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Microbial Community Structure
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Wastewater Treatment Reactors
Edited by:
Maulin P. Shah and Susana Rodriguez-Couto
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Wastewater Treatment Reactors: Microbial Community Structure analyzes microbial community structure in relation to changes in physico-chemical parameters, the gene content (metagen ... read full description

About the book

Description

Wastewater Treatment Reactors: Microbial Community Structure analyzes microbial community structure in relation to changes in physico-chemical parameters, the gene content (metagenome) or gene expression (metatranscriptome) of microbial communities in relation to changes in physico-chemical parameters, physiological aspects of microbial communities, enrichment cultures or pure cultures of key species in relation to changes in physico-chemical parameters, and modeling of potential consequences of changes in microbial community structure or function for higher trophic levels in a given habitat.

As several studies have been carried out to understand bulking phenomena and the importance of environmental factors on sludge settling characteristics, which are thought to be strongly influenced by flocculation, sludge bulking, foaming and rising, this book is an ideal resource on the topics covered.

Key Features

- Presents the state-of-the-art techniques and applications of omics tools in wastewater treatment reactors (WWTRs)
- Describes both theoretical and practical knowledge surrounding the fundamental roles of microorganisms in WWTRs
- Points out the reuse of treated wastewater through emerging technologies
- Covers the economics of wastewater treatment and the development of suitable alternatives in terms of performance and cost effectiveness
- Discusses cutting-edge molecular biological tools
- Gives in-depth knowledge to study microbial community structure and function in wastewater treatment reactors

Details

ISBN

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English

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Editors

Maulin P. Shah

Environmental Microbiology Lab, Bharuch, India

Susana Rodriguez-Couto

Department of Separation Science, LUT School of Engineering Science, LUT University, Finland

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9 - Metagenomics: a powerful lens viewing the microbial world

Lakhan Kumar [1], Rohit Satyam [2], Navneeta Bharadvaja [1]

https://doi.org/10.1016/B978-0-12-823991-9.00007-1

Abstract

Metagenomics—as the name suggests—deals with the metadata of several genomes in order to provide quick and reliable information on the composition and distribution of an interacting microbial population in an ecosystem. Activities of microbial communities are an integral part of an ecosystem's functioning. They also influence the system's productivity and long-term sustainability. Despite several scientific and technological advancements in biology and the development of several bioinformatics tools and techniques, it is almost impossible to isolate and identify all microorganisms from any

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

Book • 2022

Edited by:
Maulin Shah, Susana Rodriguez-Couto and Jayanta Biswas

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Book description

Many physico-chemical and operational factors influence the performance, treatment costs and long-term stability of biofilters for the treatment of wastewater. An Innovative Role o ... read full description

Description

Many physico-chemical and operational factors influence the performance, treatment costs and long-term stability of biofilters for the treatment of wastewater. *An Innovative Role of Biofiltration in Wastewater Treatment Plants* focuses on identifying the factors that affect biofiltration, such as the hydraulic retention time of the biofiltration system, the type and characteristics of the filter and the attached biomass, explains their influence and provides guidelines on how to control these factors to optimize better operation with respect to pollutant control present in wastewater treatment plants (WWTPs). The fundamental basis of treatment in biofilters is the action of pollutant-degrading microorganisms and consequently the book also discusses in depth about the microbial ecology of biofiltration. In addition, it explores the applications of biofiltration including the removal of emerging pollutants.

Key Features

- Describes the microbial ecology of biofiltration
- Includes modeling of biofiltration
- Describes the designing of biofilters, start-up, and monitoring
- Discusses the mechanism of biofiltration
- Describes the controlling and operational factors of biofiltration

Details

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[b] Department of Biotechnology, Noida Institute of Engineering and Technology, Noida, India
[c] Department of Microbiology, Swami Shraddhanand College, University of Delhi, New Delhi, India
[d] University School of Environmental Management, Guru Gobind Singh Indraprastha University, New Delhi, India

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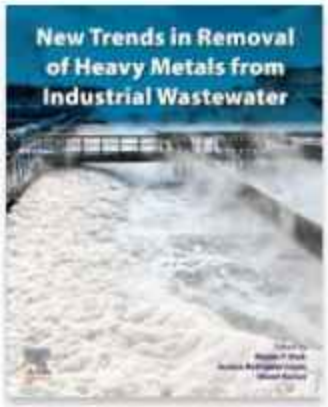

New Trends in Removal of Heavy Metals from Industrial Wastewater

1st Edition - April 23, 2021 • Imprint: Elsevier

Editors: Maulin P. Shah, Susana Rodriguez-Couto, Vineet Kumar • Language: English

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Description

New Trends in Removal of Heavy Metals from Industrial Wastewater covers the applicable technologies relating to the removal of heavy metals from wastewater and new and emerging trends in the field, both at the laboratory and industrial scale. Sections explore new environmentally friendly technologies, the principles of sustainable development, the main factors contributing to heavy metal removal from wastewater, methods and procedures, materials (especially low-cost materials originated from industrial and agricultural waste), management of wastewater containing heavy metals and wastewater valorization, recycling, environmental impact, and wastewater policies for post heavy metal removal.

This book is an advanced and updated vision of existing heavy metal removal technologies with their limitations and challenges and their potential application to remove heavy metals/environmental pollutants through advancements in bioremediation. Finally, sections also cover new trends and advances in environmental bioremediation with recent developments in this field by an application of chemical/biochemical and environmental biotechnology.

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Deepak Gola [1], Nitin Chauhan [2], Randhir K. Bharti [3], Priyadarshini Dey [4], Krishna Murthy TP [4], Medha Bajpai [1]

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Abstract

Increased industrial activities have contributed majorly toward the generation of

Chapter
Abstract

https://doi.org/10.1016/B978-0-12-822965-1.00013-1 ↗

Abstract

Increased industrial activities have contributed majorly toward the generation of wastewater comprising hazardous heavy metals. These are invariably released into the water bodies like rivers and streams. Microorganisms such as bacteria and algae play pivotal role in remediating these heavy metals through their inherent mechanisms of bioaccumulation and biosorption. Although laboratory studies have described the remediation of heavy metals via bacteria and algae in small setups. But remediation of heavy metals in actual wastewater is difficult because of its complex nature (multiple organic and inorganic contaminants are present simultaneously) and hence the heavy metal removal efficiency of bacteria and algae decreases drastically. This chapter mainly focused on the studies describing metal removal efficacies of bacteria and algae in synthetic and actual wastewaters. In addition to this, studies highlighting various bioreactor systems, their configuration, and their optimization for improved remediation have also been included. Moreover, it was also realized that further research is important to understand the insights of process mechanisms, selection of best microbial strains, and development of suitable bioreactors for efficient removal of heavy metals.

