

Microbial Granulation Technology For Nutrient Removal From Wastewater By Liu Yu Qin Lei Yang Shu Fang 2007 Hardcover

Livestock Health and Farming provides a detailed description of key aspects of livestock health issues and farming practices. Chapters cover such topics as antimicrobial resistance in livestock, nutrition and its role in animal health and farming, nutrition and health management in dairy animals, and livestock feeding in semi-arid regions.

"This book has been developed from the Conference on Sustainable Water Infrastructure for Villages and Cities of the Future (SWIF 2009) held in November 2009 in Beijing ..."--P. 4 of cover.

The abundance of organic pollutants found in wastewater affect urban surface waters. Traditional wastewater management technologies focus on the removal of suspended solids, nutrients and bacteria, however, new pollutants such as synthetic or naturally occurring chemicals are often not monitored in the environment despite having the potential to enter the environment and cause adverse ecological and human health effects. Collectively referred to as "emerging contaminants," they are mostly derived from domestic activities and occur in trace concentrations ranging from pico to micrograms per liter. Environmental contaminants are resistant to conventional wastewater treatment processes and most of them remain unaffected, causing contamination of receiving water. This in turn leads to the need for advanced wastewater treatment processes capable of removing environmental contaminants to ensure safe fresh water sources. This book provides an up-to-date overview of the current bioremediation strategies, including their limitations, challenges and their potential application to remove environmental pollutants. It also introduces the latest trends and advances in environmental bioremediation, and presents the state-of-the-art in biological and chemical wastewater treatment processes. As such, it will appeal to researchers and policy-makers, as well as undergraduate and graduate environmental sciences students.

Around the World, metal pollution is a major problem. Conventional practices of toxic metal removal can be ineffective and/or expensive, delaying and exacerbating the crisis. Those communities dealing with contamination must be aware of the fundamental advances of microbe-mediated metal removal practices because these methods can be easily used and require less remedial intervention. This book describes innovations and efficient applications for metal bioremediation for environments polluted by metal contaminants.

Biofilms represent the natural living style of microbial communities and play a pivotal role in biogeochemical cycles and natural attenuation. Biofilms can be engineered for biodegradation and biotransformation of organic and inorganic contaminants, for both in situ bioremediation and ex situ treatment in bioreactors. This book focuses on microbial biofilms

and their potential technological applications for sustainable development. It covers recent advances in biofilm technologies for contaminant remediation coupled to recovery of resources and serves as a complete reference on the science and technology behind biofilm mediated bioremediation and wastewater treatment.

The Handbook of Environment and Waste Management, Volume 1, Air and Water Pollution Control, is a comprehensive compilation of topics that are at the forefront of many technical advances and practices in air and water pollution control. These include air pollution control, water pollution control, water treatment, wastewater treatment, industrial waste treatment and small scale wastewater treatment. Internationally recognized authorities in the field of environment and waste management contribute chapters in their areas of expertise. This handbook is an essential source of reference for professionals and researchers in the areas of air, water, and waste management, and as a text for advanced undergraduate and graduate courses in these fields.

"Microbial Ecology of Activated Sludge, written for both microbiologists and engineers, critically reviews our current understanding of the microbiology of activated sludge, the most commonly used process for treating both domestic and industrial wastes. The contributors are all internationally recognized as leading research workers in activated sludge microbiology, and all have made valuable contributions to our present understanding of the process. The book pays particular attention to how the application of molecular methods has changed our perceptions of the identity of the filamentous bacteria causing the operational disorders of bulking and foaming, and the bacteria responsible for nitrification and denitrification and phosphorus accumulation in nutrient removal processes. Special attention is given to how it is now becoming possible to relate the composition of the community of microbes present in activated sludge, and the in situ function of individual populations there, and how such information might be used to manage and control these systems better. Detailed descriptions of some of these molecular methods are provided to allow newcomers to this field of study an opportunity to apply them in their research. Comprehensive descriptions of organisms of interest and importance are also given, together with high quality photos of activated sludge microbes."--Publisher's description.

The Handbook of Clean Energy Systems brings together an international team of experts to present a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems. Consolidating information which is currently scattered across a wide variety of literature sources, the handbook covers a broad range of topics in this interdisciplinary research field including both fossil and renewable energy systems. The development of intelligent energy systems for efficient energy processes and mitigation technologies for the reduction of environmental pollutants is explored in depth, and environmental, social and economic impacts are also addressed. Topics covered include: Volume 1 - Renewable Energy: Biomass resources and biofuel production; Bioenergy Utilization;

Solar Energy; Wind Energy; Geothermal Energy; Tidal Energy. Volume 2 - Clean Energy Conversion Technologies: Steam/Vapor Power Generation; Gas Turbines Power Generation; Reciprocating Engines; Fuel Cells; Cogeneration and Polygeneration. Volume 3 - Mitigation Technologies: Carbon Capture; Negative Emissions System; Carbon Transportation; Carbon Storage; Emission Mitigation Technologies; Efficiency Improvements and Waste Management; Waste to Energy. Volume 4 - Intelligent Energy Systems: Future Electricity Markets; Diagnostic and Control of Energy Systems; New Electric Transmission Systems; Smart Grid and Modern Electrical Systems; Energy Efficiency of Municipal Energy Systems; Energy Efficiency of Industrial Energy Systems; Consumer Behaviors; Load Control and Management; Electric Car and Hybrid Car; Energy Efficiency Improvement. Volume 5 - Energy Storage: Thermal Energy Storage; Chemical Storage; Mechanical Storage; Electrochemical Storage; Integrated Storage Systems. Volume 6 - Sustainability of Energy Systems: Sustainability Indicators, Evaluation Criteria, and Reporting; Regulation and Policy; Finance and Investment; Emission Trading; Modeling and Analysis of Energy Systems; Energy vs. Development; Low Carbon Economy; Energy Efficiencies and Emission Reduction. Key features: Comprising over 3,500 pages in 6 volumes, HCES presents a comprehensive overview of the latest research, developments and practical applications throughout all areas of clean energy systems, consolidating a wealth of information which is currently scattered across a wide variety of literature sources. In addition to renewable energy systems, HCES also covers processes for the efficient and clean conversion of traditional fuels such as coal, oil and gas, energy storage systems, mitigation technologies for the reduction of environmental pollutants, and the development of intelligent energy systems. Environmental, social and economic impacts of energy systems are also addressed in depth. Published in full colour throughout. Fully indexed with cross referencing within and between all six volumes. Edited by leading researchers from academia and industry who are internationally renowned and active in their respective fields. Published in print and online. The online version is a single publication (i.e. no updates), available for one-time purchase or through annual subscription.

The production of wastewater from various human and industrial activities has a harsh impact on the environment. Without adequate treatment, the disposal of this wastewater poses a threat to the quality of water globally. Technologies for the Treatment and Recovery of Nutrients from Industrial Wastewater investigates emergent research and best practices within the field of wastewater management. Highlighting novel technological tools in wastewater treatment, effective nutrient removal technologies, and innovative solutions to quality water preservation practices, this book is a critical reference source for professionals, scientists, academics, and students.

The book on “Forestry Technologies – A Complete Value Chain Approach” has been designed to cater to the needs of the stakeholders by judiciously incorporating the recent technologies and research outputs available in various sectors of

institutions. The book has four major themes viz., basic and strategic technology, production technology, processing and value addition technology and consumption technology. The basic and strategic technology incorporated seven chapters which include basic information and the recent scientific applications such as: nano technology and urban forestry technology. The production technology incorporated 16 chapters that includes all the recent developments such as: mini clonal technology, high yielding short rotation variety, land development and precision silvicultural technology, and multifunctional agroforestry. Processing and value addition technology incorporated 11 chapters and the consumption technology incorporated five chapters which include the recent developments in processing, value addition and the associated supply chain process. In a holistic perspective, the current book will serve as a readymade reference material to the practicing foresters, scientific professionals, wood based industries, policy makers, forestry students, financial and other academic and research institutions.

