

Advances in Biochemical Engineering/Biotechnology 153  
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Clemens Posten  
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# Microalgae Biotechnology

 Springer

# Microalgae Biotechnology Advances In Biochemical Engineeringbiotechnology

**Se-Kwon Kim**



## **Microalgae Biotechnology Advances In Biochemical Engineeringbiotechnology:**

**Microalgae Biotechnology** Clemens Posten, Steven Feng Chen, 2015-12-21 Antenna Mutants Domestication by Roberto Bassi Heterotrophic Cultivation by William McCaffrey Chlorella for industrial applications Advances and prospective by Feng Chen Carotinoide by Carola Griehl Engineering the algal chloroplast for synthesis of therapeutic proteins by Saul Purton Design Concepts and recent developments of photobioreactors by Clemens Posten Efficiency of flat plate reactors by Mario Tredici Measuring modelling and control by Olivier Bernard Microalgae in Life Support Systems by Klaus Slenzka Heterotrophic oil production by Makato Watanabe      Microalgae Charis M. Galanakis, 2020-10-05 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      Algae and Sustainable Technologies Atul Kumar Upadhyay, D.P. Singh, 2020-11-09 Algal and sustainable technologies Bioenergy Nanotechnology and Green chemistry is an interdisciplinary overview of the world s major problems water scarcity clean environment and energy and their sustenance remedy measures using microalgae It comprehensively presents the way to tackle the socio economic issues including food feed fuel medicine and health and also entails the untapped potential of microalgae in environmental management bioenergy solution and sustainable synthesis of pharmaceutical and nutraceutical products This book basically emphasizes the success of algae as wonderful feed stocks of future and provides upto date information and sustainable and recreational outlook towards degrading environment and energy crisis Applicability of fast emerging algae based nanotechnology in bioremediation and production of nanoparticle AuNP AgNP etc are beautifully described along with latest research and findings Key features The waste to best to income strategies are the main concern of the book and take the edge off the problem of pollution energy and income Elucidate the sustainable phycoremediation and nanoparticle functions as low cost approach for various ecosystem services Information regarding pharmaceuticals nutraceuticals and other algae based value added product synthesis and fate are comprehensively discussed Knowledge resource latest research findings and prospects presented in an accessible manner for researchers

students eminent scientists entrepreneurs professionals and policy maker      *Advances in Carbon Management Technologies* Subhas K. Sikdar, Frank Principiotta, 2021-01-31 Volume 2 of *Advances in Carbon Management Technologies* has 21 chapters It presents the introductory chapter again for framing the challenges that confront the proposed solutions discussed in this volume Section 4 presents various ways biomass and biomass wastes can be manipulated to provide a low carbon footprint of the generation of power heat and co products and of recovery and reuse of biomass wastes for beneficial purposes Section 5 provides potential carbon management solutions in urban and manufacturing environments This section also provides state of the art of battery technologies for the transportation sector The chapters in section 6 deals with electricity and the grid and how decarbonization can be practiced in the electricity sector The overall topic of advances in carbon management is too broad to be covered in a book of this size It was not intended to cover every possible aspect that is relevant to the topic Attempts were made however to highlight the most important issues of decarbonization from technological viewpoints Over the years carbon intensity of products and processes has decreased but the proportion of energy derived from fossil fuels has been stubbornly stuck at about 80% This has occurred despite very rapid development of renewable fuels because at the same time the use of fossil fuels has also increased Thus the challenges are truly daunting It is hoped that the technology choices provided here will show the myriad ways that solutions will evolve While policy decisions are the driving forces for technology development the book was not designed to cover policy solutions      *Current Developments in Biotechnology and Bioengineering* Ranjna Sirohi, Ashok Pandey, Sang Jun Sim, Jo-Shu Chang, Duu-Jong Lee, 2023-01-06 Photobioreactors Design and Applications provides a comprehensive overview of photobioreactor design types and applications It also introduces key principles that enable chemical and environmental engineers to engage in analysis optimization and design with consistent control over biological and chemical transformations The use of computational modeling of processes control systems and CFD is in great demand This book covers these aspects of chemical and bioprocesses Focuses on design types modeling and simulation of photobioreactors and applications in biohydrogen and microalgae production Includes up to date reviews of photobioreactors Discusses biopolymers diatoms cyanobacteria and pigments production using different types of photobioreactors      *Sustainable Industrial Processes Based on Microalgae* Tomas Lafarga, Gabriel Acien, 2023-11-19 *Sustainable Industrial Processes based on Microalgae* addresses the current applications and potential uses of microalgae for processing waste and wastewater streams along with potential applications of the produced biomass Each chapter explores the different steps of the subject from the importance of selecting a robust strain that is able to adapt to harsh and changing environmental conditions to production and harvesting technologies and end applications of the produce biomass namely agriculture and feed production It covers microalgae biology common microalgal strains used for waste and wastewater treatment cultivation strategies novel extraction techniques safety issues and current market opportunities and challenges Moreover the book explores the potential utilization of the produced biomass focusing on industries that show higher

potential such as agriculture and feed production Gives insights in sustainable energy sufficient and economically viable microalgae based processes Applies microalgal biomass to produce high value biopesticides bio stimulants and animal feeds feed ingredients Discusses current challenges such as the need for large surface areas and provides suggestions to overcome these challenges

**Algae Biotechnology for Biomedical and Nutritional Applications** Ashfaq Ahmad, Syed Salman Ashraf, 2025-01-06 Algal based functional foods have potential health benefits and their commercial value depends on their application in the food and nutraceutical industries Algae Biotechnology for Biomedical and Nutritional Applications provides a comprehensive overview of different micro and macroalgal species their industrial production processes and the latest advancements in and applications of algae in biomedical fields This book describes advances in the biomedical and nutritional applications of algae achieved during the last decade identifies gaps in the present knowledge and proposes research areas for the future This book covers various aspects of algal biotechnology from the basics to large scale cultivation harvesting and processing for a variety of high value bioproducts Additionally it also covers topics such as algal biomaterials algal medicinal foods algal production for bio medicine as well as applications in pharmaceutical nutritional and value added bioproducts With contributions from an international array of expert researchers in the field this book is a comprehensive resource for academics researchers postgraduates graduate students and industry professionals Covers basic and applied research on scaling up algal biochemicals for commercial use Discusses the underexplored and underutilized health benefits of chemicals derived from marine sources specifically from algae Provides broad coverage of integrated algal biotechnology and engineering for biomedical issues and their solutions Provides a roadmap for potential applications of integrated algal biotechnology in dietary supplements and biomedical product

**Extremