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[Microalgae Cultivation for Biofuels Production](#) [Microalgal Production for Biomass and High-Value Products](#) **Handbook of Microalgae-Based Processes and Products** **Handbook of Microalgal Culture** [Microalgae as a Feedstock for Biofuels](#) **Sustainable Downstream Processing of Microalgae for Industrial Application** **Microalgae as a Source of Bioenergy: Products, Processes and Economics** *Algal Biorefinery: An Integrated Approach* **Biofuels** [Microalgae as a Feedstock for Biofuels](#) **Energy from Microalgae** *Case Study of Innovative Projects* *Advances in Biofuels and Bioenergy* *Microalgal Hydrogen Production* **Microalgae-Based Biofuels and Bioproducts** *Biomass and Biofuels from Microalgae* **Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae** *Biofuels from Algae* **Microalgae Biotechnology for Development of Biofuel and Wastewater Treatment** *Handbook of Algal Biofuels* *Process Systems Engineering for Biofuels Development* **Biofuels Chemicals from Microalgae** **Microalgal Biotechnology** *Pigments from Microalgae* *Handbook* **Green Energy to Sustainability: Strategies for Global Industries** **Microalgal Biotechnology** **Nutraceutical Fatty Acids from Oleaginous Microalgae** **Advances in Biofuel Production** **Handbook of Biomass Valorization for Industrial Applications** *Microalgal Biotechnology* [Microalgae for Environmental Biotechnology](#) **Microalgae Biotechnology for Food, Health and High Value Products** **Blue Biotechnology** **Biotechnological Applications of Microalgae** **Algal Biofuels** **Bioenergy and Biofuels** **Handbook of Microalgae-Based Processes and Products** *Handbook of Marine Microalgae*

Biofuels Feb 25 2022 This book offers the current state of knowledge in the field of biofuels, presented by selected research centers from around the world. Biogas from waste production process and areas of application of biomethane were characterized. Also, possibilities of applications of wastes from fruit bunch of oil palm tree and high biomass/bagasse from sorghum and Bermuda grass for second-generation bioethanol were presented. Processes and mechanisms of biodiesel production, including the review of catalytic transesterification process, and careful analysis of kinetics, including bioreactor system for algae breeding, were widely analyzed. Problem of emissivity of NOx from engines fueled by B20 fuel was characterized. The closing chapters deal with the assessment of the potential of biofuels in Turkey, the components of refinery systems for production of biodegradable plastics from biomass. Also, a chapter concerning the environmental conditions of synthesis gas production as a universal raw material for the production of alternative fuels was also added.

Microalgae Biotechnology for Food, Health and High Value Products Jan 03 2020 "Microalgae Biotechnology for Food, Health and High Value Products" presents the latest technological innovations in microalgae production, market status of algal biomass-based products, and future prospects for microalgal applications. It provides stimulating overviews from different perspectives of application that demonstrate how rapidly the commercial production of microalgae-based food, health and high value products is advancing. It also addresses a range of open questions and challenges in this field. The book highlights the latest advances of interest to those already working in the field, while providing a comprehensive overview for those readers just beginning to learn about the promise of microalgae as a sustainable source of both specialty and commercial products. It offers a valuable asset for commercial algae producers, algae product developers, scientific researchers and students who are dedicated to the advancement of microalgae biotechnology for applications in health, diet, nutrition, cosmetics, biomaterials etc.

[Microalgae for Environmental Biotechnology](#) Feb 02 2020 This is the first book to present the idea of

using Industry 4.0 and smart manufacturing in the microalgae industry for environmental biotechnology. It provides the latest developments on microalgae for use in environmental biotechnology, explains process analysis from an engineering point of view, and discusses the transition to smart manufacturing and how state of the art technologies can be incorporated. It covers applications, technologies, challenges, and future perspectives. • Showcases how Industry 4.0 can be applied in algae industry • Covers new ideas generated from Industry 4.0 for Industrial Internet of Things (IIoT) • Demonstrates new technologies invented to cater to Industry 4.0 in microalgae • Features worked examples related to biological systems Aimed at chemical engineers, bioengineers, and environmental engineers, this is an essential resource for researchers, academics, and industry professionals in the microalgae biotechnology field.

Case Study of Innovative Projects Nov 24 2021 In a global world, where the acceleration of technological changes is happening in all industrial sectors, a special focus is forced on innovation and creativity. The book has gathered a small number of sectors where innovation is being the main vector to achieve the competitiveness that companies are craving. The motivation to choose these sectors has been preceded by a careful selection in which we wanted to pick up those in which innovation is a key today. Different aspects push to create and innovate: the environment in general and in particular climate change is forcing to rethink sectors such as energy, infrastructure, water, biotechnology, materials, defense, education, or health. Dear reader, in your hand is a work that reflects the same spirit of the human being: curiosity and eagerness to overcome have allowed humanity to have evolved and still continue today.

