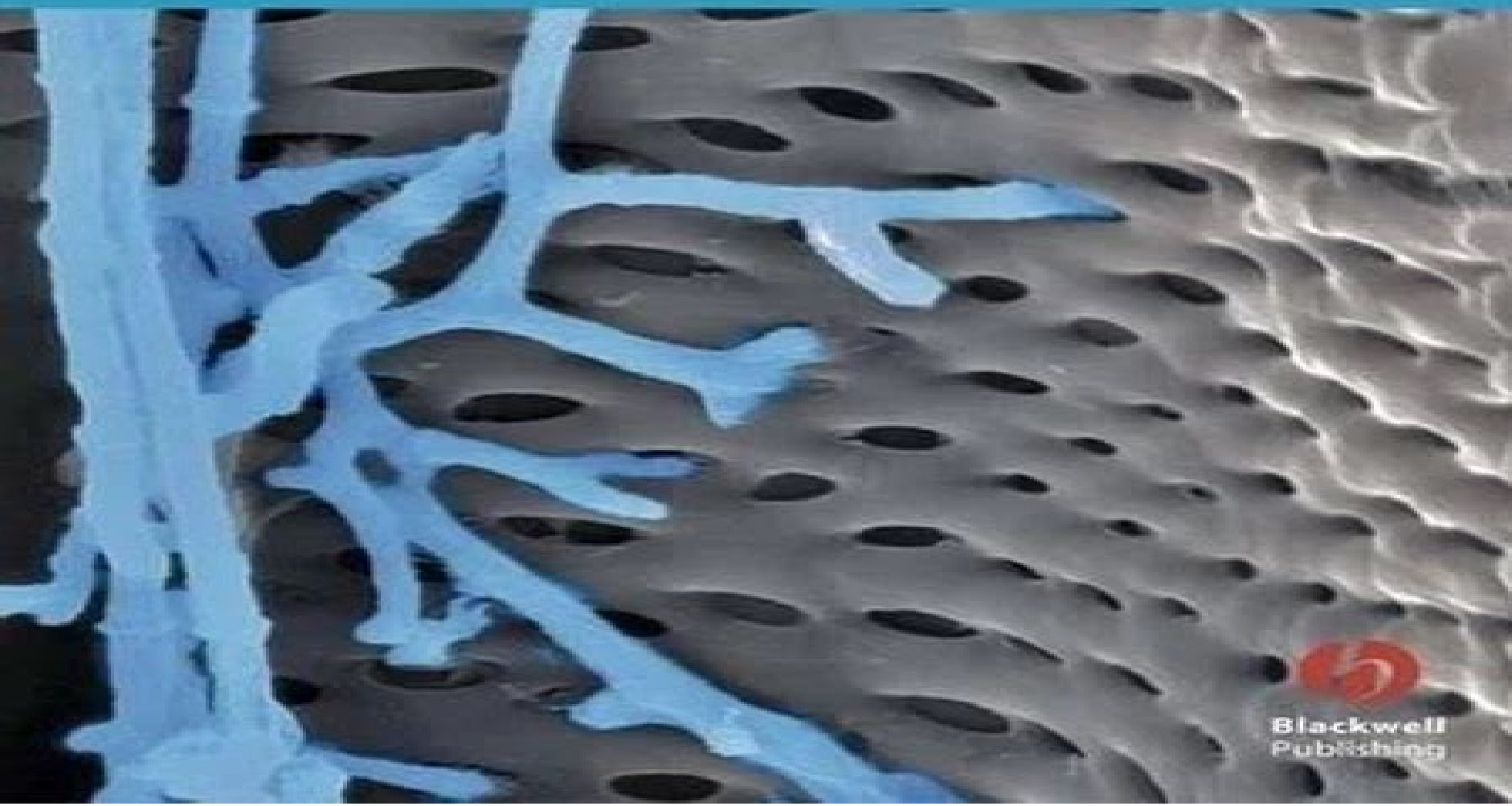


Biomass Recalcitrance

Deconstructing the Plant Cell Wall for Bioenergy

Edited by Michael E. Himmel



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Biomass Recalcitrance Deconstructing The Plant Cell Wall For Bioenergy

