

## Hydrothermal Conversion Of Lipid Extracted Microalgae

This first volume of the Handbook of Biodiesel and Petrodiesel Fuels presents a representative sample of the population papers in the field of biodiesel fuels in general. Part I provides an overview of the research field on both biodiesel and petrodiesel fuels highlighting primary and secondary research fronts in these fields. Part II presents a representative sample of the population papers in the field of biooils covering major research fronts. The research on the biooils is a fundamental part of the research on the biodiesel fuels. The research in this field has intensified in recent years with the application of advanced catalytic technologies and nanotechnologies in both production and upgrading of biooils. It covers pyrolysis, hydrothermal liquefaction, and upgrading, and characterization and properties of biooils besides an overview of the research field. Part III presents a representative sample of the population papers in the field of biodiesel fuels in general covering major research fronts. The research in this field has progressed in the lines of production, properties, and emissions of biodiesel fuels. As in the case of biooils, catalysts and additives play a crucial role for the biodiesel fuels. It covers biomass-based catalyst-assisted

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

biodiesel production, enzymatic biodiesel production, additives in biodiesel production, properties, characterization, performance, and policies of biodiesel fuels besides an overview of the research field. Part IV presents a representative sample of the population papers in the field of glycerol, biodiesel waste, covering major research fronts. The research in this field has intensified in recent years with the increasing volume of biodiesel fuels, creating eco-friendly solutions for these wastes of biodiesel fuels for producing valuable biofuels and biochemicals from glycerol. It covers biohydrogen and propanediol production from glycerol as a case study for bioenergy and biochemicals, respectively. This book will be useful to academics and professionals in the fields of Energy Fuels, Chemical Engineering, Physical Chemistry, Biotechnology and Applied Microbiology, Environmental Sciences, and Thermodynamics. Ozcan Konur is both a materials scientist and social scientist by training. He has published around 200 journal papers, book chapters, and conference papers. He has focused on the bioenergy and biofuels in recent years. In 2018, he edited *Bioenergy and Biofuels*, which brought together the work of over 30 experts in their respective field. He also edited the *Handbook of Algal Science, Technology, and Medicine* with a strong section on the algal biofuels in 2020. Renewable fuel research and process development

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

requires interdisciplinary approaches involving chemists and physicists from both scientific and engineering backgrounds. Here is an important volume that emphasizes green chemistry and green engineering principles for sustainable process development from an interdisciplinary point of view. It creates an enriching knowledge base on green chemistry of biofuel production, sustainable process development, and green engineering principles for renewable fuel production. This book includes chapters contributed by both research scientists and research engineers with significant experience in biofuel chemistry and processes. The book offers an abundance of scientific experimental methods and analytical procedures and interpretation of the results that capture the state-of-the-art knowledge in this field. The wide range of topics make this book a valuable resource for academicians, researchers, industrial practitioners and scientists, and engineers in various renewable energy fields. Key features: • Emphasizes green chemistry and green engineering principles for sustainable process development for biofuel production • Discusses a wide array of biofuels from algal biomass to waste-to-energy technologies and wastewater treatment and activated sludge processes • Presents advances and developments in biofuel green chemistry and green engineering, including process intensification (microwaves/ultrasound), ionic liquids, and green

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

catalysis • Looks at environmental assessment and economic impact of biofuel production

Handbook of Biofuels Production, Second Edition, discusses advanced chemical, biochemical, and thermochemical biofuels production routes that are fast being developed to address the global increase in energy usage. Research and development in this field is aimed at improving the quality and environmental impact of biofuels production, as well as the overall efficiency and output of biofuels production plants. The book provides a comprehensive and systematic reference on the range of biomass conversion processes and technology. Key changes for this second edition include increased coverage of emerging feedstocks, including microalgae, more emphasis on by-product valorization for biofuels' production, additional chapters on emerging biofuel production methods, and discussion of the emissions associated with biofuel use in engines. The editorial team is strengthened by the addition of two extra members, and a number of new contributors have been invited to work with authors from the first edition to revise existing chapters, thus offering fresh perspectives. Provides systematic and detailed coverage of the processes and technologies being used for biofuel production Discusses advanced chemical, biochemical, and thermochemical biofuels production routes that are fast being developed to

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

address the global increase in energy usage  
Reviews the production of both first and second generation biofuels Addresses integrated biofuel production in biorefineries and the use of waste materials as feedstocks

**Key Features** The most comprehensive resource available on the biodiversity of algal species, their industrial production processes and their use for human consumption in food, health and varied applications. Emphasis on basic and applied research, addressing aspects of scale-up for commercial exploitation for the development of novel phytochemicals (phytochemicals from algae). Addresses the underexplored and underutilized potential of chemicals from marine sources for health benefits. Each chapter, written by expert contributors from around the world, includes a Dictionary of Terms, Key Facts, Summary Points, Figures and Tables, as well as up-to-date references. The second book in this two-volume set explores phycoremediation applications, and the sustainable use of algae for biofuels and other products of economic value. It also looks at aspects such as macro- and micro algal impact on marine ecosystem and remote sensing of algal blooms. The commercial value of chemicals of value to food and health is about \$6 billion annually, of which 30 percent relates to micro and macro algal metabolites and products for health food applications. As a whole, the two