Process Systems Engineering for Biofuels Development Feb 13 2021 A comprehensive overview of current developments and applications in biofuels production Process Systems Engineering for Biofuels Development brings together the latest and most cutting-edge research on the production of biofuels. As the first book specifically devoted to process systems engineering for the production of biofuels, Process Systems Engineering for Biofuels Development covers theoretical, computational and experimental issues in biofuels process engineering. Written for researchers and postgraduate students working on biomass conversion and sustainable process design, as well as industrial practitioners and engineers involved in process design, modeling and optimization, this book is an indispensable guide to the newest developments in areas including: Enzyme-catalyzed biodiesel production Process analysis of biodiesel production (including kinetic modeling, simulation and optimization) The use of ultrasonification in biodiesel production Thermochemical processes for biomass transformation to biofuels Production of alternative biofuels In addition to the comprehensive overview of the subject of biofuels found in the Introduction of the book, the authors of various chapters have provided extensive discussions of the production and separation of biofuels via novel applications and techniques.

Microalgae-Based Biofuels and Bioproducts Aug 22 2021 Microalgae-Based Biofuels and Bioproducts: From Feedstock Cultivation to End Products compiles contributions from authors from different areas and backgrounds who explore the cultivation and utilization of microalgae biomass for sustainable fuels and chemicals. With a strong focus in emerging industrial and large scale applications, the book summarizes the new achievements in recent years in this field by critically evaluating developments in the field of algal biotechnology, whilst taking into account sustainability issues and techno-economic parameters. It includes information on microalgae cultivation, harvesting, and conversion processes for the production of liquid and gaseous biofuels, such as biogas, bioethanol, biodiesel and biohydrogen. Microalgae biorefinery and biotechnology applications, including for pharmaceuticals, its use as food and feed, and value added bioproducts are also covered. This book's comprehensive scope makes it an ideal reference for both early stage and consolidated researchers, engineers and graduate students in the algal field, especially in energy, chemical and environmental engineering, biotechnology, biology and agriculture. Presents the most current information on the uses and untapped potential of microalgae in the production of bio-based fuels and chemicals Critically reviews the state-of-the-art feedstock cultivation of biofuels and bioproducts mass production from microalgae, including intermediate stages, such as

harvesting and extraction of specific compounds Includes topics in economics and sustainability of large-scale microalgae cultivation and conversion technologies

Microalgae as a Source of Bioenergy: Products, Processes and Economics Apr 29 2022

Microalgae could play an important role in the achievement of sustainability goals related to the generation of renewable energy and greenhouse gas (GHG) emissions. These photosynthetic microorganisms are able to capture CO₂ and, therefore, can be used to produce biofuels such as ethanol, methane and green diesel. Other factors, such as their high growth rate, ability to use wastewater as a culture medium and the ability to grow on non-arable land makes them a potentially economical source of biofuel production on a large scale. This monograph introduces the reader to the basic and applied science of microalgal biofuel production. Chapters in the volume give information about bioethanol and biogas production from microalgal sources, the fermentation process, optimization of culture parameters and industrial applications of biomass projects. The book is a useful reference for biotechnology and environmental science graduates and professionals interested in biofuel production.

Bioenergy and Biofuels Aug 29 2019 This book aims to inform readers about the recent developments in bioenergy and biofuels covering current issues from an interdisciplinary approach. It will also feature coverage of anticipated future trends related to each particular biofuel. Chapters will consist of original research presented by world class experts in their respective fields. A number of interdisciplinary areas will be incorporated such as Energy & Fuels, Biotechnology, Genomics, Economics, Optimization, Chemical Engineering, Mechanical Engineering and Algae Science. Examples will relate to a matrix of biofuel and energy types such as bioethanol, biobutanol, and biomethane.

Microalgae Biotechnology for Development of Biofuel and Wastewater Treatment Apr 17

2021 This book addresses microalgae, which represent a very promising biomass resource for wastewater treatment and producing biofuels. Accordingly, microalgae are also an expanding sector in biofuels and wastewater treatment, as can be seen in several high-profile start-ups from around the globe, including Solix Biofuels, Craig Venter's Synthetic Genomics, PetroSun, Chevron Corporation, ENN Group etc. In addition, a number of recent studies and patent applications have confirmed the value of modern microalgae for biofuels production and wastewater treatment systems. However, substantial inconsistencies have been observed in terms of system boundaries, scope, the cultivation of microalgae and oil extraction systems, production costs and economic viability, cost-lowering components, etc. Moreover, the downstream technologies and core principles involved in liquid fuel extraction from microalgae cells are still in their early stages, and not always adequate for industrial production. Accordingly, multilateral co-operation between universities, research institutes, governments, stakeholders and researchers is called for in order to make microalgae biofuels economical. Responding to this challenge, the book begins with a general introduction to microalgae and the algae industry, and subsequently discusses all major aspects of microalgal biotechnology, from strain isolation and robust strain development, to biofuel development, refinement and wastewater treatment.