**Peter Albersheim, Alan Davill, Keith
Roberts, Ron Sederoff, Andrew
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Biomass Recalcitrance Deconstructing The Plant Cell Wall For Bioenergy:

Biomass Recalcitrance Michael Himmel, 2008-06-23 This book examines the connection between biomass structure ultrastructure and composition to resistance to enzymatic deconstruction with the aim of discovering new cost effective technologies for biorefineries It contains chapters on topics extending from the highest levels of biorefinery design and biomass life cycle analysis to detailed aspects of plant cell wall structure chemical treatments enzymatic hydrolysis and product fermentation options Pub desc Bioenergy Yebo Li, Samir Kumar Khanal, 2016-09-15 BIOENERGY PRINCIPLES AND APPLICATIONS BIOENERGY PRINCIPLES AND APPLICATIONS With growing concerns over climate change and energy insecurity coupled with dwindling reserves of fossil energy resources there is a growing search for alternative renewable energy resources Energy derived from renewable bioresources such as biomass energy crops agri and forest residues algae and biowastes has received significant attention in recent years With the growing interest in bioenergy there has been increasing demand for a broad ranging introductory textbook that provides an essential overview of this very subject to students in the field Bioenergy Principles and Applications offers an invaluable introduction to both fundamental and applied aspects of bioenergy feedstocks and their processing as well as lifecycle and techno economic analyses and policies as applied to bioenergy Bioenergy Principles and Applications provides readers with foundational information on first second and third generation bioenergy ranging from plant structure carbohydrate chemistry mass and energy balance thermodynamics and reaction kinetics to feedstock production logistics conversion technologies biorefinery lifecycle and techno economic analyses and government policies This textbook gives students and professionals an incomparable overview of the rapidly growing field of bioenergy Bioenergy Principles and Applications will be an essential resource for students engineers researchers and industry personnel interested in and working in the bioenergy field **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 *Advancements in Biomass Recalcitrance: The Use of Lignin for the Production of Fuels and Chemicals* Arthur J. Ragauskas, Chang Geun Yoo, 2019-01-21 Lignocellulosic biomass has great potentials as an alternative feedstock for fuels and chemicals For effective utilization of biomass biomass recalcitrance which is inherent resistance of plant cell walls to biological deconstruction needs to be reduced Among many factors in biomass lignin is significantly related to biomass recalcitrance Lignin a complex aromatic polymer is the largest non carbohydrate component 15 40% dry weight in most terrestrial plants In nature it provides a structural integrity facilitates water and nutrient transport and protects plants from microbial attack From a different angle lignin significantly contributes to biomass recalcitrance so it is necessary to reduce and or modify the lignin for effective conversion of biomass Genetic modifications of the lignin biosynthetic pathway and lignin targeting pretreatments have been developed to minimize the lignin induced biomass recalcitrance High carbon content of lignin also renders it an attractive feedstock for many applications About 100 000 to 200 000 tons of lignin can be generated per year as a byproduct from cellulosic ethanol production so valorization of these lignins could be one of keys for achieving economic biorefinery However investigations of lignin conversion have not been accomplished as the utilization of carbohydrates in biomass Depolymerization of lignin is still challenging because of its broad distribution of bond strengths recondensation of low molecular species and poor product selectivity Diverse biological and thermochemical depolymerization methods have been investigated to overcome these barriers In this Research Topic recent advancements in biomass recalcitrance by effective utilization of lignin are introduced *The Plant Cell Wall Methods and Protocols* Zoë A. Popper, **Plants and BioEnergy** Maureen C. McCann, Marcos S. Buckeridge, Nicholas C. Carpita, 2013-11-23 A country's vision for developing renewable and sustainable energy resources is typically propelled by three important drivers security cost and environmental impact The U S currently accounts for a quarter of the world's total oil consumption with domestic demands necessitating at an ever growing cost a net import of more than 50% of the oil used in this country At the same time Brazil because of its forward thinking on energy strategy is today energy independent As emerging economies around the world increase their petroleum use by large margins and as large fractions of that new consumption are necessarily supplied from unstable parts of the world the inevitable repercussions on petroleum driven economies will continue to escalate In addition there is an unequivocal imperative to take immediate and aggressive measures to reduce net greenhouse gas emissions by decreasing fossil fuel consumption and increasing our use of carbon neutral or carbon negative fuels as well as improving efficiency of