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

volumes explore the aspects of diversity of micro and macro algal forms, their traditional uses; their constituents which are of value for food, feed, specialty chemicals, bioactive compounds for novel applications, and bioenergy molecules. Bio-business and the market share of algae-based products are also dealt with, providing global perspectives. Sustainable production of hydrocarbon biofuels from biomass, fuels that are fully compatible with existing internal combustion engines, will allow the global transport economy to transition to a sustainable energy source without the need for capital-intensive new infrastructures. Hydrocarbon Biorefinery: Sustainable Processing of Biomass for Hydrocarbon Biofuels presents a comprehensive and easy to understand consolidation of existing knowledge for the production of hydrocarbon biofuels from biomass. Three major areas for the conversion of biomass to hydrocarbon biofuels are addressed: i) Chemical and thermochemical conversion processes, ii) Biological and biochemical conversion processes, and iii) Conversion processes of biomass-derived compounds. Additionally, the book includes process design, life cycle analysis of various processes, reaction engineering, catalysts, process conditions and process concepts, and is supported with detailed case studies. The economic viability of each process is specifically addressed to provide a clear guide for the economic development of future

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

hydrocarbon biofuels. Hydrocarbon Biorefinery: Sustainable Processing of Biomass for Hydrocarbon Biofuels offers an all-in-one resource for researchers, graduate students, and industry professionals working in the area of bioenergy and will be of interest to energy engineers, chemical engineers, bioengineers, chemists, agricultural researchers, and mechanical engineers. Furthermore, this book provides structured foundational content on biorefineries for undergraduate and graduate students. Presents fundamental concepts and processes of hydrocarbon biofuel production, covering chemical, biological, and biomass-derived conversion processes Synthesizes the state-of-the-art research and commercial initiatives of this emerging concept into stand-alone chapters, serving as a structured resource for researchers and practitioners Emphasizes the process design and economic feasibility of each process using life cycle assessments to support commercial development Microalgae: Cultivation, Recovery of Compounds and Applications supports the scientific community, professionals and enterprises that aspire to develop industrial and commercialized applications of microalgae cultivation. Topics covered include conventional and emerging cultivation and harvesting techniques of microalgae, design, transport phenomena models of microalgae growth

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

in photobioreactors, and the catalytic conversion of microalgae. A significant focus of the book illustrates how marine algae can increase sustainability in industries like food, agriculture, biofuel and bioprocessing, among others. This book is a complete reference for food scientists, technologists and engineers working in the bioresource technology field. It will be of particular interest to academics and professionals working in the food industry, food processing, chemical engineering and biotechnology. Explores emerging technologies for the clean recovery of antioxidants from microalgae Includes edible oil and biofuels production, functional food, cosmetics and animal feed applications Discusses microalgae use in sustainable agriculture and wastewater treatment Considers the techno-economic aspects of microalgae processing for biofuel, chemicals, pharmaceuticals and bioplastics This book explores the most effective or promising catalytic processes for the conversion of biobased components into high added value products, as platform chemicals and intermediates.

Advances in Eco-fuels for Sustainable Environment presents the most recent developments in the field of environmentally friendly eco-fuels. Dr. Kalad Azad and his team of contributors analyze the latest bio-energy technologies and emission control strategies, while also considering other important factors, such as environmental sustainability and energy efficiency

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

improvement. Coverage includes biofuel extraction and conversion technologies, the implementation of biotechnologies and system improvement methods in the process industries. This book will help readers develop a deeper understanding of the relevant concepts and solutions to global sustainability issues with the goal of achieving cleaner, more efficient energy. Energy industry practitioners, energy policymakers and government organizations, renewables researchers and academics will find this book extremely useful. Focuses on recent developments in the field of eco-fuels, applying concepts to various medium-large scale industries. Considers the societal and environmental benefits, along with an analysis of technologies and research. Includes contributions from industry experts and global case studies to demonstrate the application of the research and technologies discussed.

This edited volume focuses on comprehensive state-of-the-art information about the practical aspects of cultivation, harvesting, biomass processing and biofuel production from algae. Chapters cover topics such as synthetic ecological engineering approaches towards sustainable production of biofuel feedstock, and algal biofuel production processes using wastewater. Readers will also discover more about the role of biotechnological engineering in improving ecophysiology, biomass and lipid yields. Particular attention is given to opportunities of

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

commercialization of algal biofuels that provides a realistic assessment of various techno-economical aspects of pilot scale algal biofuel production. The authors also explore the pre-treatment of biomass, catalytic conversion of algal lipids and hydrothermal liquefaction with the biorefinery approach in detail. In a nut shell, this volume will provide a wealth of information based on a realistic evaluation of contemporary developments in algal biofuel research with an emphasis on pilot scale studies.

Researchers studying and working in the areas of environmental science, biotechnology, genetic engineering and biochemistry will find this work instructive and informative.

This volume provides an overview of recent trends in bioremediation techniques. Gathering contributions by a multi-disciplinary team of authors, it reviews the available methodologies for the remediation of various types of waste, e.g. e-waste, wastewater, municipal solid waste and algal blooms. Bioprocessing techniques are not only used for environmental cleanup but also for the production of valuable added products from waste biomass. Accordingly, this book provides the reader with an update on current valorization techniques for biofuels, algal biorefineries, and the hydrothermal conversion of biomass. Given its interdisciplinary scope, the book offers a valuable asset for students, researchers and engineers working in biotechnology, environmental engineering, wastewater management, chemical engineering and related areas.