The book on Trends in Quorum Sensing and Quorum Quenching: New Perspectives and Applications focuses on the recent advances in the field of quorum sensing in bacteria and the novel strategies developed for quorum sensing inhibition. The topics covered are multidisciplinary and wide-ranging, and includes quorum sensing phenomenon in pathogenic bacteria, food spoilers, and agriculturally relevant bacteria. The applications of quorum sensing inhibitors such as small molecules, bioactives, natural compounds, and quorum quenching enzymes in controlling bacterial infections in clinical settings, agriculture and aquaculture are discussed. The potential use of quorum quenching enzymes for mitigating biofouling is also covered. Special focus is given to exploring quorum sensing inhibitors from microbes and flora inhabiting biodiversity rich regions including tropical rain forests and marine environments. Key features: Covers the fundamental aspects, the progress and challenges in the field of quorum sensing and quorum quenching Reviews quorum sensing in Gram-positive and Gram-negative bacteria of clinical, agricultural, and industrial relevance Discusses the application and future trends of quorum sensing inhibitors from lab to clinical and environmental settings Provides comprehensive coverage on molecular mechanisms in bacterial signaling

In recent years, biotechnology research and development (R&D) in China has been receiving increasing attention from the world. With the open-door policy of the Chinese government, many international publications (for academia) and large market potential (for industry) constitute the two big reasons for the above phenomenon. Biotechnology has become one of the priorities in Mainland China for solving many important problems, such as food supply, health care, environment protection, and even energy. The central government has been implementing a couple of programs which cover a wide spectrum in basic research, high-tech development and industrialization, such as Basic Research Program (973 Plan), Hi-Tech R&D Program (863 Plan), Key Science & Technology Problem Solving Program (Gong-guan Plan),

as well as the establishment of centers of excellence - Key Laboratories and Engineering Centers, etc. The funding from various local governments and industry for R&D has also been increasing continuously. Biotechnology centers in Shenzhen, Shanghai and Beijing have been established. There are more than 400 universities, research institutes and companies and a total of over 20,000 researchers involved in biotechnology in the Mainland. The number of research papers published internationally and patent applications is also increasing rapidly. In addition, the huge market potential with about 1.4 billion population, which is already open to the outside world, has provided numerous opportunities for international and domestic companies to invest in biotechnology, which pushes forward the biotechnology industrialization in China.

This book is a printed edition of the Special Issue "Biofilms: Extracellular Bastions of Bacteria" that was published in IJMS new sets of advanced standards for wastewater treatment --

Agriculture and industry are the two most important economic sectors for various countries around the globe, providing millions of jobs as well as being the main source of income for these countries. Nevertheless, with the increasing demand for agricultural and industrial produce, huge amounts of waste are also being produced. Without proper management, this waste (both liquid and solid) poses a serious threat to overall environmental quality, mainly due to its toxicity and slow degradation processes. Current approaches are effective but would normally require huge capital investments, are labour intensive and generate potential hazardous by-products. As such, there is a need for alternative approaches that are cheaper, easier-to-handle and have a minimum potential impact on environmental quality. This book presents up-to-date approaches using biological techniques to manage the abundance of waste generated from agricultural and industrial activities. It discusses techniques such as bioconversion, biodegradation, biotransformation, and biomonitoring as well as the utilization of these wastes. A number of chapters also include individual case studies to enhance readers' understanding of the topics. This comprehensive book is a useful resource for anyone involved in agricultural and industrial waste management, green chemistry or biotechnology. It is also recommended as a reference work for graduate students and all agriculture and biotechnology libraries.

