engineers working in the areas of wastewater, solid waste treatment, soil remediation and ground improvement.

Biofilms are the default mode-of-life for many bacterial species. The three-dimensional structure of the biofilm provides the associated microbial communities with additional protection from predation, toxic substances, and physical perturbation. The variety of microniches provided by the biofilm also promotes a huge diversity of microbial life and metabolic potential. These complex and highly structured communities help to maintain the health of soils and waters. Current applications of biofilms include the degradation of toxic substances in soil and water, the commercial production of chemicals, and the generation of electricity. However, biofilm-based infections cause harm to millions of humans annually. In addition, biofilms can affect the quality and yield of crops and cause biofouling and microbially-induced corrosion. In this book, leading scientists provide an up-to-date review of the latest scientific research on these fascinating microbial communities and predict future trends and growth areas in biofilm-related research. Authors from around the world have contributed critical reviews on the most topical aspects of current biofilm research. The subjects covered include: quorum sensing and social interactions in microbial biofilms * biofilms in disease * plant-associated biofilms * biofilms in the soil * applications in bioremediation * biofilms in wastewater treatment * corrosion and fouling * aquatic biofilms * microbial fuel cells * catalytic biofilms. The book will be essential for everyone interested in biofilms and their applications. It is also highly recommended for environmental microbiologists, soil scientists, medical microbiologists, bioremediation experts, and microbiologists working in biocorrosion, biofouling, biodegradation, water microbiology, quorum sensing, and many other areas.

The third edition of this bestselling text has been rigorously updated to reflect major new discoveries and concepts since 2011, especially progress due to extensive application of high-throughput sequencing, single cell genomics and analysis of large datasets. Significant advances in understanding the diversity and evolution of bacteria, archaea, fungi, protists, and viruses are discussed and their importance in marine processes is explored in detail. Now in full colour throughout, all chapters have been significantly expanded, with many new diagrams, illustrations and boxes to aid students' interest and understanding. Novel pedagogy is designed to encourage students to explore current high-profile research topics. Examples include the impacts of rising CO2 levels on microbial community structure and ocean processes, interactions of microbes with plastic pollution, symbiotic interactions, and emerging diseases of marine life. This is the only textbook addressing such a broad range of topics in the specific area of marine microbiology, now a core topic within broader Marine Science degrees. A Companion Website provides additional online resources for instructors and students, including a summary of key concepts and terminology for each chapter, links to further resources, and flashcards to aid self-assessment.

Microbial Nanobiotechnology

The Science and Applications of Microbial Genomics

Biomedicine, Agriculture and Industry

Techniques and Applications

Advances and Applications

Microbial Metal and Metalloid Metabolism

Environmental and Agricultural Microbiology

In the second edition of this bestselling textbook, new materials have been added, including a new chapter on real time polymerase chain reaction (RTPCR) and a chapter on fungal solid state cultivation. There already exist a number of excellent general textbooks on microbiology and biotechnology that deal with the basic principles of microbial biotechnology. To complement them, this book focuses on the various applications of microbial-biotechnological principles. A teaching-based format is adopted, whereby working problems, as well as answers to frequently asked questions, supplement the main text. The book also includes real life examples of how the application of microbial-biotechnological principles has achieved breakthroughs in both research and industrial production. Although written for polytechnic students and undergraduates, the book contains sufficient information to be used as a reference for postgraduate students and lecturers. It may also serve as a resource book for corporate planners, managers and applied research personnel.

"Microbiology covers the scope and sequence requirements for a single-semester microbiology course for non-majors. The book presents the core concepts of microbiology with a focus on applications for careers in allied health. The pedagogical features of the text make the material interesting and accessible while maintaining the career-application focus and scientific rigor inherent in the subject matter. Microbiology's art program enhances students' understanding of concepts through clear and effective illustrations, diagrams, and photographs. Microbiology is produced through a collaborative publishing agreement between OpenStax and the American Society for Microbiology Press. The book aligns with the curriculum guidelines of the American Society for Microbiology."--BC Campus website.

Nature Farming and Microbial ApplicationsCRC Press

This edited book serves as a vital resource on the contributions of microorganisms to advances in nanotechnology, establishing their applications in diverse areas of biomedicine, environment, biocatalysis, food and nutrition, and renewable energy. It documents the impacts of microorganisms in nanotechnology leading to further developments in microbial nanobiotechnology. This book appeals to researchers and scholars of microbiology, biochemistry and nanotechnology.