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

Waste Biorefinery: Potential and Perspectives offers data-based information on the most cutting-edge processes for the utilisation of biogenic waste to produce biofuels, energy products, and biochemicals – a critical aspect of biorefinery. The book explores recent developments in biochemical and thermo-chemical methods of conversion and the potential generated by different kinds of biomass in more decentralized biorefineries. Additionally, the book discusses the move from 200 years of raw fossil materials to renewable resources and how this shift is accompanied by fundamental changes in industrial manufacturing technologies (from chemistry to biochemistry) and in logistics and manufacturing concepts (from petrochemical refineries to biorefineries). Waste Biorefinery: Potential and Perspectives designs concepts that enable modern biorefineries to utilize all types of biogenic wastes, and to integrate processes that convert byproduct streams to high-value products, achieving higher cost benefits. This book is an essential resource for researchers and students studying biomass, biorefineries, and biofuels/products/processes, as well as chemists, biochemical/chemical engineers, microbiologists, and biotechnologists working in industries and government agencies. Details the most advanced and innovative methods for biomass conversion Covers biochemical and thermo-chemical processes as well as product development Discusses the integration of technologies to produce bio-fuels, energy products, and biochemicals Illustrates specific applications in numerous case studies for reference and teaching purposes

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

In 2014 NCM initiated a new project: “Test centers for green energy solutions – Biorefineries and Business needs” to strengthen Nordic bioeconomy by identifying potentials, obstacles, needs and opportunities. The Nordic bioeconomy has a unique profile: Upgrade of many types of residues also to higher value products; good collaboration between private and public sector; R&D efforts in all Nordic countries. However, shortcomings were also identified: few activities across Nordic countries beyond designated Nordic programs; too few upscaling facilities; need for improved framework conditions (within regulatory and market stimulus) for biobased products. This report is part of the Nordic Prime Ministers' green growth initiative: “The Nordic Region – leading in green growth” - read more in the web magazine “Green Growth the Nordic Way” at [www.nordicway.org](http://www.nordicway.org) or at [www.norden.org/greengrowth](http://www.norden.org/greengrowth)

Using SuperCritical Fluids (SCFs) in various processes is not new, because Mother Nature has been processing minerals in aqueous solutions at critical and supercritical pressures for billions of years. Somewhere in the 20th century, SCFs started to be used in various industries as working fluids, coolants, chemical agents, etc. Written by an international team of experts and complete with the latest research, development, and design, *Advanced Supercritical Fluids Technologies* is a unique technical book, completely dedicated to modern and advanced applications of supercritical fluids in various industries. *Advanced Supercritical Fluids Technologies* provides engineers and specialists in various industries dealing with SCFs as well as researchers, scientists, and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

students of the corresponding departments with a comprehensive overview of the current status, latest trends and developments of these technologies. Dr Igor Pioro is a professor at the University of Ontario Institute of Technology, Canada, and the Founding Editor of the ASME Journal of Nuclear Engineering and Radiation Science.

Since the industrial revolution the world's reliance on fossil fuels has been increasing at an accelerated rate. The negative environmental effects of burning fossil fuels and the demand for energy security have increased interest in renewable fuels technology. Using biomass as a feedstock for energy generation has emerged as an area of interest, and the focus of this study is on the sustainable production of a crude oil from the algal species *Chlorella vulgaris*. The derived crude oil is to serve as a feedstock for renewable diesel production. The constituents of this algae derived oil must be similar in structure and low in impurities, especially nitrogen and sulfur content, to allow for the economical upgrade of this oil to renewable diesel. Two methods for the generation of the crude oil were explored: direct oil extraction from the algal biomass and hydrothermal liquefaction of the algal biomass. Total algal lipid extraction from both dry and wet algal biomass was studied and multiple solvents, procedures and cell pretreatment methods were compared; this includes solvents at ambient conditions, supercritical carbon dioxide, liquefied dimethyl ether, ultrasonication, mechanical disruption and steaming. It was determined that pretreatment of the *Chlorella vulgaris* biomass is not necessary for total oil

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

extraction, that total oil extraction from dry algae can be achieved by using a 95 percent ethanol solvent and that total oil extraction from wet algae can be achieved by using a 6:77:17 w/w/w ratio of water to ethanol to hexane. The optimal oil extraction procedure was scaled up and a process was developed to fractionate the algal biomass and isolate the lipid fractions conducive to upgrading to renewable diesel. The crude oil produced through this method was analyzed and found to be suitable for economical upgrade to renewable diesel. However biomass conversion to oil was low; only about 13.5 percent of the biomass could be converted to oil due to the relatively low lipid content of the *Chlorella vulgaris* (about 18 percent lipids on a dry weight basis). The hydrothermal liquefaction of the *Chlorella vulgaris* biomass was capable of converting about 44 percent of the initial *Chlorella vulgaris* biomass to bio-crude. However, the quality of the oil produced was not ideal for upgrading to renewable diesel due to the high nitrogen and sulfur content of the oil and the diverse molecular structures of the oil constituents. In conclusion, it was recommended that a method to enhance *Chlorella vulgaris* lipid content, such as nitrogen starvation or the introduction of sugars in the growth media, should be adopted prior to harvest and that the developed oil extraction procedure should be used to produce a renewable upgradable crude oil.

