

Green Energy and Technology



Zhen Fang *Editor*

Pretreatment Techniques for Biofuels and Biorefineries



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Ram Chandra



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Pretreatment Techniques for Biofuels and Biorefineries Zhen Fang, 2013-01-04 This book includes 19 chapters contributed by the world's leading experts on pretreatment methods for biomass. It extensively covers the different types of biomass, e.g., molasses, sugar beet pulp, cheese whey, sugarcane residues, palm waste, vegetable oil, straws, stalks, and wood. Various pretreatment approaches, e.g., physical, thermal, chemical, physicochemical, and biological, and methods that show the subsequent production of biofuels and chemicals such as sugars, ethanol, extracellular polysaccharides, biodiesel, gas, and oil. In addition to traditional methods such as steam, hot water, hydrothermal, diluted acid, organosolv, ozonolysis, sulfite milling, fungal, and bacterial, microwave, ultrasonic, plasma, torrefaction, pelletization, gasification, including biogas and liquefaction pretreatments, it also introduces and discusses novel techniques such as nano and solid catalysts, organic electrolyte solutions, and ionic liquids. This book offers a review of state-of-the-art research and provides guidance for the future paths of developing pretreatment techniques of biomass for biofuels, especially in the fields of biotechnology, microbiology, chemistry, materials science, and engineering. It intends to provide a systematic introduction of pretreatment techniques. It is an accessible reference work for students, researchers, academicians, and industrialists in biorefineries. Zhen Fang is a Professor of Bioenergy and the leader and founder of the biomass group at the Xishuangbanna Tropical Botanical Garden of the Chinese Academy of Sciences. He is also an adjunct full Professor of Life Sciences at the University of Science and Technology of China.

Bioprocess Engineering for a Green Environment V. Sivasubramanian, 2018-05-04 *Bioprocess Engineering for a Green Environment* examines numerous bioprocesses that are crucial to our day-to-day life, specifically the major issues surrounding the production of energy relating to biofuels and waste management. The nuance of this discussion is reflected by the text's chapter breakdown, providing the reader with a fulsome investigation of the energy sector, the importance of third-generation fuels, and the application of micro and macroalgae for the production of biofuels. The book also provides a detailed exploration of biocatalysts and their application to the food industry, bioplastics production, conversion of agrowaste into polysaccharides, as well as the importance of biotechnology in bio-processing. Numerous industries discharge massive amounts of effluents into our rivers, seas, and air systems. As such, two chapters are dedicated to the treatment of various pollutants through biological operation, with hopes of achieving a cleaner, greener environment. This book represents the most comprehensive study of bioprocessing and its various applications to the environment available on the market today. It was furthermore written with various researchers in mind, ranging from undergraduate and graduate students looking to enhance their knowledge of the topics presented to scholars and engineers interested in the bioprocessing field, as well as members of industry and policy makers. Provides a comprehensive overview of bioprocesses that apply to day-to-day living. Is learner-centered, providing detailed diagrams for easy understanding. Explores the importance of biocatalysts and their applications to the food industry, as well as bioplastics production. Examines the unique capabilities of bioprocess engineering.

and its ability to treat various pollutants **Biorefinery: A Sustainable Approach for the Production of Biomaterials, Biochemicals and Biofuels** Pranav D. Pathak, Sachin A. Mandavgane, 2023-03-01 This book discusses recent trends and concepts in the field of biorefinery. It discusses optimal and economic strategies for converting biomass to value added products to maximize profits with minimal environmental impact with a sustainability approach. The chapters of the book are focused on the current technologies, technological aspects, life cycle assessment and case studies. The book is divided into three sections: the first section presents strategies for the production of biofuels like bioethanol, biomethane, biohydrogen, bio-oil, gasification etc. from the biomass in a sustainable way. The second section reviews the extraction of bioactive chemicals, phenolic antioxidants, enzymes and carboxylic acid from the biomass residue. The last section examines the utilization of biomass for the production of bioactive materials including biofertilizers, bioadsorbents, activated carbon, nano materials and pigments. This book explores the relation between biofuels and the sustainable development goals (SDGs). 7

Biorefining of Biomass to Biofuels Sachin Kumar, Rajesh K. Sani, 2017-11-06 This volume focuses on the prospects of the conversion of biomass into biofuels including ethanol, butanol, biogas, biohydrogen, biodiesel, syngas and other useful products. Biomass derived fuels have gained tremendous attention worldwide. However, due to high raw material and processing costs, biofuels produced from lignocelluloses have been found to be more expensive than conventional fuels. Therefore, a concept of biorefining has been introduced where more than one product or each and every component of biomass may be derived into useful products in a manner of petroleum refinery. Advances in Biodegradation and Bioremediation of Industrial Waste Ram Chandra, 2015-03-24 Addresses a Global Challenge to Sustainable Development. Advances in Biodegradation and Bioremediation of Industrial Waste examines and compiles the latest information on the industrial waste biodegradation process and provides a comprehensive review. Dedicated to reducing pollutants generated by agriculturally contaminated soil and plastic waste. Biorefinery of Oil Producing Plants for Value-Added Products Suraini Abd-Aziz, Misri Gozan, Mohamad Faizal Ibrahim, Lai-Yee Phang, 2022-04-18 Biorefinery of Oil Producing Plants for Value Added Products. An instructive and up to date pretreatment and industrial applications of oil producing plants. Biorefinery of Oil Producing Plants for Value Added Products is a two volume set that delivers a comprehensive exploration of oil producing plants from their availability to their pretreatment, bioenergy generation, chemical generation, bioproduct generation and economic impact. The distinguished team of editors has included a wide variety of highly instructive resources written by leading contributors to the field. This set explores the current and future potential of bioenergy production to address the energy and climate crisis as well as the technologies used to produce materials like biogas, biodiesel, bioethanol, biobutanol, biochar, fuel pellets and biohydrogen. It also discusses the production of biobased chemicals including bio-oil, biosurfactants, cationic surfactants, glycerol, biovanillin, bioplastic and plant oil based polyurethanes. Concluding with an insightful analysis of the economic effects of oil producing plants, the set also offers