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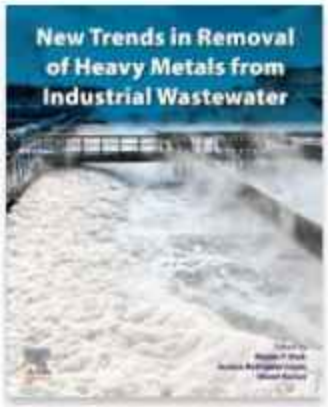

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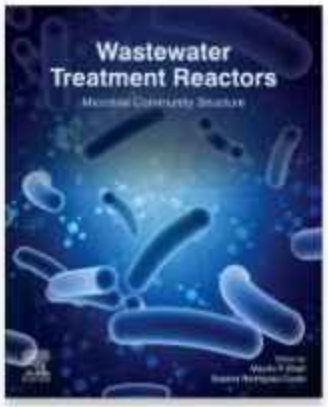

Wastewater Treatment Reactors

Microbial Community Structure

1st Edition - May 12, 2021 • Imprint: Elsevier

Editors: Maulin P. Shah, Susana Rodriguez-Couto • Language: English

Paperback ISBN: 9780128239919 • eBook ISBN: 9780128242445

Description

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Chapter
Abstract

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Effluents from different industries are rampantly being discharged into the natural water bodies. Thus it is pertinent to treat this wastewater pollution from different sources before discharging it to the environment. The most extensively used biological process for the treatment of wastewater plant is the activated sludge process. The activated sludge process has shown high nutrient removal, biomass retention capacities, and removal of toxins, due to which activated sludge processes are a lucrative option for treating the wastewater. The diverse microbial communities comprising bacteria, fungi, protozoa, viruses, algae, and metazoa account for 95% of the microbes and play a chief role in the wastewater treatment. Many high-throughput techniques, such as metagenomics, metatranscriptomics, and metaproteomics, are utilized to decipher the functional aspects of these microbial communities.

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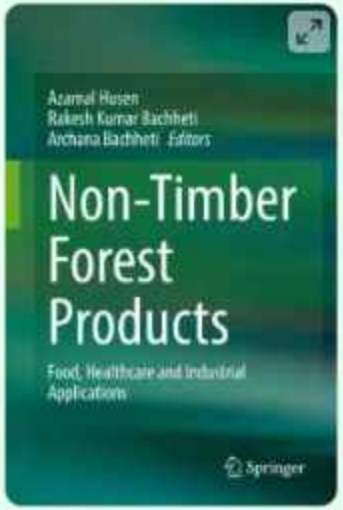

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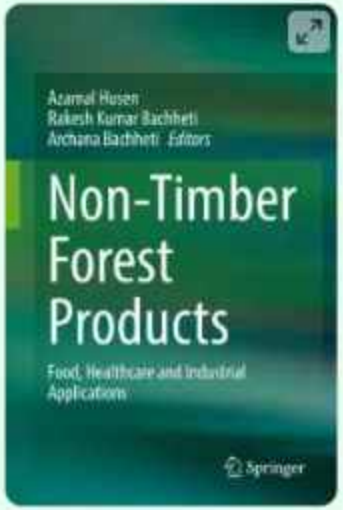

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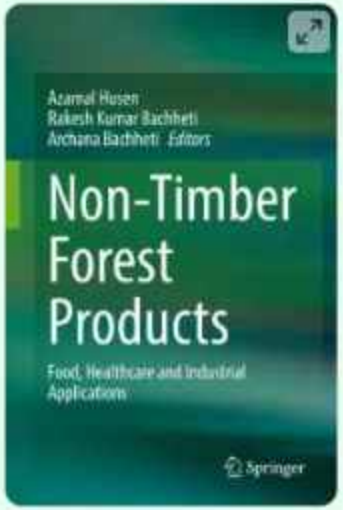

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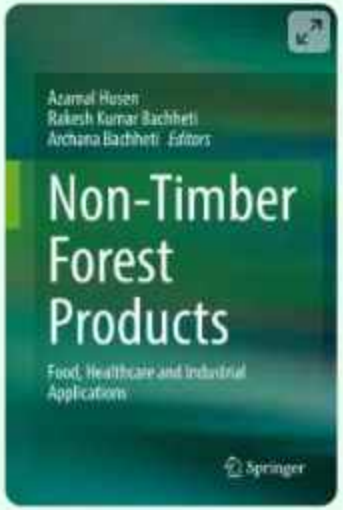

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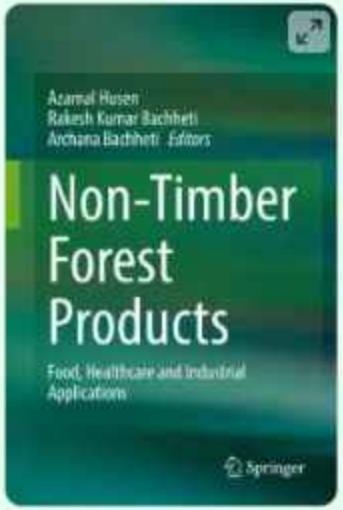

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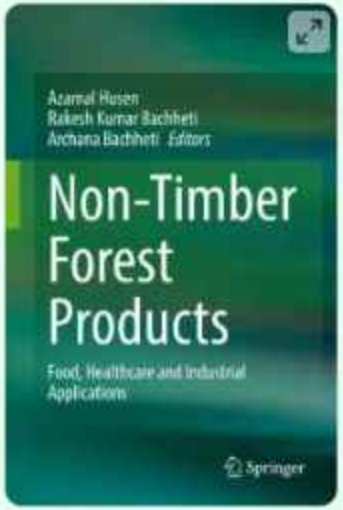

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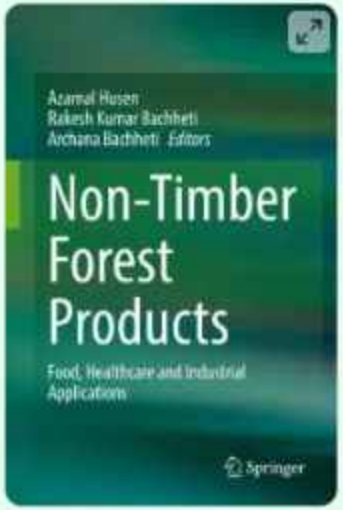

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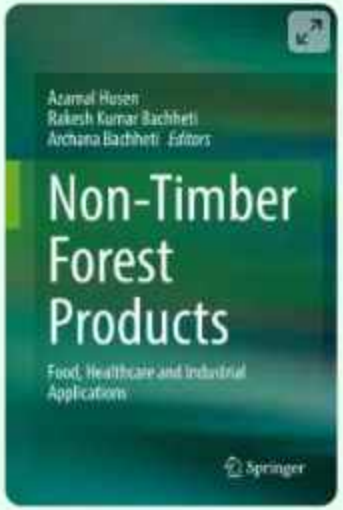

