

Microbiology Monographs

Series Editor: Alexander Steinbüchel

Birgit Kamm *Editor*

Microorganisms in Biorefineries

 Springer

Microorganisms In Biorefineries Microbiology Monographs

Scott C. Dulebohn



Microorganisms In Biorefineries Microbiology Monographs:

Microorganisms in Biorefineries Birgit Kamm, 2014-11-27 The book describes how plant biomass can be used as renewable feedstock for producing and further processing various products Particular attention is given to microbial processes both for the digestion of biomass and the synthesis of platform chemicals biofuels and secondary products Topics covered include new metabolic pathways of microbes living on green plants and in silage using lignocellulosic hydrolysates for the production of polyhydroxyalkanoates fungi such as *Penicillium* as host for the production of heterologous proteins and enzymes bioconversion of sugar hydrolysates into lipids production of succinic acid lactones lactic acid and organic lactates using different bacteria species cellulose hydrolyzing bacteria in the production of biogas from plant biomass and isoprenoid compounds in engineered microbes

Biorefineries Kurt Wagemann, Nils Tippkötter, 2018-12-06 This book offers a comprehensive review on biomass resources examples of biorefineries and corresponding products The first part of this book covers topics such as different biorefinery resources from agriculture wood processing residues and transport logistics of plant biomass In the second part expert contributors present biorefinery concepts of different biomass feedstocks including vegetable oils sugarcane starch lignocellulose and microalgae Readers will find here a summary of the syngas utilization and the bio oil characterization and potential use as an alternative renewable fuel and source for chemical feedstocks Particular attention is also given to the anaerobic digestion based and Organosolv biorefineries The last part of the book examines relevant products and components such as alcohols hydrocarbons bioplastics and lignin and offers a sustainability evaluation of biorefineries

Biorefinery Juan-Rodrigo Bastidas-Oyanedel, Jens Ejbye Schmidt, 2019-04-15 This book discusses the biorefinery of biomass feedstocks In depth chapters highlight the scientific and technical aspects and present a techno economic analysis of such systems By using a TEA approach the authors present feasible pathways for the conversion of biomass both residual biomass energy crops and algae biomass showing the different possibilities for the production of biochemical materials biofuels and fertilizers The concepts presented in this book will link companies investors and governments by providing a framework that will help reduce pollutants and create a biomass related economy that incorporates the newest developments and technologies in the area

Terpene Synthases, 2024-06-28 *Terpene Synthases* Volume 700 in the *Methods in Enzymology* series continues the legacy of this highly respected laboratory standard with its first dedicated collection on this important family of enzymes Terpene synthases are a diverse set of enzymes that use exquisite mechanisms to form complex poly cyclic hydrocarbon skeletons Chapters in this new volume include Structural analysis by X ray crystallography and cryo EM Understanding mechanisms using stable isotopes substrate analogs or computational tools Engineering fusion enzymes Ancestral terpene cyclases as well as the Sequence structure and function of non canonical terpene synthases Presents the only collection of current methodology for the investigation of terpene synthases with topics including from bioinformatics enzymology computational chemistry and engineering Includes chapters

authored by international experts in the field Provides the latest contributions in the leading serial Methods in Enzymology

Biofungicides: Eco-Safety and Future Trends Kamel A. Abd-Elsalam, Mousa A. Alghuthaymi, Salah M.

