

# RENEWABLE BIORESOURCES

Scope and Modification for Non-Food Applications



 **WILEY**

**EDITORS**

**Christian V. Stevens with Roland G. Verhé**

# Renewable Bioresources Scope And Modification For Non Food Applications

**Zengshe Liu, George Kraus**



### **Renewable Bioresources Scope And Modification For Non Food Applications:**

*Renewable Bioresources* Christian Stevens,Roland Verhé,2004-11-19 Renewable Bioresources scope and modification for non food applications is the first text to consider the broad concept of renewable materials from the socio economic aspects through to the chemical production and technical aspects of treating different raw products The text sets the context of the renewables debate with key opening chapters on green chemistry and the current situation of US and EU policy regarding sustainability and industrial waste The quantitative and technical scope and production of renewable resources is then discussed with material looking at integral valorisation the primary production of raw materials downstream processing and the identification of renewable crop materials The latter part of the book concludes with a discussion on the uses for renewable materials such as carbohydrates woods fibres biopolymers lipids and proteins in different industrial applications including a key chapter on the high value added industries Covers the broad concept of renewable resources from different points of view Takes readers through the identification production processing and end applications for renewable raw materials Considers and compares EU and US renewable resources and sustainability objectives Devotes one chapter to green chemistry and sustainability focussing on the green industrial processes This is an essential book for upper level undergraduates and Masters students taking modules on Renewable Resources Green Chemistry Sustainable Development Environmental Science Agricultural Science and Environmental Technology It will also benefit industry professionals and product developers who are looking at improved economic and environmental means of utilising renewable materials

**Monomers, Polymers and Composites from Renewable Resources** Mohamed Naceur Belgacem,Alessandro Gandini,2011-10-10 The progressive dwindling of fossil resources coupled with the drastic increase in oil prices have sparked a feverish activity in search of alternatives based on renewable resources for the production of energy Given the predominance of petroleum and carbon based chemistry for the manufacture of organic chemical commodities a similar preoccupation has recently generated numerous initiatives aimed at replacing these fossil sources with renewable counterparts In particular major efforts are being conducted in the field of polymer science and technology to prepare macromolecular materials based on renewable resources The concept of the bio refinery viz the rational exploitation of the vegetable biomass in terms of the separation of its components and their utilisation as such or after suitable chemical modifications is thus gaining momentum and considerable financial backing from both the public and private sectors This collection of chapters each one written by internationally recognised experts in the corresponding field covers in a comprehensive fashion all the major aspects related to the synthesis characterization and properties of macromolecular materials prepared using renewable resources as such or after appropriate modifications Thus monomers such as terpenes and furans oligomers like rosin and tannins and polymers ranging from cellulose to proteins and including macromolecules synthesized by microbes are discussed with the purpose of showing the extraordinary variety of materials that can be

prepared from their intelligent exploitation Particular emphasis has been placed on recent advances and imminent perspectives given the incessantly growing interest that this area is experiencing in both the scientific and technological realms Discusses bio refining with explicit application to materials Replete with examples of applications of the concept of sustainable development Presents an impressive variety of novel macromolecular materials

**Sustainable Inorganic Chemistry** David A. Atwood, 2016-09-21 The Earth's natural resources are finite and easily compromised by contamination from industrial chemicals and byproducts from the degradation of consumer products The growing field of green and sustainable chemistry seeks to address this through the development of products and processes that are environmentally benign while remaining economically viable Inorganic chemistry plays a critical role in this endeavor in areas such as resource extraction and isolation renewable energy catalytic processes waste minimization and avoidance and renewable industrial feedstocks Sustainable Inorganic Chemistry presents a comprehensive overview of the many new developments taking place in this rapidly expanding field in articles that discuss fundamental concepts alongside cutting edge developments and applications The volume includes educational reviews from leading scientists on a broad range of topics including inorganic resources sustainable synthetic methods alternative reaction conditions heterogeneous catalysis photocatalysis sustainable nanomaterials renewable and clean fuels water treatment and remediation waste valorization and life cycle sustainability assessment The content from this book will be added online to the Encyclopedia of Inorganic and Bioinorganic Chemistry