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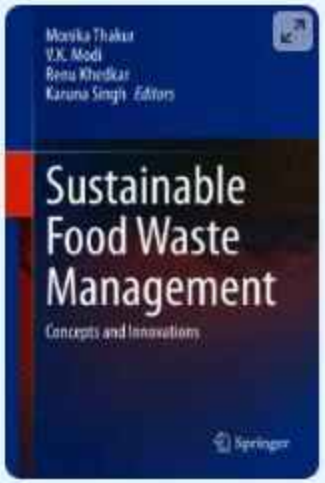
Abstract

Among all the basic flavors, sweet flavors are the most desired ones among human beings. The food industries are trying to lure their customers to have more products although it poses potential health hazards to many of their consumers. Obesity, metabolic disorder, and many other diseases increase due to overconsuming sweeteners. Despite all these problems, sugar consumption is constantly increasing. In the recent past, we have witnessed increased cases of diabetes, obesity, dental problems, and many others. The one reason for all these incidences is the overconsumption of sugar/sweeteners. Therefore, the demand for sugar substitutes and, moreover, natural sweeteners has arisen. Sugar is now an unavoidable food ingredient that the consumers are most concerned about. Therefore, they are looking for a more healthy and natural way to sweeten their tongue. This has led to the study of the best natural sweeteners. There are many plant-derived as well as artificial sweeteners available in the market. This chapter sought to enlist natural sweeteners of nutritive and non-nutritive types. A comparative is also shown for intense sweeteners. The traditional and modern-day sweeteners have some health-related issues, which have also been delivered here.

Book Detail



Sustainable Food Waste Management

Concepts and Innovations

Book | © 2020

Overview

Editors: Monika Thakur, V. K. Modi, Renu Khedkar, Karuna Singh

- Discusses important regulations and standards for waste management in food industry
- Provides the latest information about the various food industry by-products and their proper utilization for health and environment
- Describes important waste management approaches that help in recovery of important, bio-active molecules from food wastes

Table of contents (22 chapters)

Utilization of Waste from Food Processing Industries

Sustainable Food Waste Management Technologies

Chapter Detail

Characterization and Treatment of Waste from Food Processing Industries

Chapter | First Online: 05 January 2021

pp 41–58 | Cite this chapter

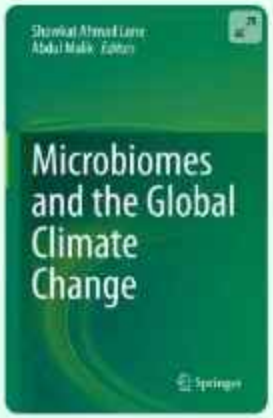
Sustainable Food Waste Management

Manish Kaushik & Dipti Sharma

Abstract

Food waste is complex which consists of both liquid and solid waste. Solid waste from food processing units includes both organic waste and packaging waste. The food processing sector includes milk and milk products, fruits, vegetables and juices, grain and flour processing, poultry and meat, alcoholic beverages, fisheries, and many consumer-predicated products like chocolates, coffee, tea, confectionaries, soya-based products, mineral water, soft-drink, etc. Food waste from each type of food industry has specific characteristic and hence need treatments, e.g., aerobic and anaerobic lagoons, vermicomposting accordingly. Along with this the use of food waste could significantly reduce food waste levels and create new opportunities and benefits for all those involved in the food production system. Reducing food waste through the recovery of its valuable components is therefore an important way to increase sustainability. The need for a sustainable approach can no longer be overlooked by food production companies and other stackholders of food production system. Sustainable food waste management system is the only way to reduce the developed waste.

Book
Detail



Microbiomes and the Global Climate Change

Book | © 2021

Overview

Editors: Showkat Ahmad Lone, Abdul Malik

- Provides unique perspectives on the role of planetary microbiomes in climate change and the impact of climate change on microorganisms including pathogens
- Describes approaches of utilizing microbiota in bio-remediation and sustainable environment
- Discusses the importance of methanotrophs and methanogens in sustainable agriculture

Book
Detail

Bibliographic Information

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Microbiomes and the Global Climate Change

Editors
Showkat Ahmad Lone, Abdul Malik

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XIII, 374

Number of Illustrations
8 b/w illustrations, 33 illustrations in colour

Table of contents (19 chapters)

Climate Change and Pathogens

Climate Change and Agriculture

Climate Change and the Environmental Microbiology

Front Matter

Chapter
Detail

Microbes and Climate: A Tangled Relation

Chapter | First Online: 03 July 2021

pp 3–15 | Cite this chapter

Irfan Khan, Fahad Khan, Saghir Ahmad, Pratibha Pandey & Mohammad Mustufa Khan

Chapter Detail

About this chapter

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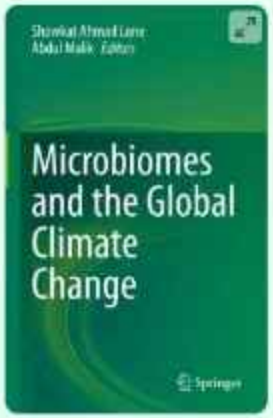
Abstract

In the present scenario, the undesirable changes in the climatic conditions impact different components of ecosystem such as microbes, plants, animals, soil, etc. In this chapter, an effort has been made to summarize the relation between microbes and climate and their impact on each other. There are very few relationships that could be as complex as that of microorganisms and climate. More recent evidence has attempted to explain the role of microorganisms in regulating the fluxes of greenhouse gases such as carbon dioxide, methane, and nitrous oxide. Microbes play an integral role in modulating the cycles of various elements such as carbon, nitrogen, and oxygen. They directly as well as indirectly influence the release of greenhouse gases into the environment as well as the consumption of these gases from the atmosphere. As such, the application of utilizing these microbes for mitigating climate change has started receiving greater attention. This chapter enumerates the various beneficial microbes and their individual role in amelioration of the damage to the climate, laying emphasis on the potential to exploit these microbes as a technique for remedying the adverse climatic conditions.