Application of Microbes in Environmental and Microbial Biotechnology

Microbial Decontamination in the Food Industry

Benson's Microbiological Applications

The New Science of Metagenomics

Beneficial Plant-microbial Interactions

Applications of Microbial Engineering

Microbial Inoculants in Sustainable Agricultural Productivity

1. INTRODUCTION; 2. TEICHOIC ACID STRUCTURES; 3. BIOSYNTHESIS OF WTAs AND LTA; 4. ROLES OF WTAs AND LTA IN BACTERIAL PHYSIOLOGY; 5. TEICHOIC ACIDS AND HOST CELL RECEPTOR INTERACTION; 6. CONCLUSIONS AND PERSPECTIVES; ACKNOWLEDGEMENTS; REFERENCES; Chapter 6. Bacterial capsular polysaccharides and exopolysaccharides; SUMMARY; 1. INTRODUCTION; 2. CARBOHYDRATE COMPONENTS OF CAPSULAR AND EXO-POLYSACCHARIDES; 3. NON-CARBOHYDRATE SUBSTITUENTS OF CAPSULAR AND EXOPOLYSACCHARIDES; 4. STRUCTURE OVERVIEW OF BACTERIAL POLYSACCHARIDES; 5. POLYSACCHARIDE SHAPES.

Written by leading experts in their respective fields, Principles and Applications of Soil Microbiology 3e, provides a comprehensive, balanced introduction to soil microbiology, and captures the rapid advances in the field such as recent discoveries regarding habitats and organisms, microbially mediated transformations, and applied environmental topics. Carefully edited for ease of reading, it aids users by providing an excellent multi-authored reference, the type of book that is continually used in the field. Background information is provided in the first part of the book for ease of comprehension. The following chapters then describe such fundamental topics as soil environment and microbial processes, microbial groups and their interactions, and thoroughly addresses critical nutrient cycles and important environmental and agricultural applications. An excellent textbook and desk reference, Principles and Applications of Soil Microbiology, 3e, provides readers with broad, foundational coverage of the vast array of microorganisms that live in soil and the major biogeochemical processes they control. Soil scientists, environmental scientists, and others, including soil health and conservation specialists, will find this material invaluable for understanding the amazingly diverse world of soil microbiology, managing agricultural and environmental systems, and formulating environmental policy. Includes discussion of major microbial methods, embedded within topical chapters Includes information boxes and case studies throughout the text to illustrate major concepts and connect fundamental knowledge with potential applications Study questions at the end of each chapter allow readers to evaluate their understanding of the materials

The classic resource for undergraduate microbiology laboratory courses just keeps getting better. The self-contained, clearly illustrated exercises and four-color format make Microbiological Applications: A Laboratory Manual in General Microbiology the ideal lab manual.

Appropriate for either a majors or non-majors lab course, this lab manual assumes no prior organic chemistry course has been taken.

Understanding the origin of fecal pollution is essential in assessing potential health risks as well as for determining the actions necessary to remediate the quality of waters contaminated by fecal matter. As a result, microbial source tracking (MST) has emerged as a field that has evolved and diversified rapidly since the first approaches were described only a decade ago. In response to the emergence of MST, there have been three large multi-laboratory method comparison studies (two in the US and one in Europe), plus numerous workshops, book chapters, and review articles dedicated to synthesizing information on the topic. Furthermore, a federal (USEPA) guide document describing the uses and limitations of MST methods was published in 2005, and a book dedicated to MST as an emerging issue in food safety was published in 2007. These documents provide a collective body of literature on MST that is both conflicting and complementary, often repetitious, and difficult to condense and interpret. In addition, it does not reflect the current diversity of MST approaches with different organisms, newer methodologies such as quantitative PCR, and anthropogenic chemicals, nor does it embrace the scope of MST research being conducted around the world. The three editors of the book, all with extensive MST expertise, have developed chapters and invited authors who reflect the rich diversity and truly international scope of MST. The unifying theme throughout the book is the design of more standardized approaches to MST that include performance criteria (regardless of method or organism), plus recommendations for field study design and MST implementation. The editors intend that this book will serve as a valuable reference for all those who are involved with

