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Editors

Wastewater Treatment with Algae



Springer

Wastewater Treatment With Algae Biotechnology Intelligence Unit

Imran Ahmad



Wastewater Treatment With Algae Biotechnology Intelligence Unit:

Algal Biorefinery: An Integrated Approach Debabrata Das, 2015-11-30 This book critically discusses different aspects of algal production systems and several of the drawbacks related to microalgal biomass production namely low biomass yield and energy consuming harvesting dewatering drying and extraction processes These provide a background to the state of the art technologies for algal cultivation CO₂ sequestration and large scale application of these systems In order to tap the commercial potential of algae a biorefinery concept has been proposed that could help to extract maximum benefits from algal biomass This refinery concept promotes the harvesting of multiple products from the feedstock so as to make the process economically attractive For the last few decades algal biomass has been explored for use in various products such as fuel agricultural crops pigments and pharmaceuticals as well as in bioremediation To meet the huge demand there has been a focus on large scale production of algal biomass in closed or open photobioreactors Different nutritional conditions for algal growth have been explored such as photoautotrophic heterotrophic mixotrophic and oleaginous This book is aimed at a wide audience including undergraduates postgraduates academics energy researchers scientists in industry energy specialists policy makers and others who wish to understand algal biorefineries and also keep abreast of the latest developments

Application of Microbial Technology in Wastewater Treatment and Bioenergy Recovery Shaon Ray Chaudhuri, 2024-11-29 This book explores microbial intervention in wastewater treatment for resource recovery bioenergy production and environmental sustainability It discusses the fate of pollutants challenges in existing treatment strategies and the need for innovation Case studies illustrate wastewater specific treatment strategies for bioenergy and resource recovery at different scales The book emphasizes the use of wastewater for resource recovery through sequestration or biotransformation and highlights tailor-made consortium development for sludge free treatment It also covers sustainable approaches like microbial biofilm reactors microbial fuel cells and membrane technology for wastewater treatment It also deals with nanotechnology in combination with microbial technology for handling refractory components in wastewater that could not be handled by microbes alone This book provides insights into microbial technology for a clean environment and bioenergy production through a reduce recover and reuse approach This valuable resource offers practical information that can be applied by engineers researchers and undergraduate and graduate students as well as business professionals in the bioenergy field aiding them in the implementation of renewable energy projects

Microalgae Horizons Ihana Aguiar Severo, Juan Carlos Ordóñez, André Bellin Mariano, José Viriato Coelho Vargas, 2025-06-16 This book provides comprehensive recommendations and insights into the fundamentals innovations and industrial applications of microalgae based processes Covering both upstream and downstream processes it addresses challenges and solutions in scaling up microalgae technologies from laboratory to industrial uses Key topics include cultivation techniques bioreactor designs harvesting and drying methods and applications in food biofuels and environmental management Special emphasis is placed on market

trends socio political factors regulatory frameworks innovation and sustainability ensuring a holistic understanding of this rapidly evolving field In addition the final chapters are dedicated to real world cases highlighting pilot projects and large scale installations that tackle practical challenges in engineering and commercialization As an interdisciplinary science microalgae technology has significant relevance in academia industry and government driving innovation and contributing to a growing billion dollar global market for high value products This book serves as an essential resource for students researchers scientists engineers and professionals seeking to deepen their knowledge and stay updated on the latest developments in microalgae research and applications

Photo-Activated Sludge: A Novel Algal-Bacterial Biotreatment for Nitrogen Removal from Wastewater Angélica Rada Ariza, 2018-12-07 Nitrogen rich wastewaters 10 400 mg N L⁻¹ are usually produced by municipal industrial and agricultural wastes such as effluents from anaerobic treatments These represent a risk to the environment due to the high nutrient concentrations nitrogen and phosphorous which can cause eutrophication of water bodies deteriorating the quality of the ecosystems As a solution the potential nitrogen removal capacity of a novel bio treatment system namely the Photo Activated Sludge PAS which is composed of microalgae and bacteria consortia is presented in this thesis This novel bio treatment is based on the symbiosis between microalgae nitrifiers and heterotrophic bacteria microalgal bacterial consortia Experimental work using photobioreactors for the cultivation of microalgae and bacteria under sequencing batch conditions showed that microalgal bacterial consortia can remove ammonium 50% faster than solely microalgal consortia The increase in ammonium removal rates was due to the action of nitrifying bacteria supplied with oxygen produced by algae Nitrification was the main ammonium removal mechanism within the microalgal bacterial biomass followed by algal uptake and nutrient requirements for bacterial growth Carbon oxidation and denitrification were the main removal mechanisms for organic carbon Hence the role of algae within the microalgal bacterial system is to provide oxygen to support the aerobic processes The microalgal bacterial system offers the possibility of reducing the hydraulic retention time which can decrease the large area requirements often demanded by algal systems