Microalgal Biotechnology Mar 05 2020 "Microalgae are a valuable resource of carbon materials that may be used in biofuels, pharmaceuticals, cosmetics, and health supplements. Still, there are tremendous challenges in the microalgae production process, such as mass cultivation, strain improvement, biomass disruption, and reprocessing of nutrients and water that have been the encumbering microalgal industry in several ways. Microalgal biotechnology has the capability to introduce remarkable breakthroughs and innovations. This volume brings together current advancements in the field of microalgal biotechnology to provide understanding of the fundamentals and progress of the industry-oriented technologies. The volume covers biofuel production and its technical challenges; current trends of microalgae in agriculture, aquaculture and food biotechnology; market space; biosafety and other regulatory issues; and sustainability of microalgal products. The volume first provides insight into desmids and other conjugating algae along with prospective trends of diatoms. It then goes on to explore the commercial applications of microalgae

that take advantage of their bioactive compounds, natural colorants, and functional metabolites. The role of microalgae in agriculture, aquaculture, and the food sector are discussed, and tools from genome manipulation to bioprocess engineering are studied. Several chapters focus on future prospects of biofuel and biodiesel production for environmental and economic viability. The key features of the book: Presents the role of microalgae in various industries including food, agriculture, aquaculture, biofuel, and metabolites Shows the historical and prospective use of microalgae elements for economic and ecological benefits Explains the integrated technologies for massive production of microalgae-derived products Includes the various industrial case studies to improve the sustainable production of microalgae products Discusses current developments and confronts in microalgae bioprocessing Microalgal Biotechnology: Bioprospecting Microalgae for Functional Metabolites towards Commercial and Sustainable Applications will be a useful reference for academicians, researchers, industry professionals, postgraduate students, and policymakers who are interested in future prospects of microalgae commercialization"--

Pigments from Microalgae Handbook Sep 10 2020 The Pigments from Microalgae Handbook presents the current state of knowledge on pigment production using microalgae-based processes, and covers both the scientific fundamentals of this technology and its practical applications. It addresses biology, chemistry, biochemistry, analysis and engineering aspects, as well as applications of natural pigments in photosynthetic organisms. The book also describes the analytical procedures associated with the characterization of pigments and the engineering aspects of microalgal pigment production. It considers the three major classes of pigments(chlorophylls, carotenoids and phycobiliproteins) produced and surveys the main commercial applications of these chemicals. The book offers a valuable source of information for industrial researchers and practitioners in industrial biotechnology, as it covers various engineering aspects of microalgal pigment production, such as bioreactors and bioprocesses, industrial extraction processes, and the bioeconomy of production including life-cycle assessment. The book will also be of interest to undergraduate and graduate students of biochemistry, food chemistry, and industrial microbiology.

Microalgal Hydrogen Production Sep 22 2021 Hydrogen could be the fuel of the future. Some microorganisms can produce hydrogen upon illumination. Biological methods of production could be greener than chemical or physical production methods, but the potential of biological methods is still being harnessed. This comprehensive book highlights the key steps necessary for future exploitation of solar-light-driven hydrogen production by microalgae. The highly regarded editors bring together 46 contributors from key institutions in order to suggest and examine the most significant issues that must be resolved to achieve the goal of practical implementation, while proposing reliable methodologies and approaches to solve such issues. This 19 chapter book will be an indispensable resource for academics, undergraduate and graduate students, postgraduates and postdoctoral scholars, energy scientists, bio/chemical engineers, and policy makers working across the field of biohydrogen and bioenergy.

Handbook of Microalgae-Based Processes and Products Jul 29 2019 The Handbook of Microalgae-based Processes and Products provides a complete overview of all aspects involved in the production and utilization of microalgae resources at commercial scale. Divided into four parts (fundamentals, microalgae-based processes, microalgae-based products, and engineering approaches applied to microalgal processes and products), the book explores the microbiology and metabolic aspects of microalgae, microalgal production systems, wastewater treatment based in microalgae, CO₂ capture using microalgae, microalgae harvesting techniques, and extraction and purification of biomolecules from microalgae. It covers the largest number of microalgal products of commercial relevance, including biogas, biodiesel, bioethanol, biohydrogen, single-cell protein, single-cell oil, biofertilizers, pigments, polyunsaturated fatty acids, bioactive proteins, peptides and amino acids, bioactive polysaccharides, sterols, bioplastics, UV-screening compounds, and volatile organic compounds. Moreover, it presents and discusses the available engineering tools applied to microalgae biotechnology, such as process integration, process intensification, and techno-economic analysis applied to microalgal processes and products, microalgal biorefineries, life cycle

assessment, and exergy analysis of microalgae-based processes and products. The coverage of a broad range of potential microalgae processes and products in a single volume makes this handbook an indispensable reference for engineering researchers in academia and industry in the fields of bioenergy, sustainable development, and high-value compounds from biomass, as well as graduate students exploring those areas. Engineering professionals in bio-based industries will also find valuable information here when planning or implementing the use of microalgal technologies. Covers theoretical background information and results of recent research. Discusses all commercially relevant microalgae-based processes and products. Explores the main emerging engineering tools applied to microalgae processes, including techno-economic analysis, process integration, process intensification, life cycle assessment, and exergy analyses.