Direct Thermochemical Liquefaction for Energy Applications presents the state-of-the-art of the value chains associated with these biomass conversion technologies. It covers multiple feedstock availability and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

feedstock composition impact on process chemistry and product quality and composition. Expert authors from around the world explore co-processing benefits, process parameters, implementation and scaling, upgrading to drop-in liquid biofuels or integration into existing petrochemical refinery infrastructure. Finally, these topics are put into a sustainability perspective by establishing an LCA framework for this type of process. Its focus on implementation based on the most comprehensive knowledge makes this book particularly useful for researchers and graduate students from all sorts of background working in the field of biomass and biofuels. It is also a valuable reference for engineers working to commercialize DTL technologies, engineering specialists designing process equipment, refinery professionals and developers. Focuses on implementation and scaling of direct thermochemical liquefaction technologies for biomass conversion into biofuels Covers the state-of-the-art of the technologies, as well as technical and sustainability implementation aspects Includes new approaches and concepts developed around the world within the different DTL technologies

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 production of bioenergy, including bioethanol, biomethane, biomethanol,

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

biohydrogen, and biodiesel Covers bioelectricity and marine microbial fuel cell (MFC) production from marine algae and microbes Discusses marine waste for bioenergy Considers commercialization and the global market Marine Bioenergy: Trends and Developments provides a valuable springboard for marine bioenergy research and development, making the book a must-have reference for scientists, engineers, and students. This second volume of the Handbook of Biodiesel and Petrodiesel Fuels presents a representative sample of the population papers in the field of feedstock-specific biodiesel fuels. The research on feedstocks for biodiesel fuels has first focused on the edible oils as first-generation biodiesel fuels. However, the public concerns about the competition with foods based on these feedstocks and adverse impact on the ecological diversity and deforestation have resulted in the exploration of nonedible-oil-based biodiesel fuels as second-generation biodiesel fuels in the first instance. Due to the ecological and cost benefits of treating wastes, waste oil-based biodiesel fuels as third-generation biodiesel fuels have emerged. Furthermore, following a series of influential review papers, the research has focused on the algal oil-based biodiesel fuels in recent years. Since the cost of feedstocks in general constitutes 85% of the total biodiesel production costs, the research focused more on improving biomass and lipid productivity in these research fields. Furthermore, since water, CO<sub>2</sub>, and nutrients (primarily N and P) have been major ingredients for the algal biomass and lipid production, the research has also

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

intensified in the use of wastewaters and flue gases for algal biomass production to reduce the ecological burdens and the production costs. Part 1 presents a representative sample of the population papers in the field of edible oil-based biodiesel fuels covering major research fronts. It covers soybean oil-based biodiesel fuels, palm oil-based biodiesel fuels, and rapeseed oil-based biodiesel fuels as case studies besides an overview paper. Part 2 presents a representative sample of the population papers in the field of nonedible oil-based biodiesel fuels covering major research fronts. It covers *Jatropha* oil-based biodiesel fuels, polanga oil-based biodiesel fuels, and moringa oil-based biodiesel fuels as case studies besides an overview paper. Part 3 presents a representative sample of the population papers in the field of waste oil-based biodiesel fuels covering major research fronts. It covers wastewater sludge-based biodiesel fuels, waste cooking oil-based biodiesel fuels, and microbial oil-based biodiesel fuels as case studies besides an overview paper. Part 4 presents a representative sample of the population papers in the field of algal oil-based biodiesel fuels covering major research fronts. It covers algal biomass production in general, algal biomass production in wastewaters, algal lipid production, hydrothermal liquefaction of algal biomass, algal lipid extraction, and algal biodiesel production besides an overview paper. This book will be useful to academics and professionals in the fields of Energy Fuels, Chemical Engineering, Physical Chemistry, Biotechnology and Applied Microbiology, Environmental Sciences, and Thermodynamics. Ozcan

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

Konur is both a materials scientist and social scientist by training. He has published around 200 journal papers, book chapters, and conference papers. He has focused on the bioenergy and biofuels in recent years. In 2018, he edited 'Bioenergy and Biofuels', that brought together the work of over 30 experts in their respective field. He also edited 'Handbook of Algal Science, Technology, and Medicine' with a strong section on the algal biofuels in 2020.

This book addresses a key innovative technology for decarbonization of the energy system: hydrothermal processing. It basically consists of treating biomass and wastes in a wet form, under pressure and temperature condition. This approach is becoming more and more attractive, as new feedstock and applications are appearing on the scene of bioeconomy and bioenergy. The hydrothermal processing of various type of biomass, waste, and residues, thus, raised the interest of many researchers and companies around the world, together with downstream upgrading processes and technologies: solid products as biochar, for instance, or liquid ones as crude bioliquids, are finding new market opportunities in circular economy schemes. The Special Issue collects recent innovative research works in the field, from basic to applied research, as well as pilot industrial applications/demo. It is a valuable set of references for those investing time and effort in research in the field. The biorefinery, integration of processes and technologies for biomass conversion, demands efficient utilization of all components. Hydrothermal processing is a potential clean technology to convert raw materials

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

such as lignocellulosic and aquatic biomass into bioenergy and high added-value compounds. This book aims to show fundamental concepts and key technological developments that enabled industrial application of hydrothermal processing. The scope of this book is primarily for scientists working in the biorefinery field as well as engineers from industry and potential investors in biofuels. Therefore, the information in this book will provide an overview of this technology applied to lignocellulosic materials and aquatic biomass, and especially new knowledge. Critically, this book brings together experts in the application of hydrothermal processes on lignocellulosic and aquatic biomass.

This book draws together a small selection of full-length papers based on presentations given at the 27th European Biomass Conference and Exhibition held in Lisbon, Portugal in 2019. The topics covered, which reflect the breadth of the program of the EUBCE conference itself, include biomass sources, various aspects of technologies used for the conversion of biomass to bioproducts and bioenergy, as well as different approaches to assessing environmental impacts, which include case studies based on different technologies in use in a range of countries.