Many industrial processes use water as a solvent and therefore produce wastewater containing chemicals from that process. The amounts of these chemicals and the types will vary hugely depending on the industry and the processes running and may include things that are hazardous to health or the environment. This makes the treatment of industrial wastewater both extremely important and highly complex. One route for industrial wastewater treatment is the use of bioreactors. Biological Treatment of Industrial Wastewater presents a comprehensive overview of the latest advances and trends in the use of bioreactors for treating industrial wastewater. Several different types of bioreactor and their

applications are discussed, alongside trends and considerations important in designing bioreactors. Bringing together a wealth of different approaches and voices this book will be a useful resource for anyone working in water treatment or looking at how industrial processes can be made more environmentally friendly.

In the book *Microbial Biofilms: Importance and applications*, eminent scientists provide an up-to-date review of the present and future trends on biofilm-related research. This book is divided with four subdivisions as biofilm fundamentals, applications, health aspects, and their control. Moreover, this book also provides a comprehensive account on microbial interactions in biofilms, pyocyanin, and extracellular DNA in facilitating *Pseudomonas aeruginosa* biofilm formation, atomic force microscopic studies of biofilms, and biofilms in beverage industry. The book comprises a total of 21 chapters from valued contributions from world leading experts in Australia, Bulgaria, Canada, China, Serbia, Germany, Italy, Japan, the United Kingdom, the Kingdom of Saudi Arabia, Republic of Korea, Mexico, Poland, Portugal, and Turkey. This book may be used as a text or reference 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 related areas. Scientists in academia, research laboratories, and industry will also find it of interest.

A considerable amount of research has emerged in recent years on the science, technology and health effects of oats but, until now, no book has gathered this work together. *Oats Nutrition and Technology* presents a comprehensive and integrated overview of the coordinated activities of nutritionists, plant scientists, food scientists, policy makers, and the private sector in developing oat products for optimal health. Readers will gain a good understanding of the value of best agricultural production and processing practices that are important in the oats food system. The book reviews agricultural practices for the production of oat products, the food science involved in the processing of oats, and the nutrition science aimed at understanding and advancing the health effects of oats and how they can affect nutrition policies. There are individual chapters that summarize oat breeding and processing, the many bioactive compounds that oats contain, and their health benefits. With respect to the latter, the health benefits of oats and oat constituents on chronic diseases, obesity, gut health, metabolic syndromes, and skin health are reviewed. The book concludes with a global summary of food labelling practices that are particularly relevant to oats. *Oats Nutrition and Technology* offers in-depth information about the life cycle of oats for nutrition, food and agricultural scientists and health practitioners interested in this field. It is intended to provoke thought and stimulate readers to address the many research challenges associated with the oat life cycle and food system.

Although green innovation and technology is not new, so far very limited information is available regarding the diversified approaches for green technologies and engineering. This book highlights the challenges and opportunities, offering a roadmap for using various approaches in the most cost effective way. The book discusses the interrelationship between a circular economy and green technologies. It presents the dimensions of green innovations and illustrates the challenges of industrialization,

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especially in terms of material synthesis and utilized processes. It covers the current environmental and health challenges of societies and describes the role of stakeholders in developing sustainable societies and industries. This book provides a line of approach to core and interdisciplinary students, academicians, research scientists, and various industry personnel to present their ideas of green innovations with a common vision of sustainable development of community and industries in mind. Features

- Discusses the interrelationship between a circular economy and green technologies
- Presents the dimensions of green innovations
- Illustrates the challenges of industrialization, especially in terms of material synthesis and utilized processes
- Covers the current environmental and health challenges of societies
- Offers the identification and role of stakeholders in the sustainable development of societies and industries

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.