Book
Detail



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Book | © 2021

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Microbiomes and the Global Climate Change

Editors
Showkat Ahmad Lone, Abdul Malik

DOI
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Chapter
Detail

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Chapter | First Online: 03 July 2021

pp 3–15 | Cite this chapter

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Chapter Detail

About this chapter

Cite this chapter

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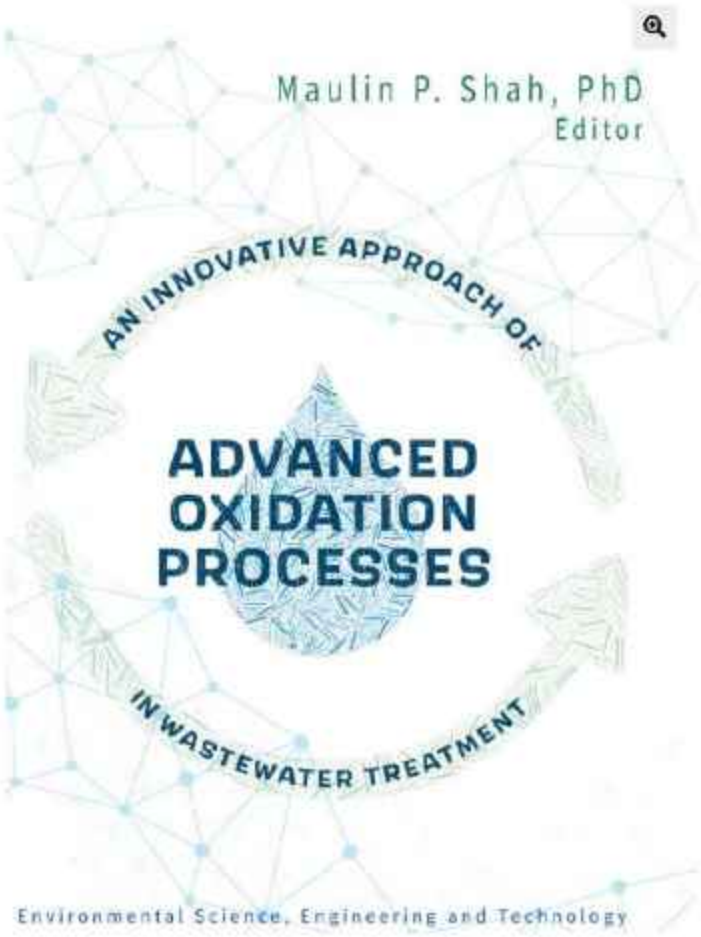

An Innovative Approach of Advanced Oxidation Processes in Wastewater Treatment

$230.00

Maulin P. Shah, PhD

Series: Environmental Science, Engineering and Technology
BISAC: SCI026000
DOI: https://doi.org/10.52305/DBMP3480

In recent decades, scientific insight into the chemistry of water has increased enormously, leading to the development of advanced wastewater and water purification technologies. However, the quality of freshwater resources has continually deteriorated worldwide, both in industrialized countries and in developing countries. Although traditional wastewater technologies are focused on the removal of suspended solids, nutrients and bacteria, hundreds of organic pollutants occur in wastewater and affected urban surface waters. These new pollutants are synthetic or naturally occurring chemicals that are not often monitored in the environment but have the potential to penetrate the environment and cause known or suspected adverse ecological and/or human health effects. These contaminants are collectively referred to as the "Emerging Contaminants" and are mostly derived from domestic use and occur in trace concentrations ranging from pico to micrograms per litre. Environmental contaminants are recalcitrant for conventional wastewater treatment processes and most of them remain unaffected, leading to the contamination of receiving water. This scenario leads to the need for an advanced wastewater treatment process that can remove environmental contaminants to safely monitor fresh water sources.

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Binding

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Pages: 319

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Categories: **2021, Books, Environmental Science, Engineering and Technology, Environmental Sciences, Nova, Science and Technology, Waste and Waste Management**

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Chapter 9. Role of Fungal and Plant Systems in Wastewater Treatment: Mechanisms and Applications

(Nitin Chauhan, Arvind Arya, Sukirti Khantwal, Surabhi, Shivangi Sharma, Randhir Kumar Bharti, Priyadarshini Dey, Sunil Gola, Pankaj Kumar Tyagi, Deepak Gola - Department of Microbiology, Swami Shraddhanand College, University of Delhi, Delhi, India, et al.)

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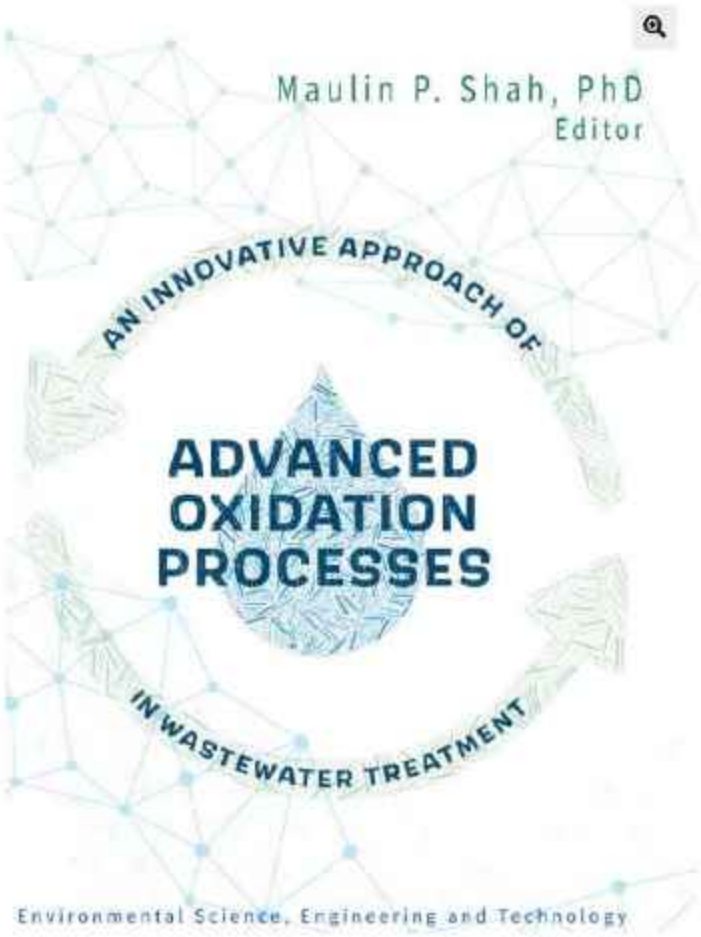

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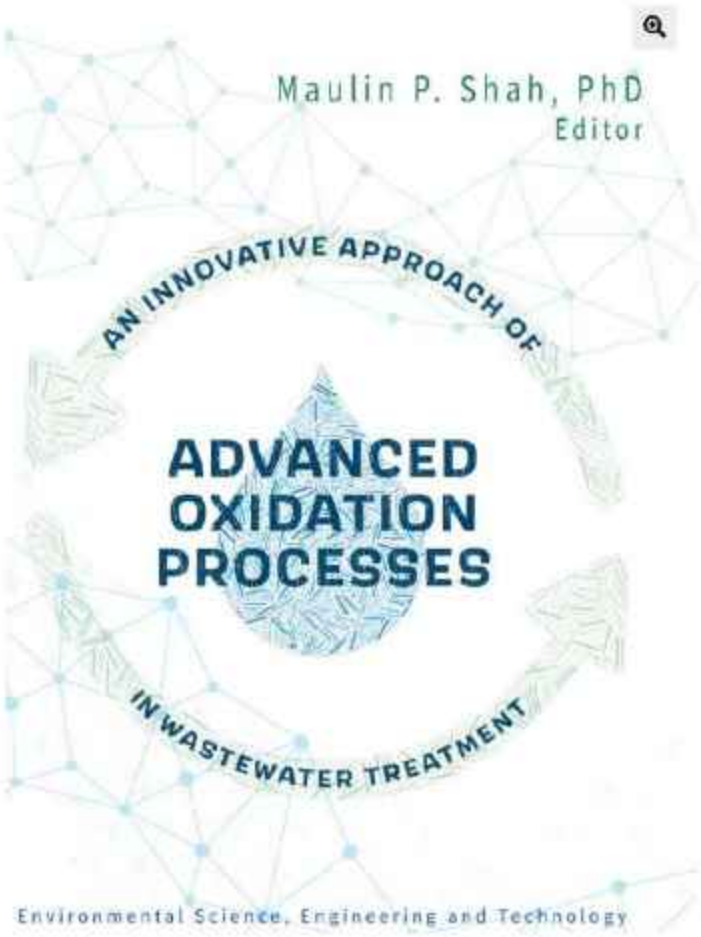