readers A thorough introduction to the availability of oil producing plants including palm oil castor oil jatropha nyamplung and coconut A comprehensive exploration of the pretreatment of oil producing plants including the physical chemical and biological pretreatment of lignocellulosic biomass Practical discussion of the generation of bioenergy including biogas generation in the palm oil mill and biodiesel production techniques using jatropha In depth examinations of the generation of biobased chemicals including those produced from the tobacco plant Perfect for researchers and industry practitioners involved with the biorefinery of oil producing plants Biorefinery of Oil Producing Plants for Value Added Products also belongs in the libraries of undergraduate and graduate students studying agriculture chemistry engineering and microbiology

Biomass Energy for Sustainable Development Maulin P Shah, Pardeep Kaur, 2024-04-22 The potential future fluctuations in energy security and potential climate change impacts require an emphasis on clean and renewable energies to safeguard the environment as well as economic livelihoods The current recalcitrant nature of biomass processing has led researchers to find the most suitable technique for its depolymerization as well as various strategies to pretreat the biomass which include physical thermochemical and biochemical methods and a combination of these Biomass Energy for Sustainable Development examines how optimal biomass utilization can reduce forest management costs help mitigate climate change reduce risks to life and property and help provide a secure competitive energy source into the future Features Provides a comprehensive review of biomass energy and focuses on in depth understanding of various strategies to pretreat biomass including physical chemical and biological Explores multidisciplinary novel approaches including AI for furthering the understanding and generation of models theories and processes in the field of bioenergy Covers the sustainable development goals for bioenergy including the related concepts of bioeconomy and the potential environmental impact from reliance on bioenergy

Relationship Between Microbes and the Environment for Sustainable Ecosystem Services, Volume 2 Justin Samuel, Ajay Kumar, Joginder Singh Panwar, 2022-08-20 Relationship Between Microbes and Environment for Sustainable Ecosystem Services Volume Two Microbial Mitigation of Waste for Sustainable Ecosystem Services promotes advances in sustainable solutions value added products and fundamental research in microbes and the environment Topics include advanced and recent discoveries in the use of microbes for sustainable development Volume Two describes the successful application of microbes and their derivatives for waste management of potentially toxic and relatively novel compounds This proposed book will be helpful to environmental scientists experts and policymakers working in the field of microbe based mitigation of environmental wastes The book provides reference information ranging from the description of various microbial applications for the sustainability in different aspects of food energy environment industry and social development Covers the latest developments recent applications and future research avenues in microbial biotechnology for sustainable development Includes expressive tables and figures with concise information about sustainable ecosystem services Provides a wide variety of applications and modern practices of harnessing the potential of microbes in the environment

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Handbook on High Value Fermentation Products, Volume 2 Saurabh Saran,Vikash Babu,Asha Chaubey,2019-05-21 Written by a group of world renowned experts the second volume in this groundbreaking set continues where the first volume left off focusing on fermentation products that contribute to human welfare across a variety of industries Green technologies are no longer the future of science but the present With more and more mature industries such as the process industries making large strides seemingly every single day and more consumers demanding products created from green technologies it is essential for any business in any industry to be familiar with the latest processes and technologies It is all part of a global effort to go greener and this is nowhere more apparent than in fermentation technology This second volume in the groundbreaking new set High Value Fermentation Products focuses on industries that are concerned with human welfare including the leather industry textiles pharmaceutical and medical food processing and others Covering topics such as chitin and chitosan microbial polyhydroxyalkanoates propanediol and many others the editors and contributors have contributed to an extremely important facet of chemical and process engineering and how to move these industries into a much more sustainable and environmentally conscious direction From converting waste into apparel to creating healthier foods and more effective medicines this is truly a monumental work that is a must have for any chemical engineer scientist or chemist

Emerging Technologies for Biorefineries, Biofuels, and Value-Added Commodities Zhi-Hua Liu,Art

Ragauskas,2021-04-30 This book provides in depth coverage on the latest concepts systems and technologies that are being utilized in biorefineries for the production of biofuels and value added commodities Written by internationally recognized experts the book provides a comprehensive overview of pretreatment technology for biorefineries and biofuels enzymatic hydrolysis and fermentation technology for biofuel production and lignin valorization for developing new products from waste lignin The book will be a valuable resource for researchers and professionals working in process engineering product engineering material science and systems and synthetic biology in the fields of biorefining biofuel biomaterials environmental waste utilization and biotechnology

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