Microbial Wastewater Treatment focuses on the exploitation of microorganisms as decontaminating tools to treat polluted wastewater, a worldwide concern. Microorganism-based processes are seen as promising technologies to treat the ever-increasing problem of polluted wastewater. The book covers recently developed process technologies to solve five major trends in the field of wastewater treatment, including nutrient removal and recovery, trace organic compounds, energy saving and production, sustainability and community involvement. Illustrates the importance of microorganisms in wastewater treatment Points out the reuse of the treated wastewater Highlights the recovery of resources from wastewater Pays attention to the occurrence of novel micro-pollutants Introduces new trends in wastewater technology

Aerobic granulation technology for wastewater treatment has been widely exploited in recent years. Currently, research on aerobic granulation is being intensively conducted in universities, institutes, private or public interest research organisations world-wide. This book provides the latest research outcomes on the fundamentals and applications of this technology for biological nutrient removal from wastewater. The book offers researchers and practitioners in wastewater treatment engineering up-to-date

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knowledge and understanding of this novel nutrient removal biotechnology.

Sound formulation is a vital aspect of microbial products used to protect plants from pests and diseases and to improve plant performance. Formulation of Microbial Biopesticides is an in-depth treatment of this vitally important subject. Written by experts and carefully edited, this important title brings together a huge wealth of information for the first time within the covers of one book. The book is broadly divided into five sections, covering principles of formulation, organisms with peroral and contact modes of action, organisms with the power of search, and future trends. Each section contains comprehensive chapters written by internationally acknowledged experts in the areas covered; the book also includes three very useful appendices, cataloguing formulation additives, spray application criteria and terminology. This outstanding book is a vitally important reference work for anyone involved in the formulation of microbial biopesticides and should find a place on the shelves of agriculture and plant scientists, microbiologists and entomologists working in academic and commercial agrochemical situations, and in the libraries of all research establishments and companies where this exciting subject is researched, studied or taught.

The second edition of Emerging Technologies in Food Processing presents essential, authoritative, and complete literature and research data from the past ten years. It is a complete resource offering the latest technological innovations in food processing today, and includes vital information in research and development for the food processing industry. It covers the latest advances in non-thermal processing including high pressure, pulsed electric fields, radiofrequency, high intensity pulsed light, ultrasound, irradiation, and addresses the newest hurdles in technology where extensive research has been carried out. Provides an extensive list of research sources to further research development Presents current and thorough research results and critical reviews Includes the most recent technologies used for shelf life extension, bioprocessing simulation and optimization

This book introduces the 3R concept applied to wastewater treatment and resource recovery under a double perspective. Firstly, it deals with innovative technologies leading to: Reducing energy requirements, space and impacts; Reusing water and sludge of sufficient quality; and Recovering resources such as energy, nutrients, metals and chemicals, including biopolymers. Besides targeting effective C,N&P removal, other issues such as organic micropollutants, gases and odours emissions are considered. Most of the technologies analysed have been tested at pilot- or at full-scale. Tools and methods for their Economic, Environmental, Legal and Social impact assessment are described. The 3R concept is also applied to Innovative Processes design, considering different levels of innovation: Retrofitting, where novel units are included in more conventional processes; Re-Thinking, which implies a substantial flowsheet modification; and Re-Imagining, with completely new conceptions. Tools are presented for Modelling, Optimising and Selecting the most suitable plant layout for each particular scenario from a holistic technical, economic and environmental point of view. Wastewater pollution is a major issue in the context of the future circular economy because all matter should be ultimately reused, calling for efficient depollution techniques. This book present timely reviews on the treatment of

wastewater contaminated by organic pollutants, with focus on aerobic granulation and degradation. Organic pollutants include microplastics, phthalates, humic acids, polycyclic aromatic hydrocarbons, pharmaceutical drugs and metabolites, plastics, oil spills, petroleum hydrocarbons, personal care products, tannery waste, dyes and pigments.