**Agriculture Waste Management and Bioresource** Suruchi Singh, Pardeep Singh, Anu Sharma, Moharana Choudhury, 2022-12-05 AGRICULTURE WASTE MANAGEMENT AND BIORESOURCE Comprehensive resource detailing the generation of agricultural waste and providing insight into waste management Agriculture Waste Management and Bioresource provides thorough coverage of the generation of agricultural waste with essential thought leadership about various options in managing the waste including composting vermicomposting to form manure and biogas generation Readers take a crucial step toward more sustainable development and creating a greener planet The text includes a wide range of information regarding resource recovery from the waste of the agriculture sector energy generation biofuels reduction in the amount and volume of waste through circular economies and much more The authors place particular importance on understanding and managing agricultural waste concerning the sustainability of the environment in the era of global climate change Topics covered in Agriculture Waste Management and Bioresource include Categories and amounts of agricultural wastes seen in a worldwide perspective and current challenges and perspectives in handling agricultural wastes State of the art processing technologies relevant for agricultural wastes categories and sustainable methods used for management of agricultural biomass Bioethanol production from lignocellulose waste of agricultural waste biomass and biogas production through anaerobic digestion of agricultural wastes Mechanical and chemical processing aerobic and anaerobic treatment other biological processing methods and thermal processing Academics students and industry

professionals in environmental science and engineering waste management and agriculture can use the valuable insights in Agriculture Waste Management and Bioresource to understand the latest in the field and the advancements that can propel us towards a better and more sustainable future

**Unsaturated Polyester Resins** Sabu Thomas, Mahesh Hosur, Cintil Jose Chirayil, 2019-07-11 *Unsaturated Polyester Resins Fundamentals Design Fabrication and Applications* explains the preparation techniques and applications relating to the use of unsaturated polyester resin systems for blends interpenetrating polymer networks IPNs gels composites and nanocomposites enabling readers to understand and utilize the improved material properties that UPRs facilitate Chapters cover unsaturated polyester resins and their interaction at the macro micro and nano levels in depth studies on the properties and analysis of UPR based materials and the applications of UPR based composites blends IPNs and gels across a range of advanced commercial and industrial fields This is a highly detailed source of information on unsaturated polyester resins supporting academics researchers and postgraduate students working with UPRs polyesters polymeric or composite materials polymer chemistry polymer physics and materials science as well as scientists R D professionals and engineers in industry Covers the use of unsaturated polyester resin systems for blends IPNs gels composites and nanocomposites Presents cutting edge techniques for the analysis and improvement of properties of advanced UPR based materials Unlocks the potential of unsaturated polyester resins in high performance materials for a range of advanced applications

**Bionanocomposites** Khalid Mahmood Zia, Farukh Jabeen, Muhammad Naveed Anjum, Saiqa Ikram, 2020-06-21 *Bionanocomposites Green Synthesis and Applications* provides an in depth study on the synthesis of a variety of bionanocomposites from different types of raw materials In addition the book offers an overview on the synthesis and applications of environmentally friendly bionanocomposites with an emphasis on bionanocomposites of natural products Final sections focus on various characterization techniques their production and the future prospects of sustainable bionanocomposites Outlines the major characterization methods and processing techniques for bionanocomposites Explores how bionanocomposites are being used to design new projects in medicine and environmental engineering Discusses how the properties of a variety of bionanocomposite classes make them suitable for particular industrial applications

**Handbook of Biopolymers and Biodegradable Plastics** Sina Ebnesajjad, 2012-12-31 *Biopolymers and Biodegradable Plastics* are a hot issue across the Plastics industry and for many of the industry sectors that use plastic from packaging to medical devices and from the construction industry to the automotive sector This book brings together a number of key biopolymer and biodegradable plastics topics in one place for a broad audience of engineers and scientists especially those designing with biopolymers and biodegradable plastics or evaluating the options for switching from traditional plastics to biopolymers Topics covered include preparation fabrication applications and recycling including biodegradability and compostability Applications in key areas such as films coatings controlled release and tissue engineering are discussed Dr Ebnesajjad provides readers with an in depth reference for the plastics industry material