Principles and Applications of Soil Microbiology

Microbial Products for Health, Environment and Agriculture

Essential Soil Microbial Ecology

Metagenomics and Microbial Ecology

Volume 2: Applications in Food and Agriculture

Microbial Biotechnology: Basic Research and Applications

Produce more abundant, high-quality crops with the information you'll find in this book! Recent concerns over environmental pollution and food quality degradation caused by the excessive use of chemicals have prompted scientists and policymakers to re-evaluate modern agricultural processes and search for alternatives that will aid in the production of healthy foods and the protection of our environment. Nature Farming and Microbial Applications summarizes current research in the field, highlighting unique practices such as the use of microbial inoculants and various alternatives to chemical fertilizers and pesticides. The principles of nature farming, as set forth by Japanese philosopher Mokichi Okada, must fulfill these requirements: producing safe and nutritious food that promotes good health providing economic and spiritual benefits to both producers and consumers being sustainable and easily practiced conserving and protecting the environment producing sufficient high-quality food for an expanding world population To this end, Nature Farming and Microbial Applications addresses issues of concern to organic farmers, including: soil fertility pest control effective microorganisms photosynthesis transpiration plant-water relations stress resistance of growing crops This well-referenced volume contains unique and original methods of modeling and analysis. It will be used again and again as a reference source for students and researchers.

Microbiomics: Dimensions, Applications, and Translational Implications of Human and Environmental Microbiome Research describes a new, holistic approach to microbiomics. International experts provide in-depth discussion of current research methods for studying human, environmental, viral and fungal microbiomes, as well as the implications of new discoveries for human health, nutrition, disease, cancer research, probiotics and in the food and agricultural industries. Distinct chapters covering culturomics and sub-microbiomes, such as the virome and mycetobiome, provide an integrative framework for the expansion of microbiomics into new areas of application, as well as crosspollination between research areas. Detailed case studies include the use of microbiomics to develop natural products with antimicrobial properties, microbiomic enhancements in food and beverage technology, microbes for bioprotection and biopreservation, microbial tools to reduce antibiotic resistance, and maintenance and cultivation of human microbial communities. Provides an integrated approach for realizing the potential of microbiomics across the life, environmental, food and agricultural sciences Includes thorough analysis of human, environmental, viral and mycotel microbiomes, as well as methods and technology for identifying microbiotes Features chapter contributions from international leaders in microbiomic methods, technology and applications

Beneficial Plant-microbial Interactions: Ecology and Applications provides insight into the mechanisms underlying the interactions of plants and microbes, the ecological relevance and roles of these symbioses, the adaptive mechanisms of plant-associated microorganisms to abiotic stress and their contribution to plant stress tolerance, and the poten

The microbial engineering technologies have been identified as an essential and important subject area of engineering and applied biological sciences. A microbial engineer works on the biological, chemical and engineering aspects of biotechnology, manipulating microbes and developing new uses for microbes. In agriculture, bioprocess engineering, in biotechnology, genetic engineering, microbial vaccines, and the development of bionanotechnology, microbial engineering could be recognized as high potential technologies in the current scenario for economic development. Scientists and engineers are motivated for sustainable green technology as a part of an upcoming industrial revolution turning more and more to processes involving microorganisms. Applications of Microbial Engineering provides a better understanding of industrially important genetically manipulated and engineered prokaryotic and eukaryotic cell systems. The content of this book are based on most recent developments in microbial engineering. The contributions by specialists on the respective topics provide a profound scientific basis for further research. It is expected that this book will be a valuable resource for researchers as well as students dealing with microbiology and biotechnology.

Laboratory Manual in General Microbiology, Short Version

Microbial Biofilms

Ecology & Applications

Current Research and Applications

Aspergillus System Properties and Applications

Principles and Applications

Biotechnological Applications of Polyhydroxyalkanoates

This edited volume discusses the role of various microbial products in healthcare, environment and agriculture. Several microbial products are directly involved in solving major health problems, agricultural and environmental issues. In healthcare sector, microbes are used as anti-tumor compounds, antibiotics, anti-parasitic agents, enzyme inhibitors and immunosuppressive agents. Microbial products are also used to degrade xenobiotic compounds and bio-surfactants, for biodegradation process. In agriculture, microbial products are used to enhance nutrient uptake, to promote plant growth, or to control plant diseases. The book presents several such applications of microbes in the ecosystems. The chapters are contributed from across the globe and contain up-to-date information. This book is of interest to teachers, researchers, microbiologists and ecologists. Also the book serves as additional reading material for undergraduate and graduate students of agriculture, forestry, ecology, soil science, and environmental sciences.