This book argues that the sustainable management of resources requires a systematic approach that primarily involves the integration of green innovative biotechnological strategies and eco-engineering. It discusses how microbial community intelligence can be used for waste management and bio-remediation and explains how biological processes can be optimized by integrating genomics tools to provide perspectives on sustainable development. The book describes the application of modern molecular techniques such as fluorescence in situ hybridization (FISH), highly sensitive catalyzed reporter deposition (CARD)-FISH, in situ DNA-hybridization chain reaction (HCR) and methods for detecting mRNA and/or functional genes to optimize bioprocesses. These techniques, supplemented with metagenomic analysis, reveal that a large proportion of micro-organisms still remain to be identified and also that they play a vital role in establishing bioprocesses.

Advances in Applied Microbiology, Volume 106, continues the comprehensive reach of this widely read and authoritative review source in microbiology. Users will find invaluable references and information on a variety of areas, with this updated volume including chapters covering The role and regulation of the stress activated sigma factor SigB in the saprophytic and host-associated life stages of the pathogen *Listeria monocytogenes*, Bacterial synthesis of Se nanoparticles, Siderophores in environmental research, Methods to reduce spoilage and microbial contamination of plant produce, Nitrogen cycling during wastewater treatment, Oxalic acid, a molecule at crossroads of bacterial-fungal interactions, and Bacterial spores, from ecology to biotechnology. Contains contributions from leading authorities in the field Informs and updates on all the latest developments in the field of microbiology Includes discussions on the role of specific molecules in pathogen life stages and interactions, and much more

This book is the result of the international symposium, "Establishment and Evaluation of Advanced Water Treatment Technology Systems Using Functions of Complex Microbial Community", organized in 2000 at the University of Tokyo. The volume presents the most recent progress in application of microbial community analysis, health-related microorganisms management, nutrient removal, waste sludge minimization and materials recovery, and water management in tropical countries. Included in this work are the following major topics in wastewater treatment: application of various innovative techniques of molecular biology such as FISH, DGGE to microbial community analysis of various types of wastewater treatment; microbial aspect of biological removal of nitrogen and phosphorus; emission of nitrous oxide during nitrogen transformation; reduction of sludge production in the wastewater treatment process using

membrane and material recovery of biopolymer and cell of photosynthetic bacteria. Health-related microbiology in water supply and water management using recent innovative molecular biological tools is presented and health risk management is discussed. The practical application of wastewater treatment in developing countries, especially tropical countries is also reviewed. Researchers in the field of environmental engineering and applied microbiology, and practical engineers who wish to learn the most recent progress in the microbiological aspect of water and wastewater management, will find this book a useful tool.

This book presents recent developments in advanced biological treatment technologies that are attracting increasing attention or that have a high potential for large-scale application in the near future. It also explores the fundamental principles as well as the applicability of the engineered bioreactors in detail. It describes two of the emerging technologies: membrane bioreactors (MBR) and moving bed biofilm reactors (MBBR), both of which are finding increasing application worldwide thanks to their compactness and high efficiency. It also includes a chapter dedicated to aerobic granular sludge (AGS) technology, and discusses the main features and applications of this promising process, which can simultaneously remove organic matter, nitrogen and phosphorus and is considered a breakthrough in biological wastewater treatment. Given the importance of removing nitrogen compounds from wastewater, the latest advances in this area, including new processes for nitrogen removal (e.g. Anammox), are also reviewed. Developments in molecular biology techniques over the last twenty years provide insights into the complex microbial diversity found in biological treatment systems. The final chapter discusses these techniques in detail and presents the state-of-the-art in this field and the opportunities these techniques offer to improve process performance.

A newcomer to the scene, aerobic granulation is on its way to becoming the hot new technology for high-efficiency wastewater treatment. Thus far, intensive research has been conducted with regard to the understanding of the mechanism of aerobic granulation in sequencing batch reactors (SBR) and its application in treating a wide variety of municipa

Environmental management deals with the use and conservation of natural resources, protection of habitats and control of hazards, and includes the field of applied ecology. this book presents the latest research from around the world in this field.