Handbook of Marine Microalgae Jun 27 2019 Handbook of Microalgae: Biotechnology Advances offers complete coverage of marine microalgae, including biology, production techniques, biotechnological applications, economic perspectives of applications, and environmental effects of marine microalgae blooms. With contributions from world experts, Handbook of Microalgae: Biotechnology Advances focuses on microalgae from an organism perspective to offer a complete picture from evolution to biofuel. Focuses on a comprehensive approach from an organism point of view Contains full coverage of all aspects of microalgae from biology through biotechnological and biomedical applications Includes biological properties of commercial algal species Provides microalgae screening and identification methods, culturing methods and new aspects of processing [Microalgae as a Feedstock for Biofuels](#) Jan 27 2022 This Brief provides a concise review of the potential use of microalgae for biofuel production. The following topics are highlighted: the advantages of microalgae over conventional biofuel-producing crops; technological processes for energy production using microalgae; microalgal biomass production systems, production rates and costs; algae cultivation strategies and main culture parameters; biomass harvesting technologies and cell disruption; CO₂ sequestration; life cycle analysis; and algal biorefinery strategies. The conclusions section discusses the contribution of the technologies described to environmental sustainability and future prospects.

Microalgal Biotechnology Jul 09 2020 Microalgal Biotechnology presents an authoritative and comprehensive overview of the microalgae-based processes and products. Divided into 10 discreet chapters, the book covers topics on applied technology of microalgae. Microalgal Biotechnology provides an insight into future developments in each field and extensive bibliography. It will be an essential resource for researchers and academic and industry professionals in the microalgae biotechnology field.

Microalgal Production for Biomass and High-Value Products Oct 04 2022 Microalgae are a particularly interesting source of products that range from currently marketed human nutritionals and food ingredients, to potential sources of biofuels and animal feeds. Rapid advances in technology and commercial development are taking place worldwide. Importantly, algal cultivation does not compete with agriculture for land, water, and in some cases, fertilizer resources. Microalgal Production for Biomass and High-Value Products covers the field from a variety of perspectives with 14 chapters contributed by recognized academic experts and industrial practitioners. The book presents the latest technologies and innovations in algal biomass production, from cultivation in open ponds and photobioreactors, to strain selection, synthetic biology, pest control, harvesting, and processing. It explores novel algal products and addresses key issues, including markets, supply chains, business strategies, legal issues, current products, and future prospects. This book brings together the latest advances of interest to those already working in the field while providing an introduction to those beginning to learn about the promise of microalgae as a sustainable source of both specialty and commodity products. It gives stimulating overviews from many different perspectives that describe how laboratory and applied research are creating advances in commercial microalgae production. It also addresses the still many open questions and challenges in this field.

Green Energy to Sustainability: Strategies for Global Industries Aug 10 2020 Reviews the

latest advances in biofuel manufacturing technologies and discusses the deployment of other renewable energy for transportation. Aimed at providing an interface useful to business and scientific managers, this book focuses on the key challenges that still impede the realization of the billion-ton renewable fuels vision. It places great emphasis on a global view of the topic, reviewing deployment and green energy technology in different countries across Africa, Asia, South America, the EU, and the USA. It also integrates scientific, technological, and business development perspectives to highlight the key developments that are necessary for the global replacement of fossil fuels with green energy solutions. *Green Energy to Sustainability: Strategies for Global Industries* examines the most recent developments in biofuel manufacturing technologies in light of business, financial, value chain, and supply chain concerns. It also covers the use of other renewable energy sources like solar energy for transportation and proposes a view of the challenges over the next two to five decades, and how these will deeply modify the industrial world in the third millennium. The coming of age of electric vehicles is also looked at, as is the impact of their deployment on the biomass to biofuels value chain. Offers extensive updates on the field of green energy for global industries. Covers the structure of the energy business; chemicals and diesel from biomass; ethanol and butanol; hydrogen and methane; and more. Provides an expanded focus on the next generation of energy technologies. Reviews the latest advances in biofuel manufacturing technologies. Integrates scientific, technological and business perspectives. Highlights important developments needed for replacing fossil fuels with green energy. *Green Energy to Sustainability: Strategies for Global Industries* will appeal to academic researchers working on the production of fuels from renewable feedstocks and those working in green and sustainable chemistry, and chemical/process engineering. It is also an excellent textbook for courses in bioprocessing technology, renewable resources, green energy, and sustainable chemistry.

Handbook of Biomass Valorization for Industrial Applications Apr 05 2020 HANDBOOK of BIOMASS VALORIZATION for INDUSTRIAL APPLICATIONS The handbook provides a comprehensive view of cutting-edge research on biomass valorization, from advanced fabrication methodologies through useful derived materials, to current and potential application sectors. Industrial sectors, such as food, textiles, petrochemicals and pharmaceuticals, generate massive amounts of waste each year, the disposal of which has become a major issue worldwide. As a result, implementing a circular economy that employs sustainable practices in waste management is critical for any industry. Moreover, fossil fuels, which are the primary sources of fuel in the transportation sector, are also being rapidly depleted at an alarming rate. Therefore, to combat these global issues without increasing our carbon footprint, we must look for renewable resources to produce chemicals and biomaterials. In that context, agricultural waste materials are gaining popularity as cost-effective and abundantly available alternatives to fossil resources for the production of a variety of value-added products, including renewable fuels, fuel components, and fuel additives. *Handbook of Biomass Valorization for Industrial Applications* investigates current and emerging feedstocks, as well as provides in-depth technical information on advanced catalytic processes and technologies that enable the development of all possible alternative energy sources. The 22 chapters of this book comprehensively cover the valorization of agricultural wastes and their various uses in value-added applications like energy, biofuels, fertilizers, and wastewater treatment. Audience The book is intended for a very broad audience working in the fields of materials sciences, chemical engineering, nanotechnology, energy, environment, chemistry, etc. This book will be an invaluable reference source for the libraries in universities and industrial institutions, government and independent institutes, individual research groups, and scientists working in the field of valorization of biomass.

