
Microalgae Biotechnology And Microbiology Cambridge Studies In Biotechnology

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Microbial Biotechnology Elsevier
Biofuels made from algae are gaining attention as a domestic source of renewable fuel. However, with current technologies, scaling up production of algal biofuels to meet even 5 percent of U.S. transportation fuel needs could create

unsustainable demands for energy, water, and nutrient resources. Continued research and development could yield innovations to address these challenges, but determining if algal biofuel is a viable fuel alternative will involve comparing the environmental, economic and social impacts of algal biofuel production and use to those associated with petroleum-based fuels and other fuel sources. Sustainable Development of Algal Biofuels was produced at the request of the U.S.

Department of Energy.
Proteins: Sustainable Source, Processing and Applications Academic Press
Industrial Biorefineries and White
Biotechnology provides a comprehensive look at the increasing focus on developing the processes and technologies needed for the conversion of biomass to liquid and gaseous fuels and chemicals, in particular, the development of low-cost technologies. During the last 3-4 years, there have been

scientific and technological developments in the area; this book represents the most updated information and technological perspective on the topic. Provides information on the most advanced and innovative pretreatment processes and technologies for biomass Covers information on lignocellulosic and algal biomass to work on the principles of biorefinery Provides information on integration of processes for the pretreatment of biomass Designed as a textbook for both graduate students and researchers

Springer Nature

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, fucodian) 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

Sustainable Water and Wastewater Processing CRC Press

This book offers insights into the recent research focusing on green solutions to address environmental pollution and its impacts. Bioremediation is a vast area that encompasses numerous innovative and cost-effective experimental and research methods involving numerous technologies, such as biotechnological, biochemical, microbial, marine, chemical and engineering approaches. Featuring original research and review articles by leading experts, the book explores potential solutions to the growing issues of waste management and environmental pollution and their impacts, and suggests future research directions. As such, it is a

valuable resource for professionals and general readers alike.

Microalgal Production for Biomass and High-Value Products John Wiley & Sons

Of major economic, environmental and social importance, industrial microbiology involves the utilization of microorganisms in the production of a wide range of products, including enzymes, foods, beverages, chemical feedstocks, fuels and pharmaceuticals, and clean technologies employed for waste treatment and pollution control. Aimed at undergraduates studying the applied aspects of biology, particularly those on biotechnology and microbiology courses and students of food science and biochemical engineering, this text provides a wide-ranging introduction to the field of industrial microbiology. The content is divided into three sections: key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products investigation of a wide range of established and novel industrial

fermentation processes and products Written by experienced lecturers with industrial backgrounds, Industrial Microbiology provides the reader with groundwork in both the fundamental principles of microbial biology and the various traditional and novel applications of microorganisms to industrial processes, many of which have been made possible or enhanced by recent developments in genetic engineering technology. A wide-ranging introduction to the field of industrial microbiology Based on years of teaching experience by experienced lecturers with industrial backgrounds Explains the underlying microbiology as well as the industrial application. Content is divided into three sections: 1. key aspects of microbial physiology, exploring the versatility of microorganisms, their diverse metabolic activities and products 2. industrial microorganisms and the technology required for large-scale cultivation and isolation of fermentation products 3. investigation of a wide range of established and novel industrial fermentation processes and products **Nutritional Freshwater Life** Academic Press

Microalgae are a group of single-celled, photosynthetic microorganisms. They are of great commercial interest as they are capable of producing biomass (with a vast array of biochemical) using sunlight, CO₂ and various other naturally occurring nutrients. Correctly utilised, they have the potential to provide sustainable supply of commercially relevant biochemicals, biofuels, nutraceuticals, food and feed supplements. The field of microalgal biotechnology is a fast-paced area of research, with technologies coming ever closer to commercial viability. Microalgal Biotechnology consolidates the latest research in the field together with a look at market potential and policy considerations. Highlighting the huge potential of microalgae as commercial commodities, it covers progress on various fronts including; bio-refinery and its technological challenges, genetic engineering, biosafety and regulatory issues, open and closed photo-bioreactors for biomass production, market space and sustainability for algal products. This book is a useful resource for researchers, academicians, postgraduate students, industries, policy makers and anyone

interested in the status and future possibilities of microalgae commercialisation.

Biotechnology: Prospects and Applications
John Wiley & Sons

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.

Industrial Biorefineries and White Biotechnology Springer Science & Business Media

The marine environment accounts for most of the biodiversity on our planet, while offering a huge potential for the benefit and wellbeing of mankind. Its extensive resources already constitute the basis of many economic activities – but many more are expected in coming years. This book covers current knowledge on uses of marine algae to obtain bulk and fine chemicals, coupled with optimization of the underlying production and purification processes. Major gaps and potential opportunities in this field are discussed in a critical manner. The current trends pertaining to marine macro- and microalgae are explained in a simple and understandable writing style. This book covers a wide variety of topics, and as such it will be appropriate as both student text and reference for advances researchers in the field.