suppliers and processors bio polymer producers bio polymer processors and fabricators and for industry sectors utilizing biopolymers automotive packaging construction wind turbine manufacturers film manufacturers adhesive and coating industries medical device manufacturers biomedical engineers and the recycling industry Essential information and practical guidance for engineers and scientists working with bioplastics or evaluating a migration to bioplastics Includes key published material on biopolymers updated specifically for this Handbook and new material including coverage of PLA and Tissue Engineering Scaffolds Coverage of materials and applications together in one handbook enables engineers and scientists to make informed design decisions      *Advances in Processing Technology* Gopal Kumar Sharma, Anil Dutt Semwal, Dev Kumar Yadav, 2021-11-29 The present book is an amalgamation of various topics which are quite relevant to academics pertaining to food science and technology Sincere attempts have been made to map consumer's perception in terms of sensory evaluation of processed foods and their role on quality determination To cover food safety the topic of advancement in the traceability and transparency of food supply chain is discussed in length Besides providing basic nutrition food has become an essential source of health promoting phyto ingredients too To take care of the concerned population therapeutic foods have also been discussed with their future trends Similarly recent trends in functional and Nutraceutical foods were also discussed in detail so as to give an exhaustive overlook of such subject matter To give impetus to the growing and aged generations the importance of the technology of weaning and geriatric foods is described in detail Bio preservation of various food products including fermentation had always attracted researchers for various reasons inclusive of its novel and chemical free approach of preservation which has been aptly covered under current expansions in microbiology for food preservation and also under progression in biotechnology and its application in food processing The cross linkage of advance technologies inclusive of nano science is elaborated as technological advances in nano science for specific food and nutrition delivery Oil and spice commerce are two giants pillars in food processing industries and readers would surely be wishing to understand the developments in the technology of oils refineries and condiments Smart and intelligent packing systems always extend an upper hand as far as shelf life monitoring of any processed food is concerned especially when these are import worthy products The science and technological approach of these packing innovations is also well covered Note T F does not sell or distribute the hardback in India Pakistan Nepal Bhutan Bangladesh and Sri Lanka This title is co published with NIPA

**Biomass and Bioenergy Solutions for Climate Change Mitigation and Sustainability** Rathoure, Ashok Kumar, Khade, Shankar Mukundrao, 2022-10-07 The depletion of fossil fuels is a major issue in energy generation hence biomass and renewable energy sources especially bioenergy are the solution The dependence on bioenergy has many benefits to mitigate environmental pollution It is imperative that the global society adopts these alternative sustainable energy sources in order to mitigate the constant growth of climate change Biomass and Bioenergy Solutions for Climate Change Mitigation and Sustainability highlights the challenges of energy conservation and current scenarios of existing fossil

fuel uses along with pollution potential of burning fossil fuel It further promotes the inventory assessment and use of biomass pollution control and techniques This book provides the solution for climate change mitigation and sustainability Covering topics such as biofuel policies economic considerations and microalgae biofuels this premier reference source is an essential resource for environmental scientists environmental engineers government officials business leaders politicians librarians students and faculty of higher education researchers and academicians      *Microwaves in Organic Synthesis* Antonio de la Hoz, André Loupy, 2013-02-26 The third edition of the bestselling two volume reference covers everything you need to know about microwave technology for synthesis from the best equipment to nonthermal effects from solid support reactions to catalysis Completely revised and updated with half of the authors completely new to the project this comprehensive work is clearly divided into two parts on the fundamentals of microwave irradiation and application of microwaves and synergies with other enabling techniques Also new to this edition are chapters on on line monitoring flow chemistry combination with ultrasounds and natural products including multicomponent reactions An indispensable source for organic catalytic physical and medicinal chemists      Bio-Based Plant Oil Polymers and Composites Samy Madbouly, Chaoqun Zhang, Michael R. Kessler, 2015-08-27 Bio based Plant Oil Polymers and Composites provides engineers and materials scientists a useful framework to help take advantage of the latest research conducted in this rapidly advancing field enabling them to develop and commercialize their own products quickly and more successfully Plant oil is one of the most attractive options as a substitute for non renewable resources in polymers and composites and is producing materials with very promising thermomechanical properties relative to traditional petroleum based polymers In addition to critical processing and characterization information the book assists engineers in deciding whether or not they should use a plant oil based polymer over a petroleum based polymer discussing sustainability concerns biodegradability associated costs and recommended applications The book details the advancements in the development of polymeric materials and composites from plant oils and provides a critical review of current applications in various fields including packaging biomedical and automotive applications Also includes the latest progress in developing multifunctional biobased polymers by increasing thermal conductivity or adding antibacterial properties for example Essential coverage of processing characterization and the latest research into polymeric materials and composites derived from plant oils thermoplastics thermosets nanocomposites and fiber reinforced composites Critically reviews the potential applications of plant oil based polymers including sensors structural parts medical devices and automotive interiors Includes the latest developments in multifunctional bio based polymer composites      **Natural Fiber Composites** Shishir Sinha, G.L. Devnani, 2022-07-06 This book focuses on the key areas and issues related to natural fibers and their reinforced polymer composites It begins with an introduction and classification of natural fibers and their different extraction methods followed by characterization techniques Further this book gives solutions to improved adhesion between natural fibers and different polymer matrices via different chemical

physical and biological treatment methods Fabrication procedures and characterization techniques for development and testing of composites including processing development and characterization have been included as well Applications of these composite materials for food packaging and structural and semi structural applications are also explained FEATURES Describes the extraction process of natural fibers with comparisons Covers the fundamental concepts for the characterization of natural fiber composites Includes a comparative study of different polymer matrices Provides insight about various fabrication methods Discusses diverse applications of these novel materials and the scope for commercialization and entrepreneurship This book is aimed at graduate students and researchers in materials polymers composites and characterization textile engineering chemical civil and mechanical engineering **Green Materials from Plant Oils**