Abdel-Momen, 2023-12-01 The current volume focuses on novel sources of biofungicides primarily providing complete knowledge of microbial and phytochemical fungicides studying antifungal activity mechanisms as well as their role in disease management in plants and fungicide bioremediation The use of biofungicides as eco friendly alternative to typical synthetic fungicides is projected to play a significant role in organic farming in the future Key Features Discovers novel sources of biofungicides Describes the role of biofungicides in the control of plant diseases Studies antifungal activity mechanisms Explores how to survey and select promising biofungicides

Industrial Biorefineries and White Biotechnology Ashok

Pandey, Rainer Höfer, Mohammad Taherzadeh, Madhavan Nampoothiri, Christian Larroche, 2015-05-08 Industrial Biorefineries and White Biotechnology provides a comprehensive look at the increasing focus on developing the processes and technologies needed for the conversion of biomass to liquid and gaseous fuels and chemicals in particular the development of low cost technologies During the last 3 4 years there have been scientific and technological developments in the area this book represents the most updated information and technological perspective on the topic Provides information on the most advanced and innovative pretreatment processes and technologies for biomass Covers information on lignocellulosic and algal biomass to work on the principles of biorefinery Provides information on integration of processes for the pretreatment of biomass Designed as a textbook for both graduate students and researchers

Clean Energy and Resources Recovery

Vinay Kumar Tyagi, Kaoutar Aboudi, 2021-08-06 Clean Energy and Resources Recovery Biomass Waste Based Biorefineries Volume One presents the technological options for energy and resources recovery from all types of organic wastes The book addresses municipal and industrial sludges municipal solid waste agro residue animal wastes industrial waste forestry residue and algal biomass and provides a global overview of biomass waste production waste handling issues and related GHG emissions and climate change legislative waste management guidelines biomass composition and conventional methods for biomass waste treatment For each biomass waste chapters cover energy and bio based products recovery pre treatment methods process microbiology community dynamics co digestion reactor design and configuration and techno economic evaluation Case studies on upscaling technology and pilot and industry scale implementation are included alongside step by step calculations that integrate practical field data and regulatory requirements into the environmental design process Finally future trends and developments in advanced biotechnological concepts for biomass waste processing and management are also discussed Provides innovative strategies to increase the efficiency of anaerobic digestion including during pre and post treatment Includes industry case studies that demonstrate successful implementation processes and strategies Addresses municipal and industrial sludges municipal solid waste agro residue animal wastes industrial waste forestry residue and algal biomass and provides a global overview of biomass waste production

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

Industrial Biotechnology Christoph Wittmann, James C. Liao, 2017-03-06 The latest volume in the Advanced Biotechnology series provides an overview of the main product classes and platform chemicals produced by biotechnological processes today with applications in the food healthcare and fine chemical industries Alongside the production of drugs and flavors as well as amino acids bio based monomers and polymers and biofuels basic insights are also given as to the biotechnological processes yielding such products and how large scale production may be enabled and improved Of interest to biotechnologists bio and chemical engineers as well as those working in the biotechnological chemical and food industries

The Handbook of Polyhydroxyalkanoates, Three Volume Set Martin Koller, 2020-11-05 The Handbook of Polyhydroxyalkanoates PHA focusses on and addresses varying facets of PHA biosynthesis and processing spread across three volumes The first volume discusses feedstock aspects enzymology metabolism and genetic engineering of PHA biosynthesis It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and profiting from this understanding in order to enhance PHA biosynthesis in bio technological terms and in terms of PHA microstructure It further discusses making PHA competitive for outperforming established petrol based plastics on industrial scale and obstacles for market penetration of PHA This second volume focusses on thermodynamic and mathematical considerations of PHA biosynthesis bioengineering aspects regarding bioreactor design and downstream processing for PHA recovery from microbial biomass It covers microbial mixed culture processes and includes a strong industry focused section with chapters on the economics of PHA production industrial scale PHA production from sucrose next generation industrial biotechnology approaches for PHA production based on novel robust production strains and holistic techno economic and sustainability considerations on PHA manufacturing Third volume is on the production of functionalized PHA bio polyesters the post synthetic modification of PHA processing and additive manufacturing of PHA development and properties of PHA based bio composites and blends the market potential of PHA and follow up materials different bulk and niche applications of PHA and the fate and use of spent PHA items Divided into fourteen chapters it describes functionalized PHA and PHA modification processing and their application including degradation of spent PHA based products and fate of these bio polyesters during compositing and other disposal strategies Aimed at professionals and graduate students in Polymer plastic industry