Algal Biofuels Sep 30 2019 Algae presents a viable biofuel alternative because the production of algae for fuel, unlike other agro-based biofuels, does not compete with food production. This book covers algae-based biofuel options and discusses the design and economic viability of algal bioenergy co-production concepts.

[Biomass and Biofuels from Microalgae](#) Jul 21 2021 This comprehensive book details the most recent advances in the microalgae biological sciences and engineering technologies for biomass and biofuel

production in order to meet the ongoing need for new and affordable sources of food, chemicals and energy for future generations. The chapters explore new microalgae cultivation techniques, including solid (biofilm) systems, and heterotrophic production methods, while also critically investigating topics such as combining wastewater as a source of nutrients, the effect of CO₂ on growth, and converting biomass to methane through anaerobic digestion. The book highlights innovative bioproduct optimization and molecular genetic techniques, applications of genomics and metabolomics, and the genetic engineering of microalgae strains targeting biocrude production. The latest developments in microalgae harvesting and dewatering technologies, which combine biomass production with electricity generation, are presented, along with detailed techno-economic modeling. This extensive volume was written by respected experts in their fields and is intended for a wide audience of researchers and engineers.

Microalgae Nov 12 2020 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 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

Handbook of Microalgal Culture Aug 02 2022 Handbook of Microalgal Culture is truly a landmark publication, drawing on some 50 years of worldwide experience in microalgal mass culture. This important book comprises comprehensive reviews of the current available information on microalgal culture, written by 40 contributing authors from around the globe. The book is divided into four parts, with Part I detailing biological and environmental aspects of microalgae with reference to microalgal biotechnology and Part II looking in depth at major theories and techniques of mass cultivation. Part III comprises chapters on the economic applications of microalgae, including coverage of industrial production, the use of microalgae in human and animal nutrition and in aquaculture, in nitrogen fixation, hydrogen and methane production, and in bioremediation of polluted water. Finally, Part IV looks at new frontiers and includes chapters on genetic engineering, microalgae as platforms for recombinant proteins, bioactive chemicals, heterotrophic production, microalgae as gene-delivery systems for expressing mosquito-cidal toxins and the enhancement of marine productivity for climate stabilization and food security. Handbook of Microalgal Culture is an essential purchase for all phycologists and also those researching aquatic systems, aquaculture and plant sciences. There is also much of great use to researchers and those involved in product formulation within pharmaceutical, nutrition and food companies. Libraries in all universities and research establishments teaching and researching in chemistry, biological and pharmaceutical sciences, food sciences and nutrition, and aquaculture will need copies of this book on their shelves. Amos Richmond is at the Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Israel.

[Advances in Biofuels and Bioenergy](#) Oct 24 2021 The worldwide consumption of fossil fuel continues to increase at unsustainable levels, which will lead to progressive scarcity, if immediate and innovative measures are not taken for its sustainable use. This scarcity necessitates the development of renewable and sustainable alternatives for fossil fuels. A possible solution to today's energy challenges can be provided by biofuels. This book intends to provide the reader with a comprehensive overview of the current status and the future implications of biofuels. Diverse and

aptly covered comprehensive information in this book will directly enhance both basic and applied research in biofuels and will particularly be useful for students, scientists, breeders, growers, ecologists, industrialists and policy makers. It will be a valuable reference point to improve biofuels in the areas of ecologically and economically sustainable bioenergy research.

Nutraceutical Fatty Acids from Oleaginous Microalgae Jun 07 2020 Over the past several years, extensive research has been done on the microbial production of polyunsaturated fatty acids (PUFA). Regardless, research on the oleaginous microalgae used as feedstock for biofuels production and the overall story about the production of nutraceutical fatty acids from oleaginous microalgae has been very limited. This volume provides an exclusive insight on the production of nutraceutical fatty acids from oleaginous microalgae and their role on human health. Some saturated and monounsaturated fatty acids can be synthesized by humans, whereas long-chain polyunsaturated fatty acids (PUFAs) such as α -linolenic acid and linoleic acid cannot and are deemed essential. The products of these acids, such as DHA, which is important for early visual and neurological development, are extremely important to human health. Replacing SFAs with omega-3 and omega-6 fatty acids in the diet reduce the risk of cardiovascular diseases and prevent Alzheimer's, bipolar disorder, and schizophrenia, among other benefits. The ever-rising global demand for omega-3 & 6 PUFAs, however, cannot be met solely by fish oil, due to diminishing fish stocks and pollution of marine ecosystems, which has led to increased interest in alternative sustainable sources. Vegetable oils from genetically engineered plant oilseeds and microorganisms are two potential alternatives to fish oil, even though omega-3 PUFAs are highest in the latter. Although transgenic plants present numerous advantages, their production is dependent on seasonal and climatic conditions and the availability of arable land. Moreover, there are public concerns regarding the cultivation of transgenic crops in open ecosystems. These, together with regulatory issues restrict the large-scale production of genetically modified crops. Microorganisms, however, are known natural producers of microbial oils similar to those obtained from plants and animals and a possible source of nutritionally important omega-3 & 6 PUFAs. This groundbreaking volume presents invaluable new research on essential fatty acids, their production from various oleaginous microorganisms, biochemical and metabolic engineering to improve PUFAs content in oil, extraction and purification of omega 3 fatty acids, and the current market scenario. Whether a veteran engineer or scientist using it as a reference or a professor using it as a textbook, this outstanding new volume is a must-have for any engineer or scientist working in food science.

