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Michael E. Himmel *Editor*

Biomass Conversion

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Wenbin Ji



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Biomass Conversion Michael E. Himmel, 2012 Biomass conversion research is a combination of basic science applied science and engineering testing and analysis Conversion science includes the initial treatment called pre treatment of the feedstock to render it more amenable to enzyme action enzymatic saccharification and finally product formation by microbiological or chemical processes In *Biomass Conversion Methods and Protocols* expert researchers in the field detail methods which are now commonly used to study biomass conversion These methods include Biomass Feedstocks and Cellulose Plant Cell Wall Degrading Enzymes and Microorganisms and Lignins and Hemicelluloses Written in the highly successful *Methods in Molecular Biology* series format the chapters include the kind of detailed description and implementation advice that is crucial for getting informed reproducible results in the laboratory

Natural Polyphenols from Wood Kun Cheng, Cornel Hagiopol, 2021-03-24 *Natural Polyphenols from Wood Tannin and Lignin An Industrial Perspective* is a detailed guide to the sourcing and processing of tannin and lignin for valuable advanced applications across areas such as fuels chemicals drugs and food Drawing on the latest academic research and patent literature this book provides strong practical understanding of the use of these valuable materials in novel industrial applications This book introduces natural polyphenols from wood and the fundamental aspects of carbon management within the tree In depth presentation of extraction and characterization methods is followed by an extensive coverage of practical and industrial applications of wood polyphenols This is an essential resource for researchers and advanced students working with lignin or tannin and across biopolymer science biomass wood chemistry paper wood adhesives polymer materials renewable resources and biotechnology It also supports industrial R D and scientists working with wood polyphenols or bio based polymers This book re evaluates wood polyphenols from an industrial perspective revealing the latest techniques and drawing on patent literature It addresses fundamental issues of wood polyphenols such as carbon cycle wood fractionation structure and properties It offers a comprehensive review of practical applications including lignin depolymerization wood reconstruction fuels chemicals drugs and food

Aqueous Pretreatment of Plant Biomass for Biological and Chemical Conversion to Fuels and Chemicals Charles E. Wyman, 2013-03-27 Plant biomass is attracting increasing attention as a sustainable resource for large scale production of renewable fuels and chemicals However in order to successfully compete with petroleum it is vital that biomass conversion processes are designed to minimize costs and maximize yields Advances in pretreatment technology are critical in order to develop high yielding cost competitive routes to renewable fuels and chemicals *Aqueous Pretreatment of Plant Biomass for Biological and Chemical Conversion to Fuels and Chemicals* presents a comprehensive overview of the currently available aqueous pretreatment technologies for cellulosic biomass highlighting the fundamental chemistry and biology of each method key attributes and limitations and opportunities for future advances Topics covered include The importance of biomass conversion to fuels The role of pretreatment in biological and chemical conversion of biomass

Composition and structure of biomass and recalcitrance to conversion Fundamentals of biomass pretreatment at low neutral and high pH Ionic liquid and organosolv pretreatments to fractionate biomass Comparative data for application of leading pretreatments and effect of enzyme formulations Physical and chemical features of pretreated biomass Economics of pretreatment for biological processing Methods of analysis and enzymatic conversion of biomass streams Experimental pretreatment systems from multiwell plates to pilot plant operations This comprehensive reference book provides an authoritative source of information on the pretreatment of cellulosic biomass to aid those experienced in the field to access the most current information on the topic It will also be invaluable to those entering the growing field of biomass conversion

Biological Conversion of Biomass for Fuels and Chemicals Jianzhong Sun, Shi-You Ding, Joy D Peterson, 2013-11-04 This book is divided into two parts The first covers biomass modification to facilitate the industrial degradation processing and other characteristics of feedstocks These include reduction in the general recalcitrance of plant cell wall and downstream processing costs The second focuses on cutting edge technologies for the conversion of lignocelluloses into biofuels and other products It describes the most up to date advances in natural biomass utilization systems such as wood feeding termites and animals that efficiently degrade lignocellulosic substrates Consolidated bioprocessing CBP integrates cellulase production and cellulose hydrolysis with pentose and hexose fermentation in a single step This replicates what happens in the digestive systems of animals such as termites and cows that effectively degrade lignocellulosic substrates CBP has the potential to reduce production costs and lower capital investment whilst increasing conversion efficiency Currently there are no CBP enabling micro organisms suitable for industrial applications Consequently this book presents technologies which integrate the lignocellulolytic systems of insects and other animals to advance CBP strategy for cellulosic biofuels It covers the progress made and challenges faced with the utilisation of gene catalyst and other unique mechanisms from cellulose eating animals as well as cutting edge technologies developed to reduce the general recalcitrance of feedstocks for processing This volume makes essential reading for academics and industrial groups concerned with overcoming the challenges inherent in the biological conversion of biomass into fuels and chemicals

Biotechnology in China III: Biofuels and Bioenergy Feng-Wu Bai, Chen-Guang Liu, He Huang, George T Tsao, 2012-04-23 Cellulolytic Enzyme Production and Enzymatic Hydrolysis for Second Generation Bioethanol Production by Mingyu Wang Zhonghai Li Xu Fang Lushan Wang und Yinbo Qu Bioethanol from Lignocellulosic Biomass by Xin Qing Zhao Li Han Zi Feng Wu Bai Hai Long Lin Xiao Ming Hao Guo Jun Yue und Nancy W Y Ho Biodiesel From Conventional Feedstocks by Wei Du und De Hua Liu Establishing Oleaginous Microalgae Research Models for Consolidated Bioprocessing of Solar Energy by Dongmei Wang Yandu Lu He Huang und Jian Xu Biobutanol by Hongjun Dong Wenwen Tao Zongjie Dai Liejian Yang Fuyu Gong Yanping Zhang und Yin Li Branched Chain Higher Alcohols by Bao Wei Wang Ai Qin Shi Ran Tu Xue Li Zhang Qin Hong Wang und Feng Wu Bai Advances in Biogas Technology by Ai Jie Wang Wen Wei Li und Han Qing Yu Biohydrogen Production from Anaerobic Fermentation by Ai Jie Wang Guang Li Cao und