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Book Detail

Development in Wastewater Treatment Research and Processes

Removal of Emerging Contaminants from Wastewater through Bio-nanotechnology

1st Edition - September 11, 2021 • Imprint: Elsevier

Editors: Susana Rodriguez-Couto, Maulin P. Shah, Jayanta Kumar Biswas

Language: English • Paperback ISBN: 9780323855839 • eBook ISBN: 9780323900119

Description

Removal of Emerging Contaminants from Wastewater through Bio-nanotechnology showcases profiles of the nonregulated contaminants termed as "emerging contaminants," which comprise industrial and household persistent toxic chemicals, pharmaceuticals and personal care products (PPCPs), pesticides, surfactants and surfactant residues, plasticizers and industrial additives, manufactured nanomaterials and nanoparticles, microplastics, etc. that are used extensively in everyday life. The occurrence of "emerging contaminants" in wastewater, and their behavior during wastewater treatment and production of drinking water are key issues in the reuse and recycling of water resources.

This book focuses on the exploitation of Nano-biotechnology inclusive of the state-of-the-art remediate strategies to degrade/detoxify/stabilize toxic and hazardous contaminants and restore contaminated sites, which is not as comprehensively discussed in the existing titles on similar topics available in the global market. In addition, it discusses the potential environmental and health hazards and ecotoxicity associated with the widespread distribution of emerging contaminants in the water bodies. It also considers the life cycle assessment (LCA) of emerging (micro)-pollutants with suitable case studies from various industrial sources.

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16. An application of bionanotechnology in removal of emerging contaminants from pharmaceutical waste

17. Removal of emerging contaminants in water Treatment by an application of nanofiltration and reverse psmosis

18. Membrane bioreactor (MBR) as an advanced wastewater treatment technology

19. Removal of pesticides from water and wastewater by solar-driven photocatalysis

20. Recent applications, reaction mechanism, and future perspective of hybrid ozonation process for water and wastewater treatment

21. Removal of emerging contaminants from pharmaceutical waste through application of bio nanotechnology

22. Antimicrobial activities of different nanoparticles concerning to wastewater treatment

23. Application of nanomaterial in wastewater treatment: recent advances and future perspective

24. Photocatalytic removal of emerging contaminants in water and wastewater treatments: a review

25. Biologically synthesized nanoparticles for dye removal

26. Removal of emerging contaminants in water treatment by nanofiltration and reserve osmosis

27. Hybrid bioreactor in combination with ozone-based technologies for industrial wastewater treatment

28. Metal organic frameworks (MOFs) in aiding water purification from emerging and ionic contaminants

29. Removal of emerging contaminants from wastewater through bionanotechnology

Chapter Details

Development in Wastewater Treatment Research and Processes

Removal of Emerging Contaminants from Wastewater Through Bio-nanotechnology

2022, Pages 123-138

Chapter 6 - Advances in nanotechnologies of waste water treatment: strategies and emerging opportunities

Deepak Gola [a], Anirban Adhikary [b], Randhir Kumar Bharti [c], Priyadarshini Dey [d], Sunil Gola [e], Nitin Chauhan [f g], Sunil Kumar Srivastava [g], Rekha Mehrotra [f]

https://doi.org/10.1016/B978-0-323-85583-9.00018-1

Chapter
Details

Abstract

Nanotechnology is a science of innovating and developing molecules of nanoscale range (1- 100 nm). Recent research has revealed the great potential hiding inside nanoparticles of variable shapes and sizes. As per reports, nanotechnologies has been successfully applied in sectors i.e., energy, healthcare, electronics, optics, food, textiles, and agriculture. However, from last few years, efforts have been made to develop clean technologies for remediation of waste water contaminated with carcinogenic dyes, heavy metals, pesticides, antibiotics and pathogenic microbes. Being smaller in size, various different nanoparticles offers large surface area useful for absorption and high degree interactions with contaminants present in waste waters. Recent advances in nanoremediation have indicated the development of efficient ways in treating waste waters precisely upto various depths of small and large scale setups. Materials such as nanosorbents (NS), metallic nanoparticles (MtNPs), nanocatalysts (NC), nanopolymers (NP) and other such materials have been designed and developed to treat different grades, strengths and volumes of waste waters. The present chapter summarizes various nanotechnologies currently being used for waste water treatment with emphasis on developing smart nanotechnologies which can effectively remove multiple different contaminants of waste waters.

Book Detail

PREVIEW BOOK

Table of Contents | Book Description

1st Edition

Big Data Analysis for Green Computing

Concepts and Applications

Edited By Rohit Sharma, Dilip Kumar Sharma, Dhowmya Bhatt, Binh Thai Pham

Paperback	eBook
₹1495	£44.09

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Chapter Details

Chapter 9 Mental Disorder Detection Using Machine Learning

Chapter

Mental Disorder Detection Using Machine Learning

By Charu Chhabra, Sneha Chaudhary, Ayasha Malik, Bharat Bhushan

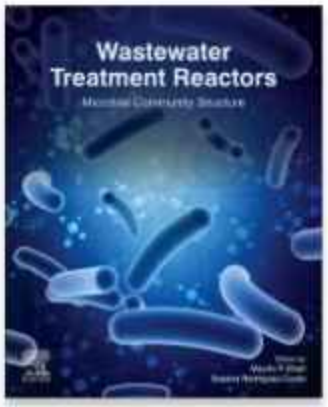
Book Big Data Analysis for Green Computing

Edition	1st Edition
First Published	2021
Imprint	CRC Press
Pages	15
eBook ISBN	9781003032328