Zengshe Liu, George Kraus, 2015 This book covers the synthesis of useful products and intermediates from plant oils which is a critically important area given current challenge of depleting fossil fuel reserves **Food Byproducts Management and Their Utilization**

Ricardo Gómez-García, Ana A. Vilas-Boas, Débora A. Campos, Maria Manuela Pintado, Cristóbal Noé Aguilar, 2024-01-09 Food byproducts derived from industrial processing is a serious worldwide problem because it generates environmental pollution and results in significant food and economic losses from food waste This new volume shows how food byproducts can be value added renewable sources with the application of novel biotechnologies that avoid hazardous chemicals The volume discusses the importance of valorizing food wastes and illustrates their value added properties for industry It explains the significant progress in bioresources processing for compound extraction and production as well as the increasing interest of food ingredients development in which health care environment and economics play an essential part in biotechnological research It considers the waste byproducts of various crops such as tomato melon maize berries soybean coffee and their uses in the generation of health benefiting bioactive compounds The volume goes on to explore the various biotechnological strategies to extract produce and recover bioactive compounds along with the cost effectiveness of these methods Key features Describes technological aspects in consolidated processing and bioprocessing of food by products Discusses technological aspects in biotechnology for food byproducts treatment and the richness of their biomolecules Looks at the nutraceutical and health benefit aspects of such biomolecules from food waste byproducts Provides attractive and sustainable methodologies for bioproduct extraction and recovery for industrial application This volume Food Byproducts Management and Their Utilization presents strategies that are of interest in food engineering green chemistry biotechnology and some other areas while paying special attention to biorefinery approaches and new challenges that industries are dealing with in the era of sustainable development It aims to encourage not only researchers but also governmental and enterprise sectors to recognize the value and applications of food byproducts and waste **Microbial Inoculants**

Vijay Kumar Sharma, Ajay Kumar, Michel R Zambrano Passarini, Shobhika Parmar, Vipin Kumar Singh, 2023-05-26 In the recent past beneficial microorganisms have been sustainably used in agriculture as a safe economic and effective



alternative to chemical fertilizers or pesticides These beneficial microbes including bacteria actinomycetes and yeast were efficiently applied in soil seeds fruits or plants as inoculants to achieve the optimum agricultural yield An efficient delivery method or enhanced shelf life of microbial inoculants in the soil or seed is still a matter of concern The response of local genetic or ecological factors after microbial applications are also unknown and less studied Therefore Microbial Inoculants Recent Progress and Applications fulfills the need to explore and learn about an efficient delivery mechanism selection of microbial strain as inoculants and related technological advances for the efficient and productive use of microbial inoculants Moreover factors like methods of formulation interaction between host plant and microbe impact of inoculation on the metabolomics of plants the effect of microbial inoculants on soil dynamics proteomics approach of plant microbe interaction as well as the registration and regulation process of bio inoculants for commercial production are described in 16 chapters by the leading academicians and researchers from different parts of the world Sums up the latest approaches and advancements in the field of microbial inoculants in microbial formulations and applications Proofs the potential development and applications of microbial inoculants as an alternative to chemical fertilizers herbicides and pesticides Shows the impact of microbial inoculants on microbial dynamics bioavailability and abiotic stress mitigation Gives insights on emerging challenges with the commercialization of microbial formulations technology patenting and legal perspectives