Biomass is widely considered as a potential alternative to dwindling fossil fuel reserves. There is a large variety of biomass sources (oleaginous, lignocellulosic, algae, etc.), with many possible conversion routes and products. Currently, biomass is not just viewed as a source of biofuels, but also as an interesting feedstock for the production of bio-based chemicals that could

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

largely replace petrochemicals. In this context, the search for new sustainable and efficient alternatives to fossil sources is gaining increasing relevance within the chemical industry. There, the role of catalysis is often critical for the development of clean and sustainable processes, aiming to produce commodity chemicals or liquid fuels with a high efficiency and atom economy. This book gathers works at the cutting edge of investigation in the application of catalysis, for the sustainable conversion of biomass into biofuels and bio-based chemicals.

Achieving environmental sustainability with rapid industrialization is currently a major global challenge. Industries are the key economic drivers, but are also the main polluters as untreated/partially treated effluents from industry are usually discharged into the aquatic environment or dumped. Industrial effluents often contain highly toxic and hazardous pollutants, which cause ecological damage and present and health hazards to living beings. As such, there is a pressing need to find ecofriendly solutions to deal with industrial waste, and to develop sustainable methods for treating/detoxifying waste before it's released into the environment. As a low cost and eco-friendly clean technology, bioremediation can offer a sustainable alternative to conventional remediation technologies for the treatment and management of industrial wastes. This book (Volume II) describes the role of biological agents in the degradation and detoxification of organic and inorganic pollutants in industrial wastes, and presents recent bioremediation approaches for waste treatment and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

management, such as constructed wetlands, electro-bioremediation and nano-bioremediation, as well as microbial fuel cells. It appeals to students, researchers, scientists, industry professionals and experts in the field of microbiology, biotechnology, environmental sciences, eco-toxicology, environmental remediation and waste management and other relevant areas who are interested in biodegradation and bioremediation of industrial wastes for environmental safety.

This book enables readers to understand the theoretical aspects, key steps and scientific techniques with a detailed mechanism to produce biofuels from algae. Each chapter provides the latest developments and recent advancements starting from algal cultivation techniques to the production of value-added green fuels, chemicals and products with wide applications. The volume brings together a broad range of international and interdisciplinary experts, including chemical and biological engineers, biotechnologists, process engineers, environmentalists, pharmacists and nutritionists, to one platform to explore the beneficial aspects and challenges for an algal-based biorefinery. Chapters address cutting-edge issues surrounding algal cultivation, including genetic modification of algal strains, design and optimization of photobioreactors and open-pond systems, algal oil extraction techniques and algal-derived fuel products (biodiesel, bio-gasoline, jet fuels and bio-oil). Finally, the book considers the potential environmental impacts for establishing a sustainable algal biorefinery through lifecycle analysis, techno-economic assessment and supply chain management.

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

This book will be an important resource for students, academics and professionals interested in algal cultivation, biofuels and agricultural engineering, and renewable energy and sustainable development more broadly.

**Sub- and Supercritical Hydrothermal Technology: Industrial Applications** offers a practical view of a variety of industrial applications and their challenges, offering a deep understanding of the application of sub- and supercritical fluids and their techno-economic viability. This book covers a wide range of applications of hydrothermal processing that result in almost zero waste, high energy efficiency, sustainable chemical processes, and minimal impact over the life cycle. These applications include processing of hazardous waste, bioproducts, coal, lipids, heavy oil and bitumen, and carbon materials. The use of hot-compressed water instead of different organic solvents, such as methanol, acetone, and hexane, is an environmentally benign, green, and sustainable option which can help to design chemical processes that support green chemistry and engineering. This book is pertinent for researchers and professionals in the fields of chemical engineering, industrial chemistry, environmental engineering, materials engineering, and manufacturing.

Maintaining the high standards that made the previous editions such well-respected and widely used references, **Food Lipids: Chemistry, Nutrition, and Biotechnology, Fourth Edition** provides a new look at lipid oxidation and highlights recent findings and research. Always representative of the current state of lipid science, this

# File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

edition provides 16 new chapters and 21 updated chapters, written by leading international experts, that reflect the latest advances in technology and studies of food lipids. New chapters Analysis of Fatty Acid Positional Distribution in Triacylglycerol Physical Characterization of Fats and Oils Processing and Modification Technologies for Edible Oils and Fats Crystallization Behavior of Fats: Effect of Processing Conditions Enzymatic Purification and Enrichment and Purification of Polyunsaturated Fatty Acids and Conjugated Linoleic Acid Isomers Microbial Lipid Production Food Applications of Lipids Encapsulation Technologies for Lipids Rethinking Lipid Oxidation Digestion, Absorption and Metabolism of Lipids Omega-3 Polyunsaturated Fatty Acids and Health Brain Lipids in Health and Disease Biotechnologically Enriched Cereals with PUFAs in Ruminant and Chicken Nutrition Enzyme-Catalyzed Production of Lipid Based Esters for the Food Industry: Emerging Process and Technology Production of Edible Oils Through Metabolic Engineering Genetically Engineered Cereals for Production of Polyunsaturated Fatty Acids The most comprehensive and relevant treatment of food lipids available, this book highlights the role of dietary fats in foods, human health, and disease. Divided into five parts, it begins with the chemistry and properties of food lipids covering nomenclature and classification, extraction and analysis, and chemistry and function. Part II addresses processing and food applications including modification technologies, microbial production of lipids, crystallization behavior, chemical interesterification, purification, and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

encapsulation technologies. The third part covers oxidation, measurements, and antioxidants. Part IV explores the myriad interactions of lipids in nutrition and health with information on heart disease, obesity, and cancer, with a new chapter dedicated to brain lipids. Part V continues with contributions on biotechnology and biochemistry including a chapter on the metabolic engineering of edible oils.

