

SPRINGER BRIEFS IN MOLECULAR SCIENCE
GREEN CHEMISTRY FOR SUSTAINABILITY

Tingyue Gu *Editor*

Green Biomass Pretreatment for Biofuels Production

Green Biomass Pretreatment For Biofuels Production Springerbriefs In Molecular Science

Se-Kwon Kim, Choul-Gyun Lee



Green Biomass Pretreatment For Biofuels Production Springerbriefs In Molecular Science:

Green Biomass Pretreatment for Biofuels Production Tingyue Gu, 2013-01-03 The increasing global demand for energy requires a versatile approach prompting many researchers to focus on renewable bioenergy from different biomasses especially cellulosic biomass Such biomasses can be agricultural wastes municipal wastes or direct harvests from high yield energy crops If properly pre treated the subsequent enzyme hydrolysis step is much more effective and can effectively minimises the waste disposal Green Biomass Pretreatment for Biofuels Production reviews a range of pretreatment methods such as ammonium fiber explosion steam explosion dilute acid hydrolysis alkali hydrolysis and supercritical carbon dioxide explosion focusing on their final sugar yields from hemicellulose glucose yields from cellulose as well as on their feasibilities in bioenergy production processes at various scales This book emphasises the tactical mobile and on farm scales applications that use green pretreatments and processing technologies without the need of on site waste treatment Because of the varieties of different biomasses no single pretreatment is expected to be the universal choice Some of the pretreatment methods present niche applications are also discussed *Green Biomass Pretreatment for Biofuels Production*, 2013-01-04

Industrially Important Fungi for Sustainable Development Ahmed M. Abdel-Azeem, Ajar Nath Yadav, Neelam Yadav, Minaxi Sharma, 2021-12-02 Fungi are an essential fascinating and biotechnologically useful group of organisms with an incredible biotechnological potential for industrial exploitation Knowledge of the world's fungal diversity and its use is still incomplete and fragmented There are many opportunities to accelerate the process of filling knowledge gaps in these areas The worldwide interest of the current era is to increase the tendency to use natural substances instead of synthetic ones The increasing urge in society for natural ingredients has compelled biotechnologists to explore novel bioresources which can be exploited in industrial sector Fungi due to their unique attributes and broad range of their biological activities hold great promises for their application in biotechnology and industry Fungi are an efficient source of antioxidants enzymes pigments and many other secondary metabolites The large scale production of fungal pigments and their utility provides natural coloration without creating harmful effects on entering the environment a safer alternative use to synthetic colorants The fungal enzymes can be exploited in wide range of industries such as food detergent paper and also for removal toxic waste This book will serve as valuable source of information as well as will provide new directions to researchers to conduct novel research in field of mycology Volume 2 of Industrially Important Fungi for Sustainable Development provides an overview to understanding bioprospecting of fungal biomolecules and their industrial application for future sustainability It encompasses current advanced knowledge of fungal communities and their potential biotechnological applications in industry and allied sectors The book will be useful to scientists researchers and students of microbiology biotechnology agriculture molecular biology and environmental biology *Nanotechnology for Biorefinery* Avinash P. Ingle, 2023-06-08 Nanotechnology for Biorefinery takes an in depth look at the emerging role of biotechnology and nanotechnology in biorefinery considered to be

one of the most important fields of research in the greener production of high value products With chapters covering the different types of nanomaterials their properties and synthesis methods the role of nanotechnology in biorefinery recent advances and challenges nanobiocatalysts and the applications of nanotechnology in biorefinery this book will be of interest to students and researchers alike It will assist users in their quest to develop cost effective and environmentally friendly production methods for various biorefining products Covers the wide range of applications of bio and nanotechnology in biorefinery Includes discussions of recent developments as well as step by step guidance on key procedures and processes

Biomass Conversion through Nanomaterials Inamuddin,Tariq Altalhi,Jibran Iqbal,2025-02-26 Biomass Conversion

Through Nanomaterials presents the catalytic processing of biomass to produce fuels as well as chemicals The book employs diverse monomers including glucose fructose as well as polymers such as starch cellulose in various catalytic processes It shows that nanomaterials with porous structures with increased surface areas and acidity strengthen the catalytic roles and also that numerous additional nanomaterial with comparable qualities such as those based on carbon resins metal oxides zeolites silica organic polymers and many others enhance the bioconversion processes of biomass The book also highlights the importance of nanotechnology in the emergence of successful biomass for producing high quality bioenergy and thoroughly covers varied bioenergy applications using nanomaterials It highlights the possibility that enabling biomass through nanomaterials improves the effectiveness of various bioenergy sources such as biofuels and microbial fuel cells After reading the book you will gain a better understanding of biomass conversion using nanomaterials its associated technologies and its various applications Provides a broad overview of biomass conversion using nanomaterials Includes in depth and detailed literature analyses on biomass conversions through nanomaterials Discusses a wide range of biomass conversions for producing high quality bioenergy