This contributed volume sheds new light on waste management and the production of biofuels. The authors share insights into microbial applications to meet the challenges of environmental pollution and the ever- growing need for renewable energy. They also explain how healthy and balanced ecosystems can be created and maintained using strategies ranging from oil biodegration and detoxification of azo dyes to biofouling. In addition, the book illustrates how the metabolic abilities of microorganisms can be used in microbial fuel-cell technologies or for the production of biohydrogen. It inspires young researchers and experienced scientists in the field of microbiology to explore the application of green biotechnology for bioremediation and the production of energy, which will be one of the central topics for future generations.

This contributed volume provides insights into multiple applications using microbes to promote productivity in agriculture, to produce biochemicals or to respond to challenges in biomedicine. It highlights the microbial production of nanocompounds with medical functionality alongside new anti-mycobacterial strategies, and introduces plant-growth-promoting Rhizobacteria as well as the correlation between biofilm formation and crop productivity. Further, the authors illustrate the green synthesis of biochemical compounds, such as hydroxamid acid or biosurfactants, using microbial and fungal enzymes. It inspires young researchers and experienced scientists in the field of microbiology to explore the combined use of green, white and red biotechnology for industrial purposes, which will be one of the central topics for future generations.

How to achieve sustainable agricultural production without compromising environmental quality, agro-ecosystem function and biodiversity is a serious consideration in current agricultural practices. Farming systems' growing dependency on chemical inputs (fertilizers, pesticides, nutrients etc.) poses serious threats with regard to crop productivity, soil fertility, the nutritional value of farm produce, management of pests and diseases, agro-ecosystem well-being, and health issues for humans and animals. At the same time, microbial inoculants in the form of biofertilizers, plant growth promoters, biopesticides, soil health managers, etc. have gained considerable attention among researchers, agriculturists, farmers and policy makers. The first volume of the book Microbial Inoculants in Sustainable Agricultural Productivity - Research Perspectives highlights the efforts of global experts with regard to various aspects of microbial inoculants. Emphasis is placed on recent advances in microbiological techniques for the isolation, characterization, identification and evaluation of functional properties using biochemical and molecular tools. The taxonomic characterization of agriculturally important microorganisms is documented, along with their applications in field conditions. The book exploresthe identification, characterization and diversity analysis of endophytic microorganisms in various crops including legumes/ non-legumes, as well as the assessment of their beneficial impacts in the context of promotingplant growth. Moreover, it provides essential updates onthe diversity and role of plant growth promoting rhizobacteria (PGPR) and arbuscular mycorrhizal mycorrhizal fungi (AMF). Further chaptersexamine in detailbiopesticides, thehigh-density cultivation of bioinoculants in submerged culture, seed biopriming strategies for abiotic and biotic stress tolerance, andPGPR as abio-control agent. Given its content,the book offers a valuable resource for researchers involved in research and development concerningPGPR, biopesticides and microbial inoculants.

Microbial Applications Vol.2

Vol. 1: Research Perspectives

Marine Microbiology

Applications for Sustainability

Revealing the Secrets of Our Microbial Planet

Environmental Microbiology for Engineers

Microbiomics

This book cover all types of microbe based polymers and their application in diverse sectors with special emphasis on agriculture. It collates latest research, methods, opinion, perspectives, and reviews dissecting the microbial origins of polymers, their production, design, and processing at industrial level, as well as improvements for specific industrial applications. Book also discusses recent advances in biopolymer production and their modification for amplifying the value. In addition, understanding of the microbial physiology and optimal conditions for polymer production are also explained. This compilation of scientific chapters on principles and practices of microbial polymers fosters the knowledge transfer among scientific communities, industries, and microbiologist and serves students, academicians, researchers for a better understanding of the nature of microbial polymers and application procedure for sustainable ecosystem

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.

Microorganisms comprise the greatest genetic diversity in the natural ecosystem, and characterization of these microbes is an essential step towards discovering novel products or understanding complex biological mechanisms. The advancement of metagenomics coupled with the introduction of high-throughput, cost-effective NGS technology has expanded the possibilities of microbial research in various biological systems. In addition to traditional culture and biochemical characteristics, omics approaches (metagenomics, metaproteomics, and metatranscriptomics) are useful for analyzing complete microbial communities and their functional attributes in various environments. Metagenomics and Microbial Ecology: Techniques and Applications explores the most recent advances in metagenomics research in the landscape of next-generation sequencing technologies. This book also describes how advances in sequencing technologies are used to study invisible microbes as well as the relationships between microorganisms in their respective environments. Features: Covers a wide range of concepts, investigations, and technological advancement in metagenomics at the global level. Highlights the novel and recent approaches to analyze microbial diversity and its functional attributes. Features a range of chapters that present an introduction to the field and functional insight into various ecosystems.