fuel use Economic growth and development worldwide depend increasingly on secure supplies of reliable affordable clean energy Together with its counterpart societies was convened the First Pan American Congress on Plants and BioEnergy which was held in June 2008 in Mrida Mexico Sponsored by the American Society of Plant Biologists this congress was designed to initiate Pan American research collaborations in energy biosciences At that congress the organizational committee committed themselves to continue the meeting biennially resulting in the 2nd Pan American Congress on Plants and BioEnergy to be held with the endorsement of ASPB July 6 10 2010 in S o Paulo Brazil Whereas the 1st congress covered a broad range of topics that bioenergy impacted the second congress will focus more on the advances in plant biology the genetic improvement of energy crop plants their fit into regional environments and the development of a sustainable energy agriculture

Plant Cell Walls Peter Albersheim, Alan Darvill, Keith Roberts, Ron Sederoff, Andrew Staehelin, 2010-04-15

Plant cell walls are complex dynamic cellular structures essential for plant growth development physiology and adaptation *Plant Cell Walls* provides an in depth and diverse view of the microanatomy biosynthesis and molecular physiology of these cellular structures both in the life of the plant and in their use for bioproducts and biofuels *Plant Cell Walls* is a textbook for upper level undergraduates and graduate students as well as a professional level reference book Over 400 drawings micrographs and photographs provide visual insight into the latest research as well as the uses of plant cell walls in everyday life and their applications in biotechnology Illustrated panels concisely review research methods and tools a list of key terms is given at the end of each chapter and extensive references organized by concept headings provide readers with guidance for entry into plant cell wall literature Cell wall material is of considerable importance to the biofuel food timber and pulp and paper industries as well as being a major focus of research in plant growth and sustainability that are of central interest in present day agriculture and biotechnology The production and use of plants for biofuel and bioproducts in a time of need for responsible global carbon use requires a deep understanding of the fundamental biology of plants and their cell walls Such an understanding will lead to improved plant processes and materials and help provide a sustainable resource for meeting the future bioenergy and bioproduct needs of humankind

Thermochemical Processing of Biomass Robert C. Brown, 2019-05-28 A comprehensive examination of the large number of possible pathways for converting biomass into fuels and power through thermochemical processes Bringing together a widely scattered body of information into a single volume this book provides complete coverage of the many ways that thermochemical processes are used to transform biomass into fuels chemicals and power Fully revised and updated this new edition highlights the substantial progress and recent developments that have been made in this rapidly growing field since publication of the first edition and incorporates up to date information in each chapter *Thermochemical Processing of Biomass Conversion into Fuels Chemicals and Power* 2nd Edition incorporates two new chapters covering condensed phased reactions of thermal deconstruction of biomass and life cycle analysis of thermochemical processing systems It offers a new introductory chapter that provides a more

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Nanotechnology for Bioenergy and Biofuel Production Mahendra Rai, Silvio Silvério da Silva, 2016-12-19 A unique feature of this book is its focus on nanotechnological solutions for the production of bioenergy and biofuels Coverage includes topics such as nanobiotechnology microalgae biofuel cells biomass pretreatment and biomass conversion An international team of experts also addresses the need to precisely characterize nanoparticles and the role of catalysts The range of topics addressed together with a chapter on risk management make this book a highly useful resource for a broad readership including physicists chemists microbiologists biotechnologists food technologists agricultural engineers and nanotechnologists

Sugarcane Alexandre De Oliveira, 2018-05-16 Sugarcane *Saccharum officinarum* L is considered one of the major bioenergy crops grown globally Thus sugarcane research to improve sustainable production worldwide is a vital task of the scientific community to address the increasing demands and needs for their products especially biofuels In this context this book covers the most recent research areas related to sugarcane production and its applications It is composed of 14 chapters divided into 5 sections that highlight fundamental insights into the current research and technology on this crop Sugarcane Technology and Research intends to provide the reader with a comprehensive overview in technology production and applied and basic research of this bioenergy species approaching the latest developments on varied topics related to this crop

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