Waste Valorization for Value-added Products Vinay Kumar,Sivarama Krishna Lakkaboyana,Neha Sharma,2023-10-23 This volume is a comprehensive compilation of reviews that show how various waste products can be used to produce useful products Thirteen chapters highlight the following topics applications of plant derived and fruit waste for value added product formation fuel and chemical production from lignin food waste bioconversion to high value products organic residues valorization for value added chemicals valorization of waste plastics to produce fuels and chemicals food valorization for bioplastic production and concepts of circular economy in the valorization process Chapters are written in an organized and strategic manner and also include the references from recent years It will help students and researchers to quickly learn about modern waste valorization practices and advance their knowledge on the subject The book is suitable as a reference for courses in environmental science chemical engineering and agriculture It also serves as a guide for trainees managers and readers involved in waste management sustainability and value added product supply chains

Wastewater Exploitation Victor Alcaraz Gonzalez,René Alejandro Flores Estrella,Andreas Haarstrick,Victor Gonzalez Alvarez,2024-06-19 With all the current efforts to use non fossil sources as a starting point for future energy

solutions consideration is also being given to using microbial activities as a direct or indirect source of energy production This ranges from the use of algae as biomass or as H₂ producers anaerobic microorganisms to produce methane hydrogen and even electricity directly This book deals with both theoretical and technical possibilities of using anaerobic microorganisms in combination with wastewater as a substrate source to produce biofuels and bioenergy in the form of biomass CH₄ and H₂ as well as the corresponding power densities and electricity quantities in economically justifiable processes Unique process facilities are widely addressed however special interest is also placed in biorefinery and circular economy related concepts The theoretical background as well as application examples are presented

Microorganisms and enzymes for lignocellulosic biorefineries Pratima Bajpai, 2024-01-10 Enzymes and Microorganisms for Lignocellulosic Biorefinery comprehensively deals with the enzymes and microorganisms for lignocellulosic degradation challenges in the engineering of lignocellulolytic enzymes and mining and engineering for better enzymes The book discusses commonly used bioprocesses for lignocellulosic biorefinery including separated hydrolysis and fermentation simultaneous saccharification and fermentation and consolidated bioprocessing Among these methods construction of microbial co culturing systems via consolidated bioprocessing is regarded as a potential strategy to efficiently produce biochemicals and biofuels providing theoretical direction for constructing efficient and stable biorefinery process system in the future The book discusses construction of high performance enzyme cocktails and presents progress witnessed in engineering lignocellulolytic enzymes and enzyme producing microorganisms and future perspectives in the context of developing cost effective lignocellulose conversion processes Presents drivers for biorefinery industry development Discusses global drivers toward the advancement of lignocellulosic biorefineries along with technical and operational challenges for industrialization to overcome said challenges Discusses the biorefinery value chain and its economical and technical considerations Provides SWOT analysis and future directions

Advances in Carbon Management Technologies Subhas K. Sikdar, Frank Princiotta, 2021-01-31 Volume 2 of Advances in Carbon Management Technologies has 21 chapters It presents the introductory chapter again for framing the challenges that confront the proposed solutions discussed in this volume Section 4 presents various ways biomass and biomass wastes can be manipulated to provide a low carbon footprint of the generation of power heat and co products and of recovery and reuse of biomass wastes for beneficial purposes Section 5 provides potential carbon management solutions in urban and manufacturing environments This section also provides state of the art of battery technologies for the transportation sector The chapters in section 6 deals with electricity and the grid and how decarbonization can be practiced in the electricity sector The overall topic of advances in carbon management is too broad to be covered in a book of this size It was not intended to cover every possible aspect that is relevant to the topic Attempts were made however to highlight the most important issues of decarbonization from technological viewpoints Over the years carbon intensity of products and processes has decreased but the proportion of energy derived from fossil fuels has been stubbornly

stuck at about 80% This has occurred despite very rapid development of renewable fuels because at the same time the use of fossil fuels has also increased Thus the challenges are truly daunting It is hoped that the technology choices provided here will show the myriad ways that solutions will evolve While policy decisions are the driving forces for technology development the book was not designed to cover policy solutions