Life Cycle Assessment of Wastewater Treatment addresses in detail the required in-depth life cycle assessment of wastewater treatment. This is to meet the special demands placed upon wastewater treatment processes, due to both the limited quantity and often low quality of water supplies. Wastewater management clearly plays a central role in achieving future water security in a world where water stress is expected to increase. Life cycle assessment (LCA) can be used as a tool to evaluate the environmental impacts associated with wastewater treatment and potential improvement options. This unique volume will focus on the analysis of wastewater treatment plants (WWTPs), using a life cycle assessment (LCA) approach. Key Features: Focuses on the analysis of wastewater treatment plants using a life cycle assessment (LCA) approach Discusses unconventional water sources such as recycled wastewater, brackish groundwater and desalinated seawater Explains life cycle assessment in detail, which has become one of the reference methods used to assess the environmental performance of processes over their complete life cycle, from raw material extraction, infrastructure construction and operation to

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

final dismantling Explores a technique (LCA) that is becoming increasingly popular amongst researchers in the water treatment field nowadays because of its holistic approach Based on the real life experiences, the subject of wastewater is presented in simple terms and made accessible to anyone willing to learn and experiment This book provides a detailed overview of aspects related to the overall provision chain for biokerosene as part of the global civil aviation business. Starting with a review of the current market situation for aviation fuels and airplanes and their demands, it then presents in-depth descriptions of classical and especially new types of non-edible biomass feedstock suitable for biokerosene provision. Subsequent chapters discuss those fuel provision processes that are already available and those still under development based on various biomass feedstock materials, and present e.g. an overview of the current state of the art in the production of a liquid biomass-based fuel fulfilling the specifications for kerosene. Further, given the growing interest of the aviation industry and airlines in biofuels for aviation, the experiences of an air-carrier are presented. In closing, the book provides a market outlook for biokerosene. Addressing a broad range of aspects related to the pros and cons of biokerosene as a renewable fuel for aviation, the book offers a unique resource. High-lipid algae are potential sources of biofuels. Lipids in this biomass provide a straightforward chemical route to hydrocarbon-based high energy-density fuels needed for diesel and jet engines. However, current schemes for producing these biofuels require large amounts of energy and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

solvents to recover the oil. The feedstocks have dilute concentrations (1 wt% or less) in aqueous media, and must be dewatered significantly to form biofuels. A hydrothermal environment, utilizing a highpressure, high-temperature, water-based medium, is well-suited for processing these dilute biomass feedstocks. Conversion of high-lipid model feedstocks to bio-crude oils was investigated over temperatures from 250 to 350 C and a wide range of reaction times (from minutes to several hours). Temperature and pressure controlled batch reactions were performed on *Isochrysis* sp., and *T. Weissflogii*. Chemical analysis was performed to give a detailed characterization of the products, including fatty acid conversion and oil yields. Product analysis was thorough enough to be used for simulation of the hydrothermal process. These results were used to fit a model for lipid reactions in hydrothermal systems. Life cycle assessment (LCA) of the algal hydrothermal process was performed for comparison to conventional algal biofuel production techniques. Extraction and conversion to fuels had similar energy inputs for either hydrothermal or extracted oil. *Algae Based Polymers, Blends, and Composites: Chemistry, Biotechnology and Material Sciences* offers considerable detail on the origin of algae, extraction of useful metabolites and major compounds from algal bio-mass, and the production and future prospects of sustainable polymers derived from algae, blends of algae, and algae based composites. Characterization methods and processing techniques for algae-based polymers and composites are discussed in detail, enabling researchers to apply the latest techniques to their own work. The conversion of bio-mass into high value chemicals, energy, and materials has ample financial and ecological importance, particularly in the era of declining petroleum reserves and global warming. Algae are an important source of biomass since they flourish rapidly and

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

can be cultivated almost everywhere. At present the majority of naturally produced algal biomass is an unused resource and normally is left to decompose. Similarly, the use of this enormous underexploited biomass is mainly limited to food consumption and as bio-fertilizer. However, there is an opportunity here for materials scientists to explore its potential as a feedstock for the production of sustainable materials. Provides detailed information on the extraction of useful compounds from algal biomass Highlights the development of a range of polymers, blends, and composites Includes coverage of characterization and processing techniques, enabling research scientists and engineers to apply the information to their own research and development Discusses potential applications and future prospects of algae-based biopolymers, giving the latest insight into the future of these sustainable materials

Biomass, Biofuels, Biochemicals: Biofuels: Alternative Feedstocks and Conversion Processes for the Production of Liquid and Gaseous Biofuels, Second Edition, provides general information, basic data and knowledge on one of the most promising renewable energy sources—liquid and gaseous biofuels—and their production and application. The book delineates green technologies for abating environmental crisis and enabling the transformation into a sustainable future. It provides date-based scientific information on the most advanced and innovative technology on biofuels, as well as the process scale-up and commercialization of various liquid and gaseous biofuels, detailing the functional mechanisms involved, various operational configurations, influencing factors and integration strategies. All chapters have been updated, with new chapters covering topics of current interest, including sustainability and biohydrogen. Presents a holistic view of biofuels in research, operation, scale-up and application Widens the scope of the existing