Bioremediation and Green Technologies

John Wiley & Sons

This book covers a range of important topics on environmental remediation, biofuels and value-added microbial products for environmental clean-up, water and wastewater recycling and sustainable wastewater treatment using microalgae. Designed to document advances in biotechnology, this book highlights bio-resource utilization in fostering low-carbon renewable energy-based economies and provides new insights into chlorine disinfectant usage in water treatment, wastewater treatment using microalgae, etc. The book will be useful reference material for scientists and researchers in the fields of microbial biotechnology and bioremediation, environmental biotechnology and sustainable development, climate change mitigation, provision of safe water and sustainable wastewater recycling. Emphasizes recent advances in bioremediation techniques towards environmental sustainability Provides detailed information on how to harness indigenous bio-resources including microorganisms as bioenhancement

agents for environmental remediation Introduces new frontiers in the area of wastewater treatment using microalgae — important for sustainability and water safety Reviews biotechniques that could enhance higher levels of sustainability in heavily polluted environments and also provides an intelligent monitoring system for waste recycling and environmental remediation, and fostering a low-carbon renewable energy-based bioeconomy Discusses the need for review of existing guidelines on chlorine disinfectant usage for enhanced water quality Akinola Rasheed Popoola, Ph.D., is a Professor of Plant Pathology and the Director of the Biotechnology Centre, Federal University of Agriculture, Abeokuta, Nigeria. Emeka Godfrey Nwoba, Ph.D., is a research scholar at the Algae Research & Development Centre, Murdoch University, Western Australia. James Chukwuma Ogbonna, Ph.D., is a Professor of Microbiology and Biotechnology and Director, National Biotechnology Development Agency, South East Zonal Biotechnology Centre, University of Nigeria, Nsukka, Nigeria. Charles Oluwaseun Adetunji, Ph.D., is an Associate

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Marine Macro- and Microalgae Springer Nature

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.

Industrial Microbiology CRC Press

This book presents the latest developments and recent research trends in the field of plankton, highlighting the potential ecological and biotechnological applications. It critically and comprehensively discusses strain selection, growth characteristics, large-scale culturing, and biomass harvesting,

focusing on the screening and production of high-value products from algae, and evaluating carbon dioxide sequestration from fuel gas as a climate change mitigation strategy. The latter areas of research are clearly central to the sustainable development approach that is currently attracting global attention. Over the decades, much of the literature on has focused on the biological and ecological aspects of phytoplankton found in freshwater, marine and brackish water environments. However, these organisms are known to also inhabit various other environments. More recently, there has been a substantial shift toward the concept of sustainable development and the “green economy” with emphasis on exploiting biological systems for the benefit of mankind. The significance of these plankton cannot be underestimated as they contribute approximately 40% of the oxygen in the atmosphere. Therefore, there is potential for exploitation of this invaluable biomass source that could lead to significant environmental and economic benefits for man. Providing a comprehensive outline of the most recent developments and advances in the field of

industrial applications of these plankton, this book is an excellent reference resource for researchers and practitioners.

Handbook of Microalgae-Based Processes and Products CRC Press

The author presents a state-of-the-art account of research in algal production and utilization. Dr Becker provides a compilation of the different methods employed worldwide for the artificial cultivation of different microalgae, including recipes for culture media, description of outdoor and indoor cultivation systems as well as harvesting and processing methods. The book will be essential reading for advanced undergraduates, postgraduates and researchers in the field.

Biorefinery Co-Products Elsevier

Supplying sustenance for millions of the poorest people in the world, freshwater flora and fauna also contribute to overall economic well-being by means of export commodity trade, tourism, and recreation. As sources of high-quality nutrients, freshwater flora and fauna of edible value represent a viable option for alleviating the problems related to malnutrition in developing and underdeveloped countries.

Although the nutritional benefits of freshwater flora and fauna are well known, there has long been a need for a book that supplies an assessment of their nutritional qualities. Well-illustrated with approximately 325 photographs, this book fills that need. *Nutritional Freshwater Life* details the characteristics of more than 300 species of nutritionally important freshwater animals and plants. The book covers algae and plants, crustaceans (prawns, crayfish, and crabs), mollusks (bivalves and gastropods), fish, and frogs. For each species of freshwater life identified, the book provides a photograph and details its characteristics such as scientific name, common names, habitats, global distribution, nutritional facts, and biological features.