This book presents the latest research on the uses of polyhydroxyalkanoates (PHA), introducing readers to these natural, biodegradable polyesters produced by microorganisms, their functions and applications. The individual chapters discuss the various potentials of these bioplastics, which offer an attractive alternative to non-biodegradable plastics. The book also describes the diverse medical and biomedical applications of PHAs, including their use as drug carriers, memory enhancers, and biocontrol agents, and examines their role in creating a more sustainable economy – which is the need of the hour.

A Laboratory Manual in General Microbiology

Microbial Extremozymes

Recent Advancements and Future Developments

Workshop Summary

Bioremediation and Bioenergy

Microbial Biotechnology

Structures, Relevance and Applications

The book, Environmental and Agricultural Microbiology: Applications for Sustainability is divided in to two parts which embodies chapters on sustenance and life cycles of these microorganisms in various environmental conditions, their dispersal, interactions with other inhabited communities, metabolite production and reclamation. Though books pertaining to soil & agricultural microbiology/environmental biotechnology are available, there is a dearth of comprehensive literature on behavior of microorganisms in environmental and agricultural realm. Part 1 includes bioremediation of agrochemicals by microalgae, detoxification of chromium and other heavy metals by microbial biofilm, microbial biopolymer technology including polyhydroxyalkanoates (PHAs) and polyhydroxybutyrates (PHB), their production, degradability behaviors and applications. Biosurfactants production and their commercial importance are also systematically represented in this part. Part 2 having 9 chapters and facilitates imperative ideas on approaches for sustainable agriculture through functional soil microbes, next generation crop improvement strategies via rhizosphere microbiome, production and implementations of liquid biofertilizers, mitigation of methane from livestock, chitinases from microbes, extremozymes, an enzyme from extremophilic microorganism and their relevance in current biotechnology, lithobiontic communities and their environmental importance have been comprehensively elaborated. In the era of sustainable energy production biofuel and other bioenergy products play a key role and their production from microbial sources are frontiers for researchers. The last chapter unveils the importance of microbes and their consortia for management of solid waste in amalgamation with biotechnology.

Biochar Application: Essential Soil Microbial Ecology outlines the cutting-edge research on the interactions of complex microbial populations and their functional, structural, and compositional dynamics, as well as the microbial ecology of biochar application to soil, the use of different phyto-chemical analyses, possibilities for future research, and recommendations for climate change policy. Biochar, or charcoal produced from plant matter and applied to soil, has become increasingly recognized as having the potential to address multiple contemporary concerns, such as agricultural productivity and contaminated ecosystem amelioration, primarily by removing carbon dioxide from the atmosphere and improving soil functions. Biochar Application is the first reference to offer a complete assessment of the various impacts of biochar on soil and ecosystems, and includes chapters analyzing all aspects of biochar technology and application to soil, from ecogenomic analyses and application ratios to nutrient cycling and next generation sequencing. Written by a team of international authors with interdisciplinary knowledge of biochar, this reference will provide a platform where collaborating teams can find a common resource to establish outcomes and identify future research needs throughout the world. Includes multiple tables and figures per chapter to aid in analysis and understanding Includes a comprehensive table of the methods used within the contents, ecosystems, contaminants, future research, and application opportunities explored in the book Includes knowledge gaps and directions of future research to stimulate further discussion in the field and in climate change policy

Outlines the latest research on the interactions of complex microbial populations and their functional, structural, and compositional dynamics Offers an assessment of the impacts of biochar on soil and ecosystems

An accessible introduction to the world of microbes—from basic microbe biology through industrial applications

Microbes affect our lives in a variety of ways—playing an important role in our health, food, agriculture, and environment. While some microbes are beneficial, others are pathogenic or opportunistic. Microbes: Concepts and Applications describes basic microbe biology and identification and shows not only how they operate in the subfields of medicine, biotechnology, environmental science, bioengineering, agriculture, and food science, but how they can be harnessed as a resource. It provides readers with a solid grasp of etiologic agents, pathogenic processes, epidemiology, and the role of microbes as therapeutic agents. Placing a major emphasis on omics technology, the book covers recent developments in the arena of microbes and discusses their role in industry and agriculture, as well as in related fields such as immunology, cell biology, and molecular biology. It offers complete discussions of the major bacterial, viral, fungal, and parasitic pathogens; includes information on emerging infectious diseases, antibiotic resistance, and bioterrorism; and talks about the future challenges in microbiology. The most complete treatment of microbial biology available, Microbes features eye-opening chapters on: Human and Microbial World Gene Technology: Application and Techniques Molecular Diagnostic and Medical Microbiology Identification and Classification of Microbes Diversity of Microorganisms Microbes in Agriculture Microbes as a Tool for Industry and Research Complete with charts and figures, this book is an invaluable textbook for university teachers, students, researchers, and people everywhere who care about microorganisms.