Wen Zong Liu Microbial Fuel Cells in Power Generation and Extended Applications by Wen Wei Li and Guo Ping Sheng Fuels and Chemicals from Hemicellulose Sugars by Xiao Jun Ji He Huang Zhi Kui Nie Liang Qu Qing Xu and George T Tsao

Biomass for Bioenergy and Biomaterials Nidhi Adlakha, Rakesh Bhatnagar, Syed Shams Yazdani, 2021-10-21 Biomass for Bioenergy and Biomaterials presents an overview of recent studies developed specifically for lignocellulose based production of biofuels biochemicals and functional materials The emphasis is on using sustainable chemistry and engineering to develop innovative materials and fuels for practical applications Technological strategies for the physical processing or biological conversion of biomass for material production are also presented FEATURES Offers a comprehensive view of biomass processing biofuel production life cycle assessment techno economic analysis and biochemical and biomaterial production Presents details of innovative strategies to pretreat biomass Helps readers understand the underlying metabolic pathways and identify the best engineering strategies for their native strain Highlights different strategies to make biomaterials from biomass Provides insight into the potential economic viability of the biomass based process This book serves as an ideal reference for academic researchers and engineers working with renewable natural materials the biorefining of lignocellulose and biofuels It can also be used as a comprehensive reference source for university students in metabolic chemical and environmental engineering

Fungal Biotechnology for Biofuel Production Roberto Nascimento Silva, 2016-01-25 Mycology Current and Future Developments is a book series that brings together the latest contributions to research on the biology genetics and industrial use of fungi Each book chapter is written by academic professional experts from around the world The book series is of interest to mycologists and allied researchers seeking to gain new knowledge perspectives about fungi This volume of the book series focuses chiefly on advances biofuel production Topics covered in this volume include an overview of biofuel production the use of lignocelluloses in fungal biofuel production fungal metabolic engineering biomass pretreatment for biofuel refineries and more The volume also contains chapters about research on other fungi such as *S. Cerevisiae* The reviews presented in this volume serve as a useful reference for researchers and readers interested in learning about new developments in biofuel production at a time when the need for alternative energy sources is ever increasing

Valorization of Biomass to Value-Added Commodities Michael O. Daramola, Augustine O. Ayeni, 2020-04-21 This book presents the most up to date technologies for the transformation of biomass into valuable fuels chemicals materials and products It provides comprehensive coverage of the characterization and fractionation of various types of biomass and details the many challenges that are currently encountered during this process Divided into two sections this book discusses timely topics such as the characterization of biomass feedstock pretreatment and fractionation of biomass and describes the process for conversion of biomass to value added commodities The authors bring biomass transformational strategies that are yet to be explored to the forefront making this innovative book useful for graduate students and researchers in academia government and industry

Densification Impact On Raw, Chemically And Thermally

Pretreated Biomass: Physical Properties And Biofuels Production Jaya Shankar Tumuluru, 2023-05-29 First generation ethanol plants did not have many operational challenges as the feedstocks e.g. corn used for fuel production are dense, stable, storable and shippable commodity type products with fewer conversion challenges. These feedstock properties led the first generation large scale biorefineries to grow exponentially. In the second generation biofuels, the feedstocks used are agricultural and forest residues, dedicated energy crops, industrial wastes and municipal solid waste. When the industry tested these feedstocks for biofuel production, they faced flowability, storage, transportation and conversion issues. One way to overcome some of the feeding, handling, transportation and variable moisture challenges is to densify the biomass. Pellet mills and briquette presses are commonly used to produce densified products. The densified products have uniform size, shape, higher bulk density and better downstream conversion performance. Also, the densified products are aerobically stable and can be stored for longer durations without any loss in quality. This book's focus is on understanding how the densification process variables, biomass types and their blends, mechanical preprocessing and thermal and chemical pretreatment methods impact the quality of the densified products produced for biofuel production. Finally, the book also explores the conversion performance of densified biomass for biofuel production.

Platform Chemical Biorefinery Satinder Kaur Brar, Saurabh Jyoti Sarma, Kannan Pakshirajan, 2016-06-02 Platform Chemical Biorefinery: Future Green Chemistry provides information on three different aspects of platform chemical biorefinery. The book first presents a basic introduction to the industry, beneficial for university students, then provides engineering details of existing or potential platform chemical biorefinery processes helpful to technical staff of biorefineries. Finally, the book presents a critical review of the entire platform chemical biorefinery process, including extensive global biorefinery practices and their potential environmental and market-related consequences. Platform chemicals are building blocks of different valuable chemicals. The book evaluates the possibility of renewable feedstock-based platform chemical production and the fundamental challenges associated with this objective. Thus, the book is a useful reference for both academic readers and industry technical workers. The book guides the research community working in the field of platform chemical biorefinery to develop new pathways and technologies in combination with their market value and desirability. Offers comprehensive coverage of platform chemicals, biorefineries, recent advances and technology developments, potential issues for preventing commercialization and solutions. Discusses existing technologies for platform chemicals production, highlighting benefits as well as their possible adverse effects on the environment and food security. Includes a global market analysis of platform chemicals and outlines industry opportunities. Serves as a useful reference for both academic readers and industry technical workers.

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