wastewater treatment plants food industry biodiesel industry this set Presents comprehensive and holistic consideration of these microbial bioplastics in the volumes Enables reader to learn about microbiological enzymatic genetic synthetic biology and metabolic aspects of PHA biosynthesis based on the latest scientific discoveries Discusses design and operate a PHA production plant Strong focus on post synthetic modification preparation of functional PHA and follow up products and PHA processing Covers all related engineering considerations The Handbook of Polyhydroxyalkanoates Martin Koller, 2020-10-19 This second volume of the Handbook of Polyhydroxyalkanoates PHA Kinetics Bioengineering and Industrial Aspects focusses on thermodynamic and mathematical considerations of PHA biosynthesis bioengineering aspects regarding bioreactor design and downstream processing for PHA recovery from microbial biomass It covers microbial mixed culture processes and includes a strong industry focused section with chapters on the economics of PHA production industrial scale PHA production from sucrose next generation industrial biotechnology approaches for PHA production based on novel robust production strains and holistic techno economic and sustainability considerations on PHA manufacturing Aimed at professionals and graduate students in Polymer plastic industry wastewater treatment plants food industry biodiesel industry this book Provides an insight into microbial thermodynamics to reveal the central domain governing in PHA formation both aerobically and anaerobically Includes systematic overview of mathematical modelling approaches starting from low structured and formal kinetic models until modern tools like metabolic models cybernetic models and so forth Discusses challenges during scale up of PHA production processes and on development of non sterile processes and contamination resistant strains Presents a holistic picture of the current state of PHA research by mixed cultures Reviews the industry related point of view about current and future trends in PHA production and processing *Legumes for Soil Health and Sustainable Management* Ram Swaroop Meena, Anup Das, Gulab Singh Yadav, Rattan Lal, 2018-07-06 Sustainable management of soils is an important global issue of the 21st century Feeding roughly 8 billion people with an environmentally sustainable production system is a major challenge especially considering the fact that 10% of the world's population at risk of hunger and 25% at risk of malnutrition Accordingly the 68th United Nations UN general assembly declared 2016 the International Year of Pulses to raise awareness and to celebrate the role of pulses in human nutrition and welfare Likewise the assembly declared the year 2015 as the International Year of Soils to promote awareness of the role of healthy soils for a healthy life and the International Union of Soil Science IUSS has declared 2015-2024 as the International Decade of Soils Including legumes in cropping systems is an important toward advancing soil sustainability food and nutritional security without compromising soil quality or its production potential Several textbooks and edited volumes are currently available on general soil fertility or on legumes but to date none have been dedicated to the study of Legumes for Soil Health and Sustainable Management This is important aspect as the soil the epidermis of the Earth geoderma is the major component of the terrestrial biosphere This book explores the impacts of legumes on soil health and sustainability structure and functioning of

agro ecosystems agronomic productivity and food security BNF microbial transformation of soil N and P plant growth promoting rhizobacteria biofertilizers etc With the advent of fertilizers legumes have been sidelined since World War II which has produced serious consequences for soils and the environment alike Therefore legume based rational cropping soil management practices must support environmentally and economically sustainable agroecosystems based on sequential rotation and intercropping considerations to restore soil health and sustainability All chapters are amply illustrated with appropriately placed data tables figures and photographs and supported with extensive and cutting edge references The editors have provided a roadmap for the sustainable development of legumes for food and nutritional security and soil sustainability in agricultural systems offering a unique resource for teachers researchers and policymakers as well as undergraduate and graduate students of soil science agronomy ecology and the environmental sciences