Climate Changes Mitigation and Sustainable Bioenergy Harvest Through Animal Waste Muhammad Arshad,2023-04-28 The valuable characteristics of animal waste materials in terms of climatic change impact and bioenergy production are discussed in this book Reutilization of such wastes for bioenergy harvest is the prime focus the great need for future animal waste recycling is also depicted Major topics discussed are types of livestock waste poultry and dairy methods and management of waste utilization and storage application of animal waste in bioenergy production economics of waste utilization novel disposable techniques circular bioeconomy pollution and water quality Furthermore utilization of animal waste for resource conservation and environmental protection is discussed such as potential materials for green biochemicals Resource recovery can therefore forestall the shortage of natural resources and at the same time can greatly reduce waste disposal problems and energy crises Many alternatives to waste disposal either currently available or under study focus on the recovery of material or energy In a world of diminishing resources and increasing needs each opportunity for the recycling of animal waste materials has been examined This book significantly contributes toward climate change mitigation through better environmental solutions A better understanding of animal waste recycling to mitigate climate changes has been portrayed in order to generate discussions among researchers and administrators Environmental implications of animal waste are of prime importance in climate change scenario Such wastes also harbor zoonotic pathogens that are transported in the environment Finally it has been tried out to collect ideas and experience in multiple aspects of animal waste management for climate change mitigation and bioenergy harvest

Processos de produção de celulose e de papel Adriana Helfenberger Coletto Assis,2024-04-10 A obra apresenta os processos associados produção de papel e de celulose enfatizando os esforços e as conquistas desenvolvidos por diferentes civilizações Desse modo trata de temas como possibilidades de obtenção e de utilização da celulose perspectivas que as indústrias desse ramo apresentam plantação da madeira obtenção de energia geração de celulose e de papel reciclagem de papel distribuição e transporte desse material

Marine Bioenergy Se-Kwon Kim,Choul-Gyun Lee,2015-05-21 Marine Bioenergy Trends and Developments features the latest findings of leading scientists from around the world Addressing the key aspects of marine bioenergy this state of the art text Offers an introduction to marine bioenergy Explores marine algae as a source of bioenergy Describes biotechnological techniques for biofuel production Explains the

Pretreatment of Lignocellulosic Biomass for Biofuel Production Pratima Bajpai,2016-03-08 The book describes the pretreatment of lignocellulosic biomass for biomass to biofuel conversion processes which is an important step in increasing ethanol production for biofuels It also highlights the main challenges and suggests possible ways to make these technologies feasible for the biofuel industry The

biological conversion of cellulosic biomass into bioethanol is based on the chemical and biological breakdown of biomass into aqueous sugars for example using hydrolytic enzymes The fermentable sugars can then be further processed into ethanol or other advanced biofuels Pretreatment is required to break down the lignin structure and disrupt the crystalline structure of cellulose so that the acids or enzymes can easily access and hydrolyze the cellulose Pre treatment can be the most expensive process in converting biomass to fuel but there is great potential for improving the efficiency and lowering costs through further research and development This book is aimed at academics and industrial practitioners who are interested in the higher production of ethanol for biofuels 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

Pre-treatment Methods of Lignocellulosic Biomass for Biofuel Production Shyamal Roy, 2021-08-31 Bioconversion of lignocellulosic biomass to biofuel is materially obstructed by the compositional and chemical complexity of biomaterials resulting in a challenge in using these as raw materials for the biofuel production process This book explains various lignocellulosic biomass pre treatment methods with emphasis on concepts practicability mechanisms of action and advantages and disadvantages and potential for industrial applications It also highlights the main challenges and suggests possible ways to make these pre treatment technologies feasible for the biofuel industry Features Presents different pre treatment technologies available for lignocellulosic biomass in a concise manner Covers use of different pre treatment methods in laboratory to industrial scales Includes combined pre treatment and deep eutectic solvents methods Discusses

problems related to industrial adaptation and corresponding economics of different techniques Explores significant fuels and chemicals derived from lignocellulosic biomass This book is aimed at graduate students and researchers working on biomass conversion characterization cellulose hemicellulose lignin microbial enzymes fermentation technology and industrial biotechnology

Bioprocessing of Biofuels Prakash Kumar Sarangi, Sonil Nanda, 2020-12-20 The major issues relating to environmental sustainability such as a heavy dependency on fossil fuels increased greenhouse gas emissions pollution global warming and climate change have prompted many efforts around the globe to seek alternative energy sources that have negligible environmental impacts and societal benefits There is an immense interest in biofuels research throughout the world owing to its massive potential to address environmental concerns Biofuels have the capacity to supplement current and future energy demands through being blended with fossil fuels or even replacing them completely as drop in fuels in automobiles as well as for heating and the power industries Waste biomass primarily lignocellulosic biomass e g agricultural crop residues forestry biomass and energy crops and microalgae can act as some inexpensive renewable bioresources for the production of biofuels and biochemicals The prime focus of Bioprocessing of Biofuels is to shed light on this significant process especially through microbial conversion technologies to recover and transform the inedible polysaccharides into hydrocarbon biofuels and bioenergy The book offers introductory coverage of the most crucial topics as follows A systematic overview of the state of the art in the production and utilization of biofuels Categorical bioprospecting of bioresources for biofuel production Biomass pretreatment and enzymatic saccharification Bioconversion of waste biomass and algae to liquid and gaseous biofuels New developments in microbial fuel cell technologies Bioprocessing of Biofuels unites topics related to the cutting edge applications of bioresources and green technologies to reinvigorate biorefineries positioning them within a competitive energy market Written to be instantly applicable this volume offers a reference book for undergraduate and graduate students scientific investigators and research scholars around the globe working in the areas relating to energy and fuels