Biodiesel Fuels Based on Edible and Nonedible Feedstocks, Wastes, and Algae Royal Society of Chemistry

Proteins: Sustainable Source, Processing and Applications addresses sustainable proteins, with an emphasis on proteins of animal origin, plant-based and insect proteins, microalgal single cell proteins, extraction, production, the stability and bioengineering of proteins, food

applications (e.g. encapsulation, films and coatings), consumer behavior and sustainable consumption. Written in a scientific manner to meet the needs of chemists, food scientists, technologists, new product developers and academics, this book addresses the health effects and properties of proteins, highlights sustainable sources, processes and consumption models, and analyzes the potentiality of already commercialized processes and products. This book is an integral resource that supports the current applications of proteins in the food industry, along with those that are currently under development. Supports the current applications of proteins in the food industry, along with those that are under development Connects the properties and health effects of proteins with sustainable sources, recovery procedures, stability and encapsulation Explores industrial applications that are affected by aforementioned aspects

Prospects and Challenges in Algal Biotechnology Springer

This contributed volume presents the latest research and state-of-the-art approaches in the study of microalgae. It

describes in detail technologies for the cultivation of marine, freshwater and extremophilic algae, as well as phototrophic biofilms, cyanobacterial mats and periphytons, including the media requirements and growth rates of different types of algae. The second part of the book is dedicated to the biotechnological applications of algal biomass and secondary metabolites produced by these organisms, and critically discusses topics such as algae-based biofuels and CO₂ sequestration. In addition, it reviews the prospects and challenges of algal bioremediation of domestic and industrial wastewaters, including the use of planktonic and self-immobilized algae systems in wastewater treatment, explaining their merits and drawbacks. Lastly, it highlights research methods and approaches related to the production of high-value products and bioactive compounds.

Microalgal Biotechnology Springer

This book focuses on two key issues confronting humanity, viz., energy and environment. There is a need to devise strategies for protecting the environment, at the same time adequately meeting the

ever-growing energy needs of the world. Harnessing the power of microbes is one step towards finding cheap, green and sustainable solutions to the problems of energy and environment. The book is divided into eight major topics. These topics include emerging trends in microbial biotechnology, harnessing sustainable energy sources from microorganisms, mechanistics of bioenergy production, bioenergy from wastes and pollutant removal, microalgae for biofuels, bioremediation technologies for petroleum hydrocarbons, polycyclic aromatic hydrocarbons and xenobiotics, bioremediation of nuclear wastes, and the role of extremophilic microorganisms in environmental cleanup.

Microalgae John Wiley & Sons

Microalgae are one of the most studied potential sources of biofuels and bioenergy. This book covers the key steps in the production of renewable biofuels from microalgae - strain selection, culture systems, inorganic carbon utilisation, lipid metabolism and quality, hydrogen production, genetic engineering, biomass harvesting, extraction. Greenhouse gas and techno-economic modelling are

reviewed as is the 100 year history of microalgae as sources of biofuels and of commercial-scale microalgae culture. A summary of relevant basic standard methods used in the study of microalgae culture is provided. The book is intended for the expert and those starting work in the field.

Biotechnology for Biofuel Production and Optimization Academic Press

A keystone reference that presents both up-to-date research and the far-reaching applications of marine biotechnology. Featuring contributions from 100 international experts in the field, this five-volume encyclopedia provides comprehensive coverage of topics in marine biotechnology. It starts with the history of the field and delivers a complete overview of marine biotechnology. It then offers information on marine organisms, bioprocess techniques, marine natural products, biomaterials, bioenergy, and algal biotechnology. The encyclopedia also covers marine food and biotechnology applications in areas such as pharmaceuticals, cosmeceuticals, and nutraceuticals. Each topic in *Encyclopedia of Marine Biotechnology* is followed by

10-30 subtopics. The reference looks at algae cosmetics, drugs, and fertilizers; biodiversity; chitins and chitosans; aeropylsinin-1, toluquinol, astaxanthin, and fucoxanthin; and algal and fish genomics. It examines neuro-protective compounds from marine microorganisms; potential uses and medical management of neurotoxic phycotoxins; and the role of metagenomics in exploring marine microbiomes. Other sections fully explore marine microbiology, pharmaceutical development, seafood science, and the new biotechnology tools that are being used in the field today. One of the first encyclopedic books to cater to experts in marine biotechnology. Brings together a diverse range of research on marine biotechnology to bridge the gap between scientific research and the industrial arena. Offers clear explanations accompanied by color illustrations of the techniques and applications discussed. Contains studies of the applications of marine biotechnology in the field of biomedical sciences. Edited by an experienced author with contributions from internationally recognized experts from around the globe. *Encyclopedia of Marine Biotechnology* is a

must-have resource for researchers, scientists, and marine biologists in the industry, as well as for students at the postgraduate and graduate level. It will also benefit companies focusing on marine biotechnology, pharmaceutical and biotechnology, and bioenergy.

Application of Microalgae in Wastewater Treatment John Wiley & Sons

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.

Basic and Applied Phytoplankton Biology
National Academies Press

With focus on the practical use of modern biotechnology for environmental sustainability, this book provides a thoughtful overview of molecular aspects of environmental studies to create a new

awareness of fundamental biological processes and sustainable ecological concerns. It covers the latest research by prominent scientists in modern biology and delineates recent and prospective applications in the sub-areas of environmental biotechnology with special focus on the biodegradation of toxic pollutants, bioremediation of contaminated environments, and bioconversion of organic wastes toward a green economy and sustainable future.

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