Sustainable Recovery and Reutilization of Cereal Processing By-Products Charis M. Galanakis, 2018-02-03 Sustainable Recovery and Reutilization of Cereal Processing By Products addresses topics associated with the sustainable management of cereal manufacturing Emphasis is placed on current advisable practices general valorization techniques of cereal processing by products and the functional properties of healthy cereal by product components that lead to target applications in foods and nutraceuticals Focus includes discussions on wheat bran distillers dried grains based within the biorefinery concept and different techniques for the separation extraction recovery and formulation of valuable compounds including proteins arabinoxylans and beta glucan Addresses topics associated with the sustainable management of cereal manufacturing Places emphasis on current advisable practices Presents general valorization techniques of cereal processing by products Highlights the functional properties of healthy cereal by product components that lead to target applications in foods and nutraceuticals

Biosurfactants and Sustainability Paulo Ricardo Franco Marcelino, Silvio Silverio da Silva, Antonio Ortiz Lopez, 2023-05-09 Biosurfactants and Sustainability A timely and authoritative collection of resources on the sustainable production of biosurfactants In Biosurfactants and Sustainability a team of distinguished researchers presents emerging themes in the rapidly evolving field of biosurfactants The editors have chosen work that focuses on biosurfactants as eco friendly and versatile compounds of interest in societies seeking sustainable forms of development The book examines biosurfactants in the context of biorefineries and in the exploration of extremophilic microorganisms for biosurfactant production The included works discuss biosurfactant production from different lignocellulosic and amylaceous raw materials as well as oilseeds and other agro industrial byproducts Readers will also find A thorough introduction to microorganisms producing biosurfactants as well as sustainable biosurfactant production in biorefineries Comprehensive explorations of the challenges of biosurfactant production in fermentation processes Practical discussions of bioreactors and metabolic engineering used in biosurfactant production Fulsome treatments of biosurfactant production using enzyme and novel biosurfactant applications in nanotechnology health agriculture and environmental cleanup Perfect for researchers and professionals with an interest in

biosurfactant application and biotechnology processes Biosurfactants and Sustainability will also benefit academic researchers industry scientists and engineers in biotechnology microbiology biomass conversion environmental science and engineering *Food Waste Reduction and Valorisation* Piergiuseppe Morone, Franka Papendiek, Valentina Elena Tartiu, 2017-04-26 This book adds a new dimension to the sustainability assessment of food waste reduction and valorisation policy analysis Featuring a transdisciplinary analysis by key experts in the field it identifies the drivers of change in food waste reduction and valorisation technologies by looking for example at the regulatory framework and at policy actions undertaken by local and global actors The book explores the development of regulations and policies for food waste prevention management and valorisation at a global as well as European Union level It also discusses the notion of food waste in legal terms and investigates the effects of the lack of a standard universal definition of food waste on the efficient use of by products promising processes and products for technological and commercial exploitation Utilising mathematical mapping methods to assess food consumption impacts and providing supply chain models that allow the testing of consumption scenarios the book goes on to discuss a series of emerging technologies tested at lab scale and or pilot scale and opportunities for the valorisation of food waste **Fermentation Microbiology and Biotechnology** E. M. T. El-Mansi, C. F. A. Bryce, Arnold L. Demain, A.R. Allman, 2011-12-12 Fermentation Microbiology and Biotechnology Third Edition explores and illustrates the diverse array of metabolic pathways employed for the production of primary and secondary metabolites as well as biopharmaceuticals This updated and expanded edition addresses the whole spectrum of fermentation biotechnology from fermentation kinetics and dynam **Sustainable Biotechnology- Enzymatic Resources of Renewable Energy** Om V. Singh, Anuj K. Chandel, 2018-08-25 Nature offers abundant renewable resources that can be used to partially replace fossil fuels and commodity chemicals but issues of cost technology readiness levels and compatibility with existing distribution networks remain huge challenges Cellulosic ethanol and biodiesel are the most immediately obvious target fuels with hydrogen methane and butanol as other potentially viable products This book continues to bridge the technology gap and focus on critical aspects of lignocellulosic biomolecules and the respective mechanisms regulating their bioconversion to liquid fuels into energy and value added products of industrial significance This book is a collection of reviews elucidating several broad ranging areas of progress and challenges in the utilization of sustainable resources of renewable energy especially in biofuels This book comes just at a time when government and industries are accelerating their efforts in the exploration of alternative energy resources with expectations of the establishment of long term sustainable alternatives to petroleum based liquid fuels Apart from liquid fuel this book also emphasizes the use of sustainable resources for value added products which may help in revitalizing the biotechnology industry at a broader scale This book also provides a comprehensive review of basic literature and advance research methodologies to graduate students studying environmental microbiology chemical engineering bio economy and microbial biotechnology *Fermentation*