ABSTRACT

Mental health depicts the status and condition of the welfare of the society. It indicates the ability of an individual to handle stress, decision-making and handling situations in daily life dealings. By the virtue of an increase in the number of cases of mental disorders arises a need of emphasizing on possibly causes of the disorder and remedies to cure. In recent years, there has been a tremendous increase in the statistics of the occurrence of mental illness and instability. Although the rate of diagnosis of mental illness has been improved over the time but to the major extent, the issues remain undetected. In the recent 5 years, machine learning has been widely used in the areas of neurological disorders, radiology, medical imagine for diagnosis along with prognosis in disease pattern matching, Alzheimer's Disease/Mild Cognitive Impairment, brain tumor, schizophrenia, Parkinson's Disease, stroke and traumatic brain injuries, post-partum depression, epilepsy, autism disease. There has been a significant increase in usage of machine learning techniques in keeping the track of brain disorders in neuroimaging data. The paper will contribute to various factors responsible for mental health problems thereby leading to mental illness. These factors include stress, anxiety, depression, obsession and obsessive disorder. Also, the paper will focus on the working on the need for more effective mental healthcare systems combined the need of digital technology for pattern matching for recognition followed by prediction and finally analysis would play a vital role. The paper emphasizes on how machine learning has contributed so far in the disorder detection and also the vitality on how it plays an indispensable role concerning Electronic Health Records (EHR) management as statistics states that mental health captures the humongous of the data when comparing to all the medical specialty.

Book Detail



Wastewater Treatment Reactors

Microbial Community Structure

1st Edition - May 12, 2021 • Imprint: Elsevier

Editors: Maulin P. Shah, Susana Rodriguez-Couto • Language: English

Paperback ISBN: 9780128239919 • eBook ISBN: 9780128242445

Description

Wastewater Treatment Reactors: Microbial Community Structure analyzes microbial community structure in relation to changes in physico-chemical parameters, the gene content (metagenome) or gene expression (metatranscriptome) of microbial communities in relation to changes in physico-chemical parameters, physiological aspects of microbial communities, enrichment cultures or pure cultures of key species in relation to changes in physico-chemical parameters, and modeling of potential consequences of changes in microbial community structure or function for higher trophic levels in a given habitat.

As several studies have been carried out to understand bulking phenomena and the importance of environmental factors on sludge settling characteristics, which are thought to be strongly influenced by flocculation, sludge bulking, foaming and rising, this book is an ideal resource on the topics covered.

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16. Microbial community diversity in a waste water treatment plant

17. Molecular Biology Techniques for the Identification of Microbial Community in Waste- Water Treatment Reactors

18. Aerobic sludge granulation and enhanced dicamba removal efficiency in the presence of AQS redox mediator in a lab scale anaerobic-aerobic treatment method

19. Unraveling microbial complexities via metagenomic approach: Expanding cross-talk for environment management & Prospecting

20. Metagenomics: A computational approach in emergence of novel applications

21. Microbial Community Analysis of Domestic Wastewater during Blackwater Treatment

22. Molecular Biological Techniques used in Environmental Engineering: Current prospects and challenges

23. Removal of Heavy Metals by Microbial Communities

24. A comprehensive insight into tetracycline resistant bacteria and antibiotic resistance genes in activated sludge using next-generation sequencing

25. Bacterial Community Structure, Composition and Their Role in Biological Wastewater Treatment Reactors Plants

Chapter Detail

Wastewater Treatment Reactors
Microbial Community Structure
2021, Pages 19-38

2 - Removal of pollutants from wastewater via biological methods and shifts in microbial community profile during treatment process

Vivek Dalvi [1], Farah Naaz [1], Harshita Nigam [1], Rahul Jain [1], Saurabh Samuchiwal [1], Shweta Kalia [1], Rahul Kumar [1], Megha Mathur [1], Farhat Bano [1], Anushree Malik [1], Astha Singh [2], Anu Kriti [2], Nitin Chauhan [3], Tanu Bansal [4], Deepak Gola [1 2]

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Abstract

Abstract

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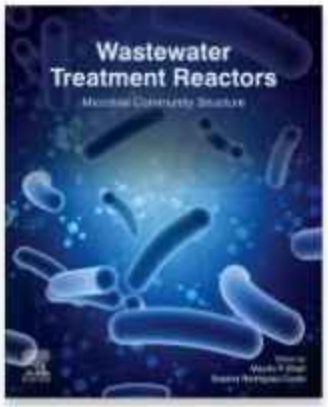

Wastewater Treatment Reactors

Microbial Community Structure

1st Edition - May 12, 2021 • Imprint: Elsevier

Editors: Maulin P. Shah, Susana Rodriguez-Couto • Language: English

Paperback ISBN: 9780128239919 • eBook ISBN: 9780128242445

Description

Wastewater Treatment Reactors: Microbial Community Structure analyzes microbial community structure in relation to changes in physico-chemical parameters, the gene content (metagenome) or gene expression (metatranscriptome) of microbial communities in relation to changes in physico-chemical parameters, physiological aspects of microbial communities, enrichment cultures or pure cultures of key species in relation to changes in physico-chemical parameters, and modeling of potential consequences of changes in microbial community structure or function for higher trophic levels in a given habitat.

As several studies have been carried out to understand bulking phenomena and the importance of environmental factors on sludge settling characteristics, which are thought to be strongly influenced by flocculation, sludge bulking, foaming and rising, this book is an ideal resource on the topics covered.

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21. Microbial Community Analysis of Domestic Wastewater during Blackwater Treatment

22. Molecular Biological Techniques used in Environmental Engineering: Current prospects and challenges

23. Removal of Heavy Metals by Microbial Communities

24. A comprehensive insight into tetracycline resistant bacteria and antibiotic resistance genes in activated sludge using next-generation sequencing

25. Bacterial Community Structure, Composition and Their Role in Biological Wastewater Treatment Reactors Plants

Chapter Detail

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Microbial Community Structure
2021, Pages 19-38

2 - Removal of pollutants from wastewater via biological methods and shifts in microbial community profile during treatment process

Vivek Dalvi [1], Farah Naaz [1], Harshita Nigam [1], Rahul Jain [1], Saurabh Samuchiwal [1], Shweta Kalia [1], Rahul Kumar [1], Megha Mathur [1], Farhat Bano [1], Anushree Malik [1], Astha Singh [2], Anu Kriti [2], Nitin Chauhan [3], Tanu Bansal [4], Deepak Gola [1 2]

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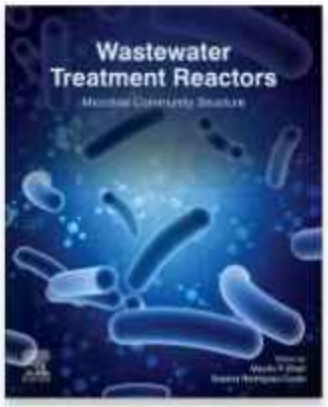

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Handbook of Nanomaterials for Sensing Applications

A volume in Micro and Nano Technologies

Book • 2021

Edited by:
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Editors

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Handbook of Nanomaterials for Sensing Applications