**Climate-Smart Sugarcane Cultivation** Rajan Bhatt,Krishan K. Verma,Shiv Prasad,Mauro Wagner de Oliveira,2025-10-21 Sugarcane is a crucial eco friendly cash crop with massive agro industrial value as a sweetener and a source of renewable energy Known for its high varietal resistance to changing climate scenarios sugarcane is also reported to be prone to biotic stresses like drought water logging salinity multiple soil related problems and nutrient deficiencies This new volume is a 700 plus page comprehensive resource offering state of the art practical information on sugarcane cultivation and management based on the practical experience knowledge and research from around the world Key features Discusses the impact of global warming and climate change on sugarcane production and offers mitigation and adaptation strategies Presents a plethora of new climate smart technologies for sugarcane cultivation and management Considers climate smart sugarcane fertilization strategies as well as climate smart pest management Looks at recycling and alternate uses of sugarcane products and byproducts for bioethanol production and other purposes *Foundations of High Performance Polymers* Abbas Hamrang,Bob A. Howell,2013-09-20 This book presents some fascinating phenomena associated with the remarkable features of high performance polymers and also provides an update on applications of modern polymers It offers new research on structure property relationships synthesis and purification and potential applications of high performance polymers The collection of topics i *Re-using Manuscripts in Late Medieval England* Hannah Ryley,2022 A fresh appraisal of late medieval manuscript culture in England examining the ways in which people sustained older books exploring the practices and processes by which manuscripts were crafted mended protected marked

gifted and shared During the long fifteenth century here 1375 1530 the demand for books in England flourished The fast developing book trade produced them in great quantity Fragments of manuscripts were often repurposed as flyleaves and other components such as palimpsests and alongside the creation of new books medieval manuscripts were also repaired recycled and re used This monograph examines the ways in which people sustained older books exploring the practices and processes by which manuscripts were crafted mended protected marked gifted and shared Drawing on the codicological evidence gathered from an extensive survey of extant manuscript collections in conjunction with historical accounts recipes and literary texts it presents detailed case studies exploring parchment production and recycling the re use of margins and second hand exchanges of books Its engagement with the evidence in and inscribed on surviving books enables a fresh appraisal of late medieval manuscript culture in England looking at how people went about re using books and arguing that over the course of this period books were made used and re used in a myriad of sustainable ways **Green Chemical**

**Analysis and Sample Preparations** Mahmoud H. El-Maghrabey,V. Sivasankar,Rania N. El-Shaheny,2022-06-20 This volume focuses on the most recent trends for greening analytical activities beginning with an introduction to green analytical chemistry followed by a discussion of green analytical chemistry metrics and life cycle assessment approach to analytical method development The chapters discuss two main topics first is the most recent techniques for greening sample pretreatment steps and second is modern trends for tailoring analytical techniques and instrumentation to implement the green analytical chemistry concept The role of different kinds of green solvents such as ionic liquids supercritical fluids deep eutectic solvents bio based solvents and surfactants as well as nanomaterials and green sorption materials in greening sample extraction steps is also a focus of this book Furthermore different approaches for greening chromatography as a key analytical technique are discussed The applications of nanomaterials in analytical procedures are deeply reviewed and miniaturization of spectrometers is also discussed as a recently evolved approach for efficient green on site analysis This book will appeal to a wide readership of academic and industrial researchers in different fields It can be used in the classroom for undergraduate and postgraduate students focusing on the development of new analytical procedures for organic and inorganic compounds determination in different kinds of samples characterized by complex matrices composition The book will also be useful for researchers that are interested in both chemical analysis and environment protection

**Fundamentals of Environmental and Toxicological Chemistry** Stanley E. Manahan,2013-02-25 Fundamentals of Environmental and Toxicological Chemistry Sustainable Science Fourth Edition covers university level environmental chemistry with toxicological chemistry integrated throughout the book This new edition of a bestseller provides an updated text with an increased emphasis on sustainability and green chemistry It is organized based on the five spheres of Earth s environment 1 the hydrosphere water 2 the atmosphere air 3 the geosphere solid Earth 4 the biosphere life and 5 the anthrosphere the part of the environment made and used by humans The first chapter defines environmental chemistry and

each of the five environmental spheres The second chapter presents the basics of toxicological chemistry and its relationship to environmental chemistry Subsequent chapters are grouped by sphere beginning with the hydrosphere and its environmental chemistry water pollution sustainability and water as nature s most renewable resource Chapters then describe the atmosphere its structure and importance for protecting life on Earth air pollutants and the sustainability of atmospheric quality The author explains the nature of the geosphere and discusses soil for growing food as well as geosphere sustainability He also describes the biosphere and its sustainability The final sphere described is the anthrosphere The text explains human influence on the environment including climate pollution in and by the anthrosphere and means of sustaining this sphere It also discusses renewable nonpolluting energy and introduces workplace monitoring For readers needing additional basic chemistry background the book includes two chapters on general chemistry and organic chemistry This updated edition includes three new chapters new examples and figures and many new homework problems

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