Wastewater Treatment with Algae Yuk Shan Kwong, Nora F.Y. Tam, 2013-03-09 This book brings together environmental scientists and engineers to discuss the development of new approaches and methodologies which utilize microalgae for biological wastewater treatment The researchers report their recent findings on microalgal removal of nutrients heavy metals and other organic pollutants from sewage and industrial effluents The technologies discussed here include biosorption and bioaccumulation of heavy metals cell immobilization of algae and mathematical modelling of metal uptake by cells This book is unique in that it takes a practical approach to the subject matter and is a useful reference both in and outside of the laboratory

Green Technologies for Wastewater Treatment and Bioenergy Production Imran Ahmad, 2025-03-28 Currently most of the physical and chemical technologies generally employed for the treatment of wastewater are costly and inefficient Researchers have been working to find green technologies for the sustainable and economically viable treatment

methods for wastewater and Green Technologies for Wastewater Treatment and Bioenergy Production focuses on these latest advancements These include bioremediation bioaugmentation wetlands and algal treatment technologies which are considered to contribute toward a circular bioeconomy and to be crucial in attaining various sustainable development goals Examines the production of biofuels and other forms of bioenergy derived from wastewater Explains how these emerging green technologies contribute toward a circular bioeconomy and aid in achieving various sustainable development goals

Current Developments in Biotechnology and Bioengineering Ranjna Sirohi,Ashok Pandey,Sang Jun Sim,Jo-Shu Chang,Duu-Jong Lee,2023-01-06 Photobioreactors Design and Applications provides a comprehensive overview of photobioreactor design types and applications It also introduces key principles that enable chemical and environmental engineers to engage in analysis optimization and design with consistent control over biological and chemical transformations The use of computational modeling of processes control systems and CFD is in great demand This book covers these aspects of chemical and bioprocesses Focuses on design types modeling and simulation of photobioreactors and applications in biohydrogen and microalgae production Includes up to date reviews of photobioreactors Discusses biopolymers diatoms cyanobacteria and pigments production using different types of photobioreactors *Biorefinery of Industrial Effluents for a Sustainable Circular Economy* Mu. Naushad,Shamsul Rahman Mohamed Kutty,Sohrab Hossain,Abdullahi Haruna Birniwa,Ahmad Hussaini Jagaba,2024-11-28 Bio Refinery of Industrial Effluents for a Sustainable Circular Economy provides a combined approach between environmental engineering which involves the improvement of the natural environment or remediation of polluted sites In addition it discusses bioprocess engineering involving the development of processes for the manufacture of products from biological materials to produce a valuable bioproduct This book covers knowledge on sources impacts and applications of industrial effluents that could potentially be used as feedstock for the IEB with examples of applied research that demonstrates the relationship between the effluents biorefinery treatment and bioproduct recovery Materials that can be produced from IEB and the treatment processes for such are considered Provides industrial effluents source characteristics and treatment Assists in designing an optimization strategy for maximizing efficiency of waste treatment and of bioresource utilization in terms of economic environmental and social impact Explains bio based product recovery for a bio based economy Discusses advanced processes for simultaneous industrial effluents treatment and the generation of bio based products of sufficient value *Value Added Products From Bioalgae Based Biorefineries: Opportunities and Challenges* Shailendra Kumar Arya,Madhu Khatri,Gursharan Singh,2024-05-27 This book covers wide aspects of algal technology and algae based biorefinery aspects Algae are the most prevalent primitive and abundant microbes on Earth however the commercialization of algal based value added products is still low due to the negligible dissemination of knowledge flow among the stakeholders and researchers This book provides up to date information on the cultivation of microalgae their harvesting downstream processing and diverse applications It further discusses the

macromolecules existing in microalgae such as proteins carbohydrates and lipids poly unsaturated fatty acids peptides exopolysaccharides flavonoids and antioxidants This book also highlights the advantages and some real time challenges before the establishment of sustainable algal based biorefineries Further it includes clear flow charts and figures in each chapter to aid in interpretation of every technical concept This book motivates readers entrepreneurs and young farmers to exploit easily growing microalgae through cottage to large scale biorefineries and start their own businesses for the production of value added products Forthcoming Books Rose Arny,1998

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