Micro and Nano Technologies

2021, Pages 119-137

Chapter 7 - Nanofabrication techniques for semiconductor chemical sensors

Mona Mittal [a], Soumen Sardar [b], Atanu Jana [c]

[a] Department of Chemistry, Noida Institute of Engineering and Technology, Greater Noida, Uttar Pradesh, India

[b] Department of Polymer Science and Technology, University of Calcutta, Calcutta, India

[c] Division of Physics and Semiconductor Science, Dongguk University, Seoul, South Korea

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Chapter
Abstract

Abstract

Chemical sensors are defined as devices or instruments that transduce different types of chemical information such as concentration, chemical activity, and presence of metal ions or gases into a measurable and distinguishable signal. Semiconductor nanomaterials, especially one-dimensional (1D) nanomaterials like nanorods, nanoneedles, nanobelts, and nanowires, have gained tremendous attention in chemical sensing devices owing to their large surface-to-volume ratio compared with their thin film and bulk counterparts. Therefore, several 1D nanomaterials have been designed for chemical sensors for detection of O_2 and H_2 gases as well as various toxic and flammable materials such as NO_2, CO, NH_3, ethanol, etc. However, two-dimensional (2D) nanomaterials such as MX_2 (M=W, Mo, and X=S, Se), graphene oxide, semiconductor metal oxides (SMO), etc. have also attracted significant attention because of their high surface-to-volume ratios, ultrahigh surface sensitivity to the environment, superior electrical/optical properties, robustness, and flexibility. These nanomaterials have been synthesized by various nanofabrication techniques such as lithography, electroplating, surface treatment by plasma, chemical vapor deposition (CVD), doping of silicon, micro-electro-mechanical systems (MEMS), and cracking. In this chapter, we discuss various fabrication techniques for different types of chemical sensors and opportunities and challenges toward practical applications of these novel materials and sensing devices.

Book Detail

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Editors

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Nano and biotechnology are two of the 21st century's most promising technologies. Nanotechnology is demarcated as the design, development, and application of materials and devices whose least functional make up is on a nanometer scale (1 to 100 nm). Meanwhile, biotechnology deals with metabolic and other physiological developments of biological subjects including microorganisms. These microbial processes have opened up new opportunities to explore novel applications, for example, the biosynthesis of metal nanomaterials, with the implication that these two technologies (i.e., thus nanobiotechnology) can play a vital role in developing and executing many valuable tools in the study of life. Nanotechnology is very diverse, ranging from extensions of conventional device physics to completely new approaches based upon molecular self-assembly, from developing new materials with dimensions on the nanoscale, to investigating whether we can directly control matters on/in the atomic scale level. This idea entails its application to diverse fields of science such as plant biology, organic chemistry, agriculture, the food industry, and more. — show all

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The Role of Zinc Oxide Nanoparticles in Plants: A Critical Appraisal

Chapter | First Online: 27 March 2021

pp 249–267 | Cite this chapter

Amit Kumar, Indrakant K. Singh ✉, Rashmi Mishra, Akanksha Singh, Naleeni Ramawat & Archana Singh ✉

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Abstract

The role of zinc oxide nanoparticles (ZnO NPs) in plants and agriculture attracted huge interests during the last few years. A whole range of positive of NPs has been demonstrated and these exquisite material can be serve as alternatives to many fertilizers, micronutrients, fungicides or antimicrobial chemicals. The ameliorative roles against abiotic stress (drought, salinity and high temperature) in various crops are particularly significant. However, high concentrations of ZnO NPs have been observed to produce a range of toxicity including growth/yield inhibition, physiological aberrations, cytotoxicity, genotoxicity and oxidative stress. The positive or negative effects depend on the type, dose of nanomaterials, methods of treatments, developmental stage, and genotype of the species or environmental conditions. Until a fuller understating of various modes of interactions between ZnO NPs and plant genome or epigenome develops, it is difficult to use these new resources for the optimal benefit, substituting conventional agents of growth promotion or protection. This requires development of appropriate methods to identify plant conditions and optimize the nanomaterial treatment.

Book Detail

Security and Privacy Issues in IoT Devices and Sensor Networks

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Description

Security and Privacy Issues in IoT Devices and Sensor Networks investigates security breach issues in IoT and sensor networks, exploring various solutions. The book follows a two-fold approach, first focusing on the fundamentals and theory surrounding sensor networks and IoT security. It then explores practical solutions that can be implemented to develop security for these elements, providing case studies to enhance understanding. Machine learning techniques are covered, as well as other security paradigms, such as cloud security and cryptocurrency technologies. The book highlights how these techniques can be applied to identify attacks and vulnerabilities, preserve privacy, and enhance data security.

This in-depth reference is ideal for industry professionals dealing with WSN and IoT systems who want to enhance the security of these systems. Additionally, researchers, material developers and technology specialists dealing with the multifarious aspects of data privacy and security enhancement will benefit from the book's comprehensive information.

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Hitesh Singh [a], Vivek Kumar [a], Kumud Saxena [a], Boncho Bonev [b]

[a] Noida Institute of Engineering and Technology, Greater Noida, India

[b] Technical University of Sofia, Sofia, Bulgaria

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Book Detail

Fungi Bio-prospects in Sustainable Agriculture, Environment and Nano-technology

Volume 1: Fungal Diversity of Sustainable Agriculture

Fungi bio-prospects in sustainable agriculture, environment and nanotechnology is a three-volume series that has been designed to explore the huge potential of the many diverse applications of fungi to human life. The series unveils the latest developments and scientific advances in the study of the

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Author(s): Sharma, Vijay Kumar • Shah Phd, Maulin P. • Parmar, Shahbika

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Fungi Bio-Prospects in Sustainable Agriculture, Environment and Nano-Technology

Volume 1: Fungal Diversity of Sustainable Agriculture

2021, Pages 285-313

Chapter 11 - Prospect of biofuel production by fungus

Arpitha Ramachandraiah [1 a], Juhi Kaushik [1 a], Lavanya Gowda [1 a], Premchand Subhash Chigadannavar [1 a], Ramya Krishnappa [1 a], Sandeep Venkatesh [1 a], Sheersha Sivadas [1 a], Sneha Judith [1 a], Unni Maya Ramesh [1 a], Zeba Quadri [1 a], Priyadarshini Dey [1 a], Mahendra Chinthala [2 a], Deepak Gola [3 a], Nitin Chauhan [4 a], Randhir Kumar Bharti [5 a]

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Chapter Detail:

Abstract

Fungus is a lucrative option and has received much attention in biofuel production of bioethanol, biodiesel and biogas. Bioethanol is obtained when lignocellulosic biomass (agriculture waste) is saccharified into a mixture of sugars by fungal assisted enzymatic pretreatment. Further, several oleaginous fungi such as Zygomycetes species are valuable feedstock for biodiesel production, as they are rich in oleic and palmitic acid. Apart from this, anaerobic fungus possesses an arsenal of extracellular multienzyme complexes that improve the digestion of various biomass for biogas production. One of the latest developments in the biofuel sector has been the fungal based microbial fuel cell technology that has the combined advantage of wastewater treatment and electricity generation. Thus, this review is a compilation of all the biofuels that can be obtained from fungus from waste materials and wastewater.