The first comprehensive monograph on periphyton, this book contains contributions by scientists from around the globe. Multi-disciplinary in nature, it covers both basic and applied aspects of periphyton, and is applicable worldwide in natural, extensive and intensive managed systems. Periphyton, as described in this book, refers to the entire complex of attached aquatic biota on submerged substrates, including associated non-attached organisms and detritus. Thus the periphyton

community comprises bacteria, fungi, protozoa, algae, zooplankton and other invertebrates. Periphyton is important for various reasons: as a major contributor to carbon fixation and nutrient cycling in aquatic ecosystems; as an important source of food in aquatic systems; as an indicator of environmental change. It can also be managed to improve water quality in lakes and reservoirs; it can greatly increase aquaculture production; it can be used in waste water treatment. The book provides an international review of periphyton ecology, exploitation and management. The ecology part focuses on periphyton structure and function in natural systems. The exploitation part covers its nutritive qualities and utilization by organisms, particularly in aquaculture. The final part considers the use of periphyton for increasing aquatic production and its effects on water quality and animal health in culture systems. This book will help scientists and entrepreneurs further understand the ecology and production of aquatic systems and venture into new and promising areas.

Removal of Toxic Pollutants through Microbiological and Tertiary Treatment: New Perspectives offers a current account of existing advanced oxidation strategies - including their limitations, challenges, and potential applications - in removing environmental pollutants through microbiological and tertiary treatment methods. The book introduces new trends and advances in environmental bioremediation technology, with thorough discussion of recent developments in the field. Updated information as well as future research directions in the field of bioremediation of industrial wastes is included. This book is an indispensable guide to students, researchers, scientists, and professionals working in fields such as microbiology, biotechnology, environmental sciences, eco-toxicology, and environmental remediation. The book also serves as a helpful guide for waste management professionals and those working on the biodegradation and bioremediation of industrial wastes and environmental pollutants for environmental sustainability. Introduces various treatment schemes, including microbiological and tertiary technologies for bioremediation of environmental pollutants and industrial wastes. Includes pharmaceutical wastewater, oil refinery wastewater, distillery wastewater, tannery wastewater, textile wastewater, mine tailing wastes, plastic wastes, and more. Describes the role of relatively new treatment technologies and their approaches in bioremediation, including molecular and protein engineering technologies, microbial enzymes, bio surfactants, plant-microbe interactions, and genetically engineered organisms. Provides many advanced technologies in the field of bioremediation and phytoremediation, including electro-bioremediation technology, microbial fuel cell technology, nano-bioremediation technology, and phytotechnologies.

As the world's population continues to grow and economic conditions continue to improve, more solid and liquid waste is being generated by society. Improper disposal methods can not only lead to harmful environmental impacts but can also negatively affect human health. To prevent further harm to the world's ecosystems, there is a dire need for sustainable waste management practices that will safeguard the environment for future generations. Waste Management: Concepts,

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Methodologies, Tools, and Applications is a vital reference source that examines the management of different types of wastes and provides relevant theoretical frameworks about new waste management technologies for the control of air, water, and soil pollution. Highlighting a range of topics such as contaminant removal, landfill treatment, and recycling, this multi-volume book is ideally designed for environmental engineers, waste authorities, solid waste management companies, landfill operators, legislators, environmentalists, policymakers, government officials, academicians, researchers, and students.

The utilisation of renewable energies is not at all new; in the history of mankind renewable energies have for a long time been the primary possibility of generating energy. This only changed with industrial revolution when lignite and hard coal became increasingly more important. Later on, also crude oil gained importance. Offering the advantages of easy transportation and processing also as a raw material, crude oil has become one of the prime energy carriers applied today. Moreover, natural gas used for space heating and power provision as well as a transportation fuel has become increasingly important, as it is abundantly available and only requires low investments in terms of energy conversion facilities. As fossil energy carriers were increasingly used for energy generation, at least by the industrialised countries, the application of renewable energies decreased in absolute and relative terms; besides a few exceptions, renewable energies are of secondary importance with regard to overall energy generation.

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