Microbiology and Biotechnology, Fourth Edition E. M. T. El-Mansi, Jens Nielsen, David Mousdale, Ross P. Carlson, 2018-12-17 Fermentation Microbiology and Biotechnology 4th Edition explores and illustrates the broad array of metabolic pathways employed for the production of primary and secondary metabolites as well as biopharmaceuticals This updated and expanded edition addresses the whole spectrum of fermentation biotechnology from fermentation kinetics and dynamics to protein and co factor engineering It also sheds light on the new strategies employed by industrialist for increasing tolerance and endurance of microorganisms to the accumulation of toxic wastes in microbial cell factories The new edition builds upon the fine pedigree of its earlier predecessors and extends the spectrum of the book to reflect the multidisciplinary and buoyant nature of this subject area Key Features Covers the whole spectrum of the field from fermentation kinetics to control of fermentation and protein engineering Includes case studies specifically designed to illustrate industrial applications and current state of the art technologies Presents the contributions of eminent international academics and industrial experts Offers new chapters addressing The prospects and the role of bio fuels refineries Control of metabolic efflux to product formation in microbial cell factories and Improving tolerance of microorganisms to toxic byproduct accumulation in the fermentation vessel

Process Design Strategies for Biomass Conversion Systems Denny K. S. Ng, Raymond R. Tan, Dominic C. Y. Foo, Mahmoud M. El-Halwagi, 2016-02-08 This book covers recent developments in process systems engineering PSE for efficient resource use in biomass conversion systems It provides an overview of process development in biomass conversion systems with focus on biorefineries involving the production and coproduction of fuels heating cooling and chemicals The scope includes grassroots and retrofitting applications In order to reach high levels of processing efficiency it also covers techniques and applications of natural resource mass and energy conservation Technical economic environmental and social aspects of biorefineries are discussed and reconciled The assessment scales vary from unit to process and life cycle or supply chain levels The chapters are written by leading experts from around the world and present an integrated set of contributions Providing a comprehensive multi dimensional analysis of various aspects of bioenergy systems the book is suitable for both academic researchers and energy professionals in industry

Integrated Biorefineries Paul R. Stuart, Mahmoud M. El-Halwagi, 2012-12-10 Integrated Biorefineries Design Analysis and Optimization examines how to create a competitive edge in biorefinery innovation through integration into existing processes and infrastructure Leading experts from around the world working in design synthesis and optimization of integrated biorefineries present the various aspects of this complex process capturing the state of the art in the advancing bioeconomy The book defines an integrated biorefinery as a processing facility that transforms biomass into value added products from biofuels and biochemicals to food and pharmaceuticals The chapters cover biorefinery product and process design supply chains process analysis feedstocks technologies and policy and environmental analysis They focus on second generation feedstocks including forestry resources energy crops agricultural residues oils and various waste materials With the growing interest in sustainability in general and

in renewable resources in industrial facilities biorefineries are likely to play increasingly significant roles and have greater economic environmental and societal impact This book fills an information gap by presenting cutting edge advances that can effectively guide engineers and decision makers in the synthesis selection design analysis and optimization of biorefineries

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