Microalgal Biotechnology Oct 12 2020 "Microalgae are a valuable resource of carbon materials that may be used in biofuels, pharmaceuticals, cosmetics, and health supplements. Still, there are tremendous challenges in the microalgae production process, such as mass cultivation, strain improvement, biomass disruption, and reprocessing of nutrients and water that have been the encumbering microalgal industry in several ways. Microalgal biotechnology has the capability to introduce remarkable breakthroughs and innovations. This volume brings together current advancements in the field of microalgal biotechnology to provide understanding of the fundamentals and progress of the industry-oriented technologies. The volume covers biofuel production and its technical challenges; current trends of microalgae in agriculture, aquaculture and food biotechnology; market space; biosafety and other regulatory issues; and sustainability of microalgal products. The volume first provides insight into desmids and other conjugating algae along with prospective trends of diatoms. It then goes on to explore the commercial applications of microalgae that take advantage of their bioactive compounds, natural colorants, and functional metabolites. The role of microalgae in agriculture, aquaculture, and the food sector are discussed, and tools from genome manipulation to bioprocess engineering are studied. Several chapters focus on future prospects of biofuel and biodiesel production for environmental and economic viability. The key features of the book: Presents the role of microalgae in various industries including food, agriculture, aquaculture, biofuel, and metabolites Shows the historical and prospective use of microalgae elements for economic and ecological benefits Explains the integrated technologies for massive production of microalgae-derived products Includes the various industrial case studies to

improve the sustainable production of microalgae products Discusses current developments and confronts in microalgae bioprocessing Microalgal Biotechnology: Bioprospecting Microalgae for Functional Metabolites towards Commercial and Sustainable Applications will be a useful reference for academicians, researchers, industry professionals, postgraduate students, and policymakers who are interested in future prospects of microalgae commercialization"--

Advances in Biofuel Production May 07 2020 Due to their high growth rate, algae, microalgae, and aquatic plants are becoming the most promising photosynthetic organisms for biofuel production. *Advances in Biofuel Production: Algae and Aquatic Plants* explores current investigations and application of the fields of biofuel production and bioengineering and considers from a global context the evolving processes of algal biofuel production. The book looks at how biomass, specifically sugars, nonedible plant materials, and algae (which are designated first, second, and third fuels respectively) are used in the production of fuel. The feasibility of such projects, current methodologies, and how to optimize biofuel production are presented.

Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae Jun 19 2021 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, CO₂, and nutrients (primarily N and P) have been major ingredients for the algal biomass and lipid production, the research has also 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 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.

Biofuels Jan 15 2021 The edited volume presents the progress of first and second generation biofuel production technology in selected countries. Possibility of producing alternative fuels

containing biocomponents and selected research methods of biofuels exploitation characteristics (also aviation fuels) was characterized. The book shows also some aspects of the environmental impact of the production and biofuels using, and describes perspectives of biofuel production technology development. It provides the review of biorefinery processes with a particular focus on pretreatment methods of selected primary and secondary raw materials. The discussion includes also a possibility of sustainable development of presented advanced biorefinery processes.

Biotechnological Applications of Microalgae Oct 31 2019 Microalgae are an invaluable biomass source with potential uses that could lead to environmental and economic benefits for society.

Biotechnological Applications of Microalgae: Biodiesel and Value Added Products presents the latest developments and recent research trends with a focus on potential biotechnologically related uses of microalgae. It gives an analysis of microalgal biology, ecology, biotechnology, and biofuel production capacity as well as a thorough discussion on the value added products that can be generated from diverse microalgae. The book provides a detailed discussion of microalgal strain selection for biodiesel production, a key factor in successful microalgal cultivation and generation of desired biofuel products. It also describes microalgal enumeration methods, harvesting and dewatering techniques, and the design, and the pros and cons, of the two most common methods for cultivation—open raceway ponds and photobioreactors. Chapters cover lipid extraction and identification, chemical and biological methods for transesterification of microalgal lipids, and procedures involved in life cycle analysis of microalgae. They also examine the importance of microalgal cultivation for climate change abatement through CO₂ sequestration and microalgae involvement in phycoremediation of domestic and industrial wastewaters. The book concludes with a general discussion of microalgal biotechnology and its potential as a modern "green gold rush." The final chapter provides an overview of advanced techniques such as genetic engineering of microalgae to increase lipid yield. This book provides a one-stop benchmark reference on microalgal biotechnology, considering all aspects, from microalgal screening to production of biofuels and other value added products.