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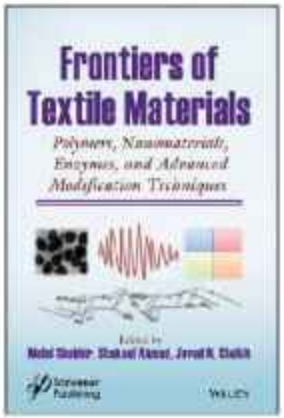

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Mohd Shabbir (Editor), Shakeel Ahmed (Editor), Javed N. Sheikh (Editor)

ISBN: 978-1-119-62037-2 | May 2020 | 384 pages

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The book "Frontiers and Textile Materials will deal with the important materials that can be utilized for value-addition and functionalization of textile materials. The topics covered in this

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Chapter Detail:

Chapter 1

Introduction to Textiles and Finishing Materials

Mohd Shabbir, Javed N. Sheikh

Book Editor(s):Mohd Shabbir, Shakeel Ahmed, Javed N. Sheikh

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Frontiers of Textile Materials: Polymers, Nanomaterials, Enzymes, and Advanced Modification Techniques

Summary

Textile is one of the basic needs of the human being, and the modern human being has a lot of choices for their clothing. Textiles have various characteristics depending on the fibers they are made from, such as wool, silk, cotton, viscose, nylon, polyester, etc. and the finishing applied on them via materials such as finishing chemicals, nanoparticles, polymers, enzymes, etc. Thus, so many materials are available which can be utilized in the development of functional and smart textiles. In the era of technology (miniaturization of this world), flexible electronics based on textiles are gaining momentum. The chapter presents the emerging materials in the field of textiles with a major focus on the functionalization of textiles. In the next chapters of this book, all these are reviewed in great detail.

Book
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Removal of Emerging Contaminants Through Microbial Processes

Book | © 2021

Overview

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Book Detail

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Table of contents (26 chapters)

Chapter Detail:

Mechanistic Insight to Bioremediation of Hazardous Metals and Pesticides from Water Bodies by Microbes

Chapter | First Online: 15 October 2020

pp 467–487 | Cite this chapter

Removal of Emerging Contaminants Through Microbial Processes

Priyadarshini Dey, Deepak Gola, Nitin Chauhan, Randhir Kumar Bharti & Anushree Malik

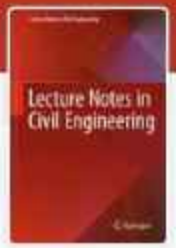
Chapter Detail:

Abstract

In the last few decades, there has been a surge in the hazardous chemicals contamination in the water bodies in various parts of India. Consequently, bioremediation of these hazardous chemicals by microorganisms has emerged as a lucrative option. Furthermore, advancement in the various physicochemical and robust molecular techniques such as 1D-SDS-PAGE followed by LC-MS/MS analysis as well as metabolite identification by ^{1}H-NMR has shed light on the various cellular strategies adopted by a microorganism for remediation of a cocktail of metals and pesticide that were either poorly highlighted or unexplained.

With this background the present chapter aims to understand the complete process of a metal or cocktail of multimetal and pesticide mixture remediation by microorganisms such as bacteria, fungus or algae at molecular level by proteomic and metabolomic techniques. Further the scale up of this bioremediation process by bioreactors would be detailed.

Book Detail



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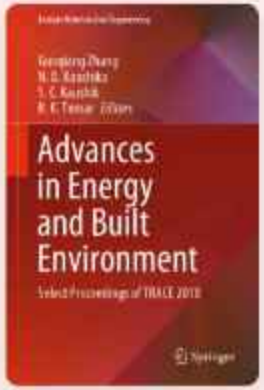
Analysis, Design, and Comparison of Different Building-Integrated Photovoltaic Thermal (BIPVT) System for Indian Meteorological Condition

Conference paper | First Online: 30 June 2019

pp 145–157 | Cite this conference paper



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Amit Kumar Dash, Sanjay Agrawal, Sanjay Gairola & Shweta Shukla

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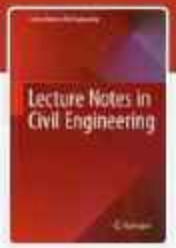

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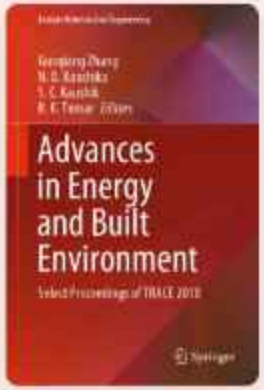

Advances in Energy and Built Environment

Amit Kumar Dash, Sanjay Agrawal, Sanjay Gairola & Shweta Shukla

Book
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Handbook of Nanomaterials for Manufacturing Applications

A volume in Micro and Nano Technologies

Book • 2020

Edited by:
Choudhery Mustansar Hussain

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Handbook of Nanomaterials for Manufacturing Applications covers the challenges and obstacles involved in using nanomaterials in manufacturing. In particular, the lack of informatio ... read full description

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Chapter Detail

Handbook of Nanomaterials for Manufacturing Applications

Micro and Nano Technologies

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Chapter 10 - Engineered nanomaterials: scope in today's textile industry

Mohd Shabbir, Manish Kaushik

Department of Chemistry, Noida Institute of Engineering and Technology (NIET), Greater Noida, India

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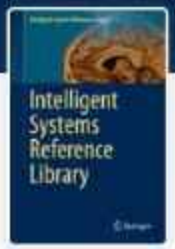

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Series Editor
Janusz Kacprzyk, Lakhmi C. Jain

Chapter Detail:

An Emerging Approach to Intelligent Techniques—Soft Computing and Its Application

Chapter | First Online: 25 February 2020

pp 171–182 | Cite this chapter

Internet of Things and Big Data Applications

Pankaj Kumar & S. K. Singh

Chapter Detail:

Abstract

Over the past decade, artificial intelligence (AI) has appeared in high-tech labs, and people use it daily without feeling it. For example, current calculations of power technologies and flexible computing in other areas related to digital products, many applications that increase the contribution of artificial intelligence, are flexible computing technologies based on these problems, the medicine, biology, industry, manufacturing described as security, education, virtual environment. We was particularly encouraged. Support for the provision of new ideas and/or theoretical studies on soft computing technology, interdisciplinary research, real-world experimental application problems and flexible computer system design descriptions, diverse in development their new analytical structure Introduce the document Encourage a soft computing technology that is particularly practical. It provides an overview of the disciplines of Artificial Intelligence with respect to Soft Computing, and presents the benefits of soft computing over traditional hard computer technologies and their disadvantages.