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

Sustainable Production of Bulk Chemicals Mo Xian, 2015-11-17 The book describes in detail the authors current understanding of the models that incorporate the concepts and techniques of synthetic chemistry chemical engineering synthetic biology and bioengineering These include chemical engineering methods for green chemical production from sustainable bio resources using synthetic chemistry and kinetics of chemical reaction concepts in the construction of non natural enzymes and bio pathways partial integration of bioconversion steps in chemical synthesis routes integration of chemo bio conversion steps in one system microbial production of chemicals from economic chemo resourced chemicals and chemical production of value added derivatives from bio based amino acids It provides a valuable reference source for laboratory and industrial professionals in a number of chemical and biological disciplines such as synthetic chemistry synthetic biology chemical engineering biotechnology microbiology molecular biology etc Dr Mo Xian is a Professor at Qingdao Institute of Bioenergy and Bioprocess Technology Chinese Academy of Sciences Qingdao China

The Role of Green Chemistry in Biomass Processing and Conversion Haibo Xie, Nicholas Gathergood, 2012-11-21 Sets the stage for the development of sustainable environmentally friendly fuels chemicals and materials Taking millions of years to form fossil fuels are nonrenewable resources it is estimated that they will be depleted by the end of this century Moreover the production and use of fossil fuels have resulted in considerable environmental harm The generation of environmentally friendly energy from renewable sources such as biomass is therefore essential This book focuses on the integration of green chemistry concepts into biomass processes and conversion in order to take full advantage of the potential of biomass to replace nonsustainable resources and meet global needs for fuel as well as other chemicals and materials The Role of Green Chemistry in Biomass Processing and Conversion features contributions from leading experts from Asia Europe and North America Focusing on lignocellulosic biomass the most abundant biomass resource the book begins with a general introduction to biomass and biorefineries and then provides an update on the latest advances in green chemistry that support biomass processing and conversion Next the authors describe current and emerging biomass processing and conversion techniques that use green chemistry technologies including Green solvents such as ionic liquids supercritical CO₂ and water Sustainable energy sources such as microwave irradiation and sonification Green catalytic technologies Advanced membrane separation technologies The last chapter of the book explores the ecotoxicological and environmental effects of converting and using fuels chemicals and materials from biomass Recommended for professionals and students in chemical engineering green chemistry and energy and fuels The Role of Green Chemistry in Biomass Processing and Conversion sets a strong

foundation for the development of a competitive and sustainable bioeconomy This monograph includes a Foreword by James Clark University of York UK Bioethanol Fuel Production Processes. I Ozcan Konur,2023-12-22 This book presents research on biomass pretreatments which are a fundamental part of bioethanol fuel production to make biomass more accessible This book also includes an introductory section on the bioethanol fuels Bioethanol Fuel Production Processes I Biomass Pretreatments is the first volume in the Handbook of Bioethanol Fuels Six Volume Set The primary pretreatments at the macro level are the biological chemical hydrothermal and mechanical pretreatments of the biomass It also has an introductory section on the biomass pretreatments at large for bioethanol fuel production The major pretreatments at the micro level are the enzymatic and fungal pretreatments of the biomass as the biological pretreatments acid alkaline ionic liquid and organic solvent pretreatment pretreatments of the biomass as the chemical pretreatments steam explosion and liquid hot water pretreatments of the biomass as the hydrothermal pretreatments and milling ultrasonic and microwave pretreatments of the biomass as the mechanical pretreatments The first volume also indicates that a wide range of pretreatments stand alone or in combination with each other fractionate the biomass to its constituents of cellulose lignin and hemicellulose and improve both sugar and bioethanol fuel yield making this bioethanol fuel more competitive in relation to crude oil and natural gas based fossil fuels This first volume is a valuable resource for the stakeholders primarily in the research fields of energy and fuels chemical engineering environmental science and engineering biotechnology microbiology chemistry physics mechanical engineering agricultural sciences food science and engineering materials science biochemistry genetics molecular biology plant sciences water resources economics business management transportation science and technology ecology public environmental and occupational health social sciences toxicology multidisciplinary sciences and humanities among others

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