# File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

technologies, providing state-of-the-art information and knowledge Provides strategic integrations of various bioprocesses that are essential in establishing a circular biorefinery Contains interdisciplinary knowledge on the environment, molecular biology, engineering, biotechnology, microbiology and economic aspects Integrates various subjects, including biotechnology, bioengineering, molecular biology, environmental science, sustainability science and chemical engineering

This book discusses recent trends and developments in the microbial conversion process, which serves as an important route for biofuel production, with particular attention to bioreactors. It combines microbial conversion with multiphase flow and mass transfer, providing an alternative perspective for the understanding of microbial biomass and energy production process as well as enhancement strategy. This book is relevant to students and researchers who work in the fields of renewable energy, engineering and biotechnology. Policymakers, economists and industry engineers also benefit from this book, as it can be used as a resource for the implementation of renewable energy technologies.

Greenhouse Gases Balance of Bioenergy Systems covers every stage of a bioenergy system, from establishment to energy delivery, presenting a comprehensive, multidisciplinary overview of all the relevant issues and environmental risks. It also provides an understanding of how these can be practically managed to deliver sustainable greenhouse gas reductions. Its expert chapter authors present readers to the methods used to determine the greenhouse gas balance of bioenergy systems, the data required and the significance of the results obtained. It also provides in-depth discussion of key issues and uncertainties, such as soil, agriculture, forestry, fuel conversion and emissions formation. Finally, international case studies

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

examine typical GHG reduction levels for different systems and highlight best practices for bioenergy GHG mitigation. For bringing together into one volume information from several different fields that was up until now scattered throughout many different sources, this book is ideal for researchers, graduate students and professionals coming into the bioenergy field, no matter their previous background. It will be particularly useful for bioenergy researchers seeking to calculate greenhouse gas balances for systems they are studying. I will also be an important resource for policy makers and energy analysts. Uses a multidisciplinary approach to synthesize the diverse information that is required to competently execute GHG balances for bioenergy systems Presents an in-depth understanding of the science underpinning key issues and uncertainty in GHG assessments of bioenergy systems Includes case studies that examine ways to maximize the GHG reductions delivered by different bioenergy systems

Food Waste to Valuable Resources: Applications and Management compiles current information pertaining to food waste, placing particular emphasis on the themes of food waste management, biorefineries, valuable specialty products and technoeconomic analysis. Following its introduction, this book explores new valuable resource technologies, the bioeconomy, the technoeconomical evaluation of food-waste-based biorefineries, and the policies and regulations related to a food-waste-based economy. It is an ideal reference for researchers and industry professionals working in the areas of food waste valorization, food science and technology, food producers, policymakers and NGOs, environmental technologists, environmental engineers, and students studying environmental engineering, food science, and more. Presents recent advances, trends and challenges related to food waste valorization Contains invaluable knowledge on of

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

food waste management, biorefineries, valuable specialty products and technoeconomic analysis Highlights modern advances and applications of food waste bioresources in various products' recovery

Advances in Feedstock Conversion Technologies for Alternative Fuels and Bioproducts: New Technologies, Challenges and Opportunities highlights the novel applications of, and new methodologies for, the advancement of biological, biochemical, thermochemical and chemical conversion systems that are required for biofuels production. The book addresses the environmental impact of value added bio-products and agricultural modernization, along with the risk assessment of industrial scaling. The book also stresses the urgency in finding creative, efficient and sustainable solutions for environmentally conscious biofuels, while underlining pertinent technical, environmental, economic, regulatory and social issues. Users will find a basis for technology assessments, current research capability, progress, and advances, as well as the challenges associated with biofuels at an industrial scale, with insights towards forthcoming developments in the industry. Presents a thorough overview of new discoveries in biofuels research and the inherent challenges associated with scale-up Highlights the novel applications and advancements for biological, biochemical, thermochemical and chemical conversion systems that are required for biofuels production Evaluates risk management concerns, addressing the environmental impact of value added bio-products and agricultural modernization, and the risk assessment of industrial scaling

Pretreatment of Biomass provides general information, basic data, and knowledge on one of the most promising renewable energy sources—biomass for their pretreatment—which is one of the most essential and critical aspects of biomass-based

# File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

processes development. The quest to make the environment greener, less polluted, and less hazardous has led to the concept of biorefineries for developing bio-based processes and products using biomass as a feedstock. Each kind of biomass requires some kind of pretreatment to make it suitable for bioprocess. This book provides state-of-art information on the methods currently available for this. This book provides data-based scientific information on the most advanced and innovative pretreatment of lignocellulosic and algal biomass for further processing. Pretreatment of biomass is considered one of the most expensive steps in the overall processing in a biomass-to-biofuel program. With the strong advancement in developing lignocellulose biomass- and algal biomass-based biorefineries, global focus has been on developing pretreatment methods and technologies that are technically and economically feasible. This book provides a comprehensive overview of the latest developments in methods used for the pretreatment of biomass. An entire section is devoted to the methods and technologies of algal biomass due to the increasing global attention of its use. 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 Useful for researchers intending to study scale-up Provides information on integration of processes and technologies for the pretreatment of biomass

Green Sustainable Processes for Chemical and Environmental Engineering and Science: Supercritical Carbon Dioxide as Green Solvent provides an in-depth review on the area of green processes for the industry, focusing on the separation, purification and extraction of medicinal, biological and bioactive compounds utilizing supercritical carbon dioxide as a green solvent and their applications in pharmaceuticals,