Biosurfactants are surface-active biomolecules produced by a wide variety of microorganisms. They can be produced from renewable sources, and possess high surface activity, high specificity, low toxicity, tolerance to pH, temperature and ionic strength, biodegradability, excellent emulsifying and demulsifying ability, antimicrobial activity, ability. Biosurfactants have found applications in several industries including organic chemicals, petroleum, petrochemicals, mining, metallurgy (mainly bioleaching), agrochemicals, fertilizers, foods, beverages, cosmetics, pharmaceuticals and many others. The enormous diversity of biosurfactants make them an interesting group of materials for application in many areas such as agriculture and food. Both epiphytic and endophytic plant associate microbes produce biosurfactants and have vital role in motility, signaling and biofilm formation. In addition, biosurfactants are used to aid germination, act as biocontrol agents, and bioremediation of contaminated soil, replace chemical surfactants and enhance plant microbe's interaction. Green surfactants, due to their amphipathic structure promotes seed germination, exhibit biocontrol activity by inhibition of phytopathogen and including systemic resistance in plants and also play a significant role in bioremediation of pollutants. Green surfactants are less toxic, more eco-friendly and have significant application in agriculture. The lipopeptides produced by many PGPRs can be used for many agricultural applications. Lipopeptides (LPs) are very small molecules that are synthesized by various microorganisms as form of secondary metabolites. Antimicrobial properties of lipopeptides are produced non-ribosomally in many bacteria and fungi during cultivation on various carbon sources. The main aim of this volume is to highlight the concept, classification, production and applications of microbial surfactants in food and agriculture. The book provides a comprehensive coverage of fermentation, recovery, genomics and metagenomics of biosurfactant production. It is presented in an easy-to-understand manner, and includes protocols, figures, and recent data on the industrial demand. Market and economics, and the production of biosurfactants from novel substrates are particularly worthwhile additions. The volume will be useful for students, researchers, teachers, and entrepreneurs in the area of PGPR and allied fields

Microbial Surfactants

Nature Farming and Microbial Applications

Industrial Applications of Microbial Enzymes

Microbiological Applications

Ecology and Applications

Concepts and Applications

Microbial Applications

Microbial Extremozymes: Novel Sources and Industrial Applications is a unique resource of practical research information on the latest novel sources and technologies regarding extremozymes in bioremediation, waste management, valorization of industrial by-products, biotransformation of natural polymers, nutrition, food safety and diagnosis of disease. The book's broad knowledge and varying applications are useful to the food industry, dairy industry, fruit and vegetable processing, and baking and beverages industries, as well as the pharmaceutical and biomedical industries. This is a concise, all-encompassing resource for a range of scientists needing knowledge of extremozymes to enhance and research. Furthermore, it provides an updated knowledge of microbial enzymes isolated from extreme environments (temperatures, etc.) and their biotechnological applications. It will be useful to researchers, scientists and students in enzyme research. In addition, users from the dairy and baking industries will benefit from the presented content. Explores recent scientific research on extremophiles and extremozymes technologies that help innovate novel ideas Provides innovative technologies for enzyme production from extremophilic microbes Includes cutting-edge research for applications in various industries where extreme temperature conditions exist Presents novel microorganisms and their enzymes from extreme environments (Thermophilic, Psychrophilic, Acidophilic, Alkaliphilic, Anaerobic, Halophilic, Barophilic, Metallotolerant, Radioresistant, etc.)

Microbial applications encompass areas including biotechnology, chemical engineering, and alternative fuel development. Research on their technological developments cover many aspects of work using microbes as cell factories. The fields of biotechnology, chemical engineering, pharmaceuticals, diagnostics and medical device development also employ these microbial products. There is an urgent need to integrate all these disciplines that caters to the need of all those who are interested to work in the area of microbial technologies. This book is a step forward to integrate the aforesaid frontline branches into an interdisciplinary research work quenching the academic as well as research thirst of all those concerned about microbes in the respective area of biotechnology, chemical engineering, and pharmaceuticals. All the chapters in this book are related to important research on microbial applications, written by international specialists for researchers and academics in the concerned disciplines. This publication aims to provide a detailed compendium of experimental work and information used to investigate different aspects of microbial technologies, their products as well as interdisciplinary interactions including biochemistry of metabolites, in a manner that reflects the recent developments of relevance to researchers/scientists investigating microbes.