[Microalgae Cultivation for Biofuels Production](#) Nov 05 2022 *Microalgae Cultivation for Biofuels Production* explores the technological opportunities and challenges involved in producing economically competitive algal-derived biofuel. The book discusses efficient methods for cultivation, improvement of harvesting and lipid extraction techniques, optimization of conversion/production processes of fuels and co-products, the integration of microalgae biorefineries to several industries, environmental resilience by microalgae, and a techno-economic and lifecycle analysis of the production chain to gain maximum benefits from microalgae biorefineries. Provides an overview of the whole production chain of microalgal biofuels and other bioproducts Presents an analysis of the economic and sustainability aspects of the production chain Examines the integration of microalgae biorefineries into several industries

Biofuels from Algae May 19 2021 This book provides in-depth information on basic and applied aspects of biofuels production from algae. It begins with an introduction to the topic, and follows with the basic scientific aspects of algal cultivation and its use for biofuels production, such as photo bioreactor engineering for microalgae production, open culture systems for biomass production and the economics of biomass production. It provides state-of-the-art information on synthetic biology approaches for algae suitable for biofuels production, followed by algal biomass harvesting, algal oils as fuels, biohydrogen production from algae, formation/production of co-products, and more. The book also covers topics such as metabolic engineering and molecular biology for algae for fuel production, life cycle assessment and scale-up and commercialization. It is highly useful and helps you to plan new research and design new economically viable processes for the production of clean fuels from algae. Covers in a comprehensive but concise way most of the algae biomass conversion technologies currently available Lists all the products produced from algae, i.e. biohydrogen, fuel oils, etc., their properties and potential uses Includes the economics of the various processes and the necessary steps for scaling them up

Sustainable Downstream Processing of Microalgae for Industrial Application May 31 2022

Microalgae can be future resource for industrial biotechnology In current energy crisis era, microalgae are under tremendous research focus for the production of biodiesel due to their high photosynthetic efficiency, growth rate and high lipid content compared to territorial plants. However, the large-scale production of algal biomass and downstream processing of harvested algae towards bio-fuels are facing several challenges from economic viability perspective. Apart from bio-fuels, the microalgae synthesize number of bio-molecules such as pigments (e.g., chlorophyll, carotenoid), protein (e.g., lectin, phycobiliprotein), and carbohydrates (e.g., agar, carrageenan, alginate, fucoidan) which are available in the various forms of microalgal products. Therefore, developing a strategy for large-scale production and use of algal biomass for the co-production of these value-added macromolecules is thus imperative for the improvement of the economics of algal biorefinery. In the above context, this book covers three major areas (i) commercial-scale production of bio-molecules from microalgae, (ii) sustainable approach for industrial-scale operation, and (iii) optimization of downstream processes. Each of these sections is composed of several chapters written by the renowned academicians/industry experts. Furthermore, in this book, a significant weightage is given to the industry experts (around 50%) to enrich the industrial perspectives. We hope that amalgamate of fundamental knowledge from academicians and applied research information from industry experts will be useful for forthcoming implementation of a sustainable integrated microalgal biorefinery. This book highlights following. Explores biomolecules from microalgae and their applications Discusses microalgae cultivations and harvesting Examines downstream processing of biomolecules Explores sustainable integrated approaches for industrial scale operations Examines purification techniques specific for microalgal proteins, Omega 3 fatty Acids, carbohydrates, and pigments

Handbook of Microalgae-Based Processes and Products Sep 03 2022 The Handbook of Microalgae-based Processes and Products provides a complete overview of all aspects involved in the production and utilization of microalgae resources at commercial scale. Divided into four parts (fundamentals, microalgae-based processes, microalgae-based products, and engineering approaches applied to microalgal processes and products), the book explores the microbiology and metabolic aspects of microalgae, microalgal production systems, wastewater treatment based in microalgae, CO₂ capture using microalgae, microalgae harvesting techniques, and extraction and purification of biomolecules from microalgae. It covers the largest number of microalgal products of commercial relevance, including biogas, biodiesel, bioethanol, biohydrogen, single-cell protein, single-cell oil, biofertilizers, pigments, polyunsaturated fatty acids, bioactive proteins, peptides and amino acids, bioactive polysaccharides, sterols, bioplastics, UV-screening compounds, and volatile organic compounds. Moreover, it presents and discusses the available engineering tools applied to microalgae biotechnology, such as process integration, process intensification, and techno-economic analysis applied to microalgal processes and products, microalgal biorefineries, life cycle assessment, and exergy analysis of microalgae-based processes and products. The coverage of a broad range of potential microalgae processes and products in a single volume makes this handbook an indispensable reference for engineering researchers in academia and industry in the fields of bioenergy, sustainable development, and high-value compounds from biomass, as well as graduate students exploring those areas. Engineering professionals in bio-based industries will also find valuable information here when planning or implementing the use of microalgal technologies. Covers theoretical background information and results of recent research. Discusses all commercially relevant microalgae-based processes and products. Explores the main emerging engineering tools applied to microalgae processes, including techno-economic analysis, process integration, process intensification, life cycle assessment, and exergy analyses.