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

polymers, leather, paper, water filtration, textiles and more. Chapters explore polymerization, polymer composite production, polymer blending, particle production, microcellular foaming, polymer processing using supercritical carbon dioxide, and a method for the production of micro- and nano-scale particles using supercritical carbon dioxide that focuses on the pharmaceutical industry. A brief introduction and limitations to the practical use of supercritical carbon dioxide as a reaction medium are also discussed, as are the applications of supercritical carbon dioxide in the semiconductor processing industry for wafer processing and its advantages and obstacles. Reviews available green solvents for extraction, separation, purification and synthesis Outlines environmentally friendly chemical processes in many applications, i.e., organic reactions, metal recovery, etc. Includes numerous, real industrial applications, such as polymers, pharmaceuticals, leather, paper, water filtration, textiles, food, oils and fats, and more Gives detailed accounts of the application of supercritical CO<sub>2</sub> in polymer production and processing Provides a process for extraction, separation and purification of compounds of biological medicinal importance Gives methods for nanoparticle production using supercritical carbon dioxide Provides a systematic discussion on the solubility of organic and organometallic compounds This book presents a review and in-depth analyses of improved biotechnological processes emphasizing critical aspects and challenges of lignocellulosic biomass conversion into biofuels and value-added products especially using extremophiles and recombinant microorganisms. The book specifically comprises extremophilic production of liquid and gaseous biofuels (bioethanol, biobutanol, biodiesel, biohydrogen, and biogas) as well as value added products (e.g. single cell

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

protein, hydrocarbons, lipids, exopolysaccharides, and polyhydroxyalkanoates). The book also provides the knowledge on how to develop safe, more efficient, sustainable, and economical integrated processes for enhanced conversion of lignocellulosic feedstocks to liquid and gaseous biofuels. Finally the book describes how to perform the techno-economical and life-cycle assessments of new integrated processes involving extremophiles. These modeling exercises are critical in addressing any deficiencies associated with the demonstration of an integrated biofuels and value-added products production process at pilot scale as well as demonstration on the commercialization scale.

Comprehensive Energy Systems provides a unified source of information covering the entire spectrum of energy, one of the most significant issues humanity has to face. This comprehensive book describes traditional and novel energy systems, from single generation to multi-generation, also covering theory and applications. In addition, it also presents high-level coverage on energy policies, strategies, environmental impacts and sustainable development. No other published work covers such breadth of topics in similar depth. High-level sections include Energy Fundamentals, Energy Materials, Energy Production, Energy Conversion, and Energy Management. Offers the most comprehensive resource available on the topic of energy systems. Presents an authoritative resource authored and edited by leading experts in the field. Consolidates information currently scattered in publications from different research fields (engineering as well as physics, chemistry,

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

environmental sciences and economics), thus ensuring a common standard and language

Innovative Energy Conversion from Biomass Waste offers a new approach to optimizing energy recovery from waste using thermochemical conversion. Instead of conventional pinch technology, the book proposes integrated systems employing exergy recovery and process integration technologies to minimize exergy loss due to entropy generation. This innovative approach is demonstrated in three case studies using high-potential low-rank fuels from industrial waste products with high moisture content, high volatile matter, and high hemicellulose content. From these case studies, readers are provided with three different examples of biomass type, pre-treatment route, and conversion, from fruit bunch cofired within existing coal power plants, black liquor in a stand-alone system, and rice waste processing integrated into existing agricultural systems. Innovative Energy Conversion from Biomass Waste is a valuable resource for researchers and practitioners alike, and will be of interest to environmental scientists, biotechnologists, and chemical engineers working in waste-to-energy and renewable energy. Provides a new approach to developing systems based on exergy recovery and process integration technologies Discusses the possible routes of energy recovery in different scenarios from selected low-rank fuels from industrial waste biomass Includes a replicable and applicable efficiency improvement method for different process developments

Engineering the physical, chemical, and energy

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

properties of lignocellulosic biomass is important to produce high-quality consistent feedstocks with reduced variability for biofuels production. The emphasis of this book will be the beneficial impacts that mechanical, chemical, and thermal preprocessing methods can have on lignocellulosic biomass quality attributes or specifications for solid and liquid biofuels and biopower production technologies. "Preprocessing" refers to treatments that can occur at a distance from conversion and result in an intermediate with added value, with improved conversion performance and efficiency. This book explores the effects of mechanical, chemical, and thermal preprocessing methods on lignocellulosic biomass physical properties and chemical composition and their suitability for biofuels production. For example, biomass mechanical preprocessing methods like size reduction (which impacts the particle size and distribution) and densification (density and size and shape) are important for feedstocks to meet the quality requirements for both biochemical and thermochemical conversion methods like enzymatic conversion, gasification, and pyrolysis process. Thermal preprocessing methods like drying, deep drying, torrefaction, steam explosion, hydrothermal carbonization, and hydrothermal liquefaction effect feedstock's proximate, ultimate and energy property, making biomass suitable for both solid and liquid fuel production. Chemical preprocessing which includes washing, leaching, acid, alkali, and ammonia fiber explosion that can enable biochemical composition, such as modification of lignin and hemicellulose, and impacts

## File Type PDF Hydrothermal Conversion Of Lipid Extracted Microalgae

the enzymatic conversion application for liquid fuels production. This book also explores the integration of these preprocessing technologies to achieve desired lignocellulosic biomass quality attributes for biofuels production.

Handbook of Biofuels Production Woodhead Publishing

[Copyright: 0d1a50dedb91d1916628e77ffce0da83](#)