In the second edition of this bestselling textbook, new materials have been added, including a new chapter on real time polymerase chain reaction (RT-PCR) and a chapter on fungal solid state cultivation. There already exist a number of excellent general textbooks on microbiology and biotechnology that deal with the basic principles of microbial biotechnology. To complement them, this book focuses on the various applications of microbial-biotechnological principles. A teaching-based format is adopted, whereby working problems, as well as answers to frequently asked questions, supplement the main text. The book also includes real life examples of how the application of microbial-biotechnological principles has achieved breakthroughs in both research and industrial production. Although written for polytechnic students and undergraduates, the book contains sufficient information to be used as a reference for postgraduate students and lecturers. It may also serve as a resource book for corporate planners, managers and applied research personnel.

Microbial enzymes are important because they can be used for a wide variety of industrial purposes. There is dispersed and scanty information available with respect to microbial enzymes and their industrial applications. In this edited book, leading scientists have covered the various aspects of microbial enzymes and their industrial applications. Using microbial enzymes can help expedite various manufacturing processes and contribute to sustainable development, which is a priority worldwide. Research gaps in the entrainment of microbial enzymes with their direct application in product development are a major focus of this volume. Key Features • Covers microbial enzymes with comprehensive and in-depth information • Benefits students by describing recent advancements into microbial enzymology • Provides updates regarding microbial enzymes for researchers and industrial scientists • Includes findings on the microbial actions for better life

New and Future Developments in Microbial Biotechnology and Bioengineering

Novel Sources and Industrial Applications

Novel Methods and Applications

Dimensions, Applications, and Translational Implications of Human and Environmental Microbiome Research

Microbiology

Microbial Applications Vol.1

Microbial Polymers

Although we can't usually see them, microbes are essential for every part of human life -- indeed all life on Earth. The emerging field of metagenomics offers a new way of exploring the microbial world that will transform modern microbiology and lead to practical applications in medicine, agriculture, alternative energy, environmental remediation, and many others areas. Metagenomics allows researchers to look at the genomes of all of the microbes in an environment at once, providing a "meta" view of the whole microbial community and the complex interactions within it. It's a quantum leap beyond traditional research techniques that rely on studying -- one at a time -- the few microbes that can be grown in the laboratory. At the request of the National Science Foundation, five Institutes of the National Institutes of Health, and the Department of Energy, the National Research Council organized a committee to address the current state of metagenomics and identify obstacles current researchers are facing in order to determine how to best support the field and encourage its success. The New Science of Metagenomics recommends the establishment of a "Global Metagenomics Initiative" comprising a small number of large-scale metagenomics projects as well as many medium- and small-scale projects to advance the technology and develop the standard practices needed to advance the field. The report also addresses database needs, methodological challenges, and the importance of interdisciplinary collaboration in supporting this new field.

Microbial biotechnology is an important area that promotes advanced research into using microbes for value-added products, human nutrition, and the overall wellbeing of society. This book presents the latest information on the use of microbes for sustainable development, and highlights state-of-the-art biotechnological techniques used to harness microbial biotechnological traits on a commercial scale. Gathering contributions from authoritative researchers in the field, it addresses recent advances in microbial biotechnological approaches that offer sustainable options for future generations. Exploring a broad range of microbial products and their uses, the book specifically places emphasis on the application of microorganisms in healthcare, the environment and industry. It also discusses various compound classes derived from microbial metabolites. Pursuing a holistic approach to recent advances in the utilization of various microbes as biotechnological tools, the book also covers traditional uses, and explores emerging strategies to harness their full potential. Accordingly, it offers a valuable resource for researchers and graduate students alike.

Over the past several decades, new scientific tools and approaches for detecting microbial species have dramatically enhanced our appreciation of the diversity and abundance of the microbiota and its dynamic interactions with the environments within which these microorganisms reside. The first bacterial genome was sequenced in 1995 and took more than 13 months of work to complete. Today, a microorganism's entire genome can be sequenced in a few days. Much as our view of the cosmos was forever altered in the 17th century with the invention of the telescope, these genomic technologies, and the observations derived from them, have fundamentally transformed our appreciation of the microbial world around us. On June 12 and 13, 2012, the Institute of Medicine's (IOM's) Forum on Microbial Threats convened a public workshop in Washington, DC, to discuss the scientific tools and approaches being used for detecting and characterizing microbial species, and the roles of microbial genomics and metagenomics to better understand the culturable and unculturable microbial world around us. Through invited presentations and discussions, participants examined the use of microbial genomics to explore the diversity, evolution, and adaptation of microorganisms in a wide variety of environments; the molecular mechanisms of disease emergence and epidemiology; and the ways that genomic technologies are being applied to disease outbreak trace back and microbial surveillance. Points that were emphasized by many participants included the need to develop robust standardized sampling protocols, the importance of having the appropriate metadata, data analysis and data management challenges, and information sharing in real time. The Science and Applications of Microbial Genomics summarizes this workshop.

New and Future Developments in Microbial Biotechnology and Bioengineering: Aspergillus System Properties and Applications provides information on emerging issues related to recent advancements in aspergillus research and its applications in bioprocess technology, chemical engineering, genome biology, molecular taxonomy, secondary and metabolite production, industrial process and biofuels/bioenergy research, and alternative fuel development. The book covers the various novel enzymes secreted by these fungi and their specific use in the food, textile, pulp and paper, biocellulosic ethanol production, and other industries. The book describes research and experimentation on aspergillus activity and directly connects them to their use in bioprocess technology, chemical engineering, bioremediation process, secondary metabolite production, pharmaceutical processes, protein production, industrial process, biofuels/bioenergy research, and alternative fuel development. Readers will find this book to be an indispensable resource for biotechnologists, biochemical engineers, biochemists, microbiologists, bioinformatics researchers, and other biologists who are interested in learning about the potential applications of these fungi. Compiles available, up-to-date information on recent developments made in the study of aspergillus system properties Contains global content from pioneering international authors Presents current research efforts and links them to various applications, including uses in foods, textiles, pulp and paper, and in biocellulosic ethanol production Provides an indispensable resource for biologists who are interested in learning about the potential applications of the fungi aspergillus

Applications and Ecological Perspectives

Microbial Glycobiology

Microbial Source Tracking: Methods, Applications, and Case Studies

Microbes

Biochar Application

Microbiological Applications of High-performance Liquid Chromatography

Volume I: Production and Applications

The ideal reference for novice and experienced investigators interested in environmental biogeochemistry and bioremediation. • Offers a broad range of current topics and approaches in microbe-metal research, including microbial fuel cells, unique microbial physiology, genomics, proteomics, and transcriptomics. • Reviews the current state of the science in the field, and examines emerging

developments and applications and forecasts future research directions. • The book is also recommended as a text for graduate courses in microbial physiology, microbial ecology, and applied and environmental microbiology.

The problem of creating microbiologically-safe food with an acceptable shelf-life and quality for the consumer is a constant challenge for the food industry. Microbial decontamination in the food industry provides a comprehensive guide to the decontamination problems faced by the industry, and the current and emerging methods being used to solve them. Part one deals with various food commodities such as fresh produce, meats, seafood, nuts, juices and dairy products, and provides background on contamination routes and outbreaks as well as proposed processing methods for each commodity. Part two goes on to review current and emerging non-chemical and non-thermal decontamination methods such as high hydrostatic pressure, pulsed electric fields, irradiation, power ultrasound and non-thermal plasma. Thermal methods such as microwave, radio-frequency and infrared heating and food surface pasteurization are also explored in detail. Chemical decontamination methods with ozone, chlorine dioxide, electrolyzed oxidizing water, organic acids and dense phase CO₂ are discussed in part three. Finally, part four focuses on current and emerging packaging technologies and post-packaging decontamination. With its distinguished editors and international team of expert contributors, *Microbial decontamination in the food industry* is an indispensable guide for all food industry professionals involved in the design or use of novel food decontamination techniques, as well as any academics researching or teaching this important subject. Provides a comprehensive guide to the decontamination problems faced by the industry and outlines the current and emerging methods being used to solve them Details backgrounds on contamination routes and outbreaks, as well as proposed processing methods for various commodities including fresh produce, meats, seafood, nuts, juices and dairy products Sections focus on emerging non-chemical and non-thermal decontamination methods, current thermal methods, chemical decontamination methods and current and emerging packaging technologies and post-packaging decontamination