Chemicals from Microalgae Dec 14 2020 The production of chemicals from microalgae is becoming a significant area of biological research. Chemicals from Microalgae seeks to cover the various aspects that relate to the use of microalgae as a source of chemicals. The chapters discuss the occurrence and physiological role of these chemicals and concentrates on the methods aimed at enhancing their content, as well as large-scale algal biomass production and down-stream

processing. This work, written by one of the true pioneers in the field describes the major algal chemicals of interest, namely pigments and lipids.

Energy from Microalgae Dec 26 2021 This book presents an authoritative and comprehensive overview of the production and use of microalgal biomass and bioproducts for energy generation. It also offers extensive information on engineering approaches to energy production, such as process integration and process intensification in harnessing energy from microalgae. Issues related to the environment, food, chemicals and energy supply pose serious threats to nations' success and stability. The challenge to provide for a rapidly growing global population has made it imperative to find new technological routes to increase the production of consumables while also bearing in mind the biosphere's ability to regenerate resources. Microbial biomass is a bioresource that provides effective solutions to these challenges. Divided into eight parts, the book explores microalgal production systems, life cycle assessment and the bio-economy of biofuels from microalgae, process integration and process intensification applied to microalgal biofuels production. In addition, it discusses the main fuel products obtained from microalgae, summarizing a range of useful energy products derived from algae-based systems, and outlines future developments. Given the book's breadth of coverage and extensive bibliography, it offers an essential resource for researchers and industry professionals working in renewable energy.

Microalgae as a Feedstock for Biofuels Jul 01 2022 This Brief provides a concise review of the potential use of microalgae for biofuel production. The following topics are highlighted: the advantages of microalgae over conventional biofuel-producing crops; technological processes for energy production using microalgae; microalgal biomass production systems, production rates and costs; algae cultivation strategies and main culture parameters; biomass harvesting technologies and cell disruption; CO₂ sequestration; life cycle analysis; and algal biorefinery strategies. The conclusions section discusses the contribution of the technologies described to environmental sustainability and future prospects.

Blue Biotechnology Dec 02 2019 With its integral treatment of ecosystem and resource management, this is the only overview of the field to address current thinking and future trends. All contributions have been written with the novice in mind, explaining the basics and highlighting recent developments and achievements. Unmatched in scope, this two-volume reference covers both traditional and well-established areas of marine biotechnology, such as biomass production, alongside such novel ones as biofuels, biological protection of structures and bioinspired materials. In so doing, it ties together information usually only found in widely dispersed sources to assemble a grand unified view of the current state of and prospects for this multi-faceted discipline. The combination of the breadth of topics and the focus on modern ideas make this introductory book especially suitable for teaching purposes and for guiding newcomers to the many possibilities offered by this booming field.

Handbook of Algal Biofuels Mar 17 2021 Handbook of Algal Biofuels: Aspects of Cultivation, Conversion and Biorefinery comprehensively covers the cultivation, harvesting, conversion and utilization of algae for biofuels. Section cover algal diversity and composition, micro- and macroalgal diversity, classification and composition, their cultivation, biotechnological applications, and their current use in industry in biofuels and value-added products. Other sections address algal biofuel production, presenting detailed guidelines and protocols for the production of biodiesel, biogas, bioethanol, biobutanol and biohydrogen, along with thermochemical conversation techniques and integrated approaches for enhanced biofuel production. This book offers an all-in-one resource for researchers, graduate students and industry professionals working in the area of biofuels and phycology. It will be of interest to engineers working in Renewable Energy, Bioenergy and alternative fuels, Biotechnology, and Chemical Engineering. Provides complete coverage of the biofuel production process, from cultivation to biorefinery Includes a detailed discussion of process intensification, lifecycle analysis and biofuel byproducts Describes key aspects of algal diversity and composition, including their cultivation, harvesting and advantages over conventional biomass

Algal Biorefinery: An Integrated Approach Mar 29 2022 This book critically discusses different

aspects of algal production systems and several of the drawbacks related to microalgal biomass production, namely, low biomass yield, and energy-consuming harvesting, dewatering, drying and extraction processes. These provide a background to the state-of-the-art technologies for algal cultivation, CO₂ sequestration, and large-scale application of these systems. In order to tap the commercial potential of algae, a biorefinery concept has been proposed that could help to extract maximum benefits from algal biomass. This refinery concept promotes the harvesting of multiple products from the feedstock so as to make the process economically attractive. For the last few decades, algal biomass has been explored for use in various products such as fuel, agricultural crops, pigments and pharmaceuticals, as well as in bioremediation. To meet the huge demand, there has been a focus on large-scale production of algal biomass in closed or open photobioreactors. Different nutritional conditions for algal growth have been explored, such as photoautotrophic, heterotrophic, mixotrophic and oleaginous. This book is aimed at a wide audience, including undergraduates, postgraduates, academics, energy researchers, scientists in industry, energy specialists, policy makers and others who wish to understand algal biorefineries and also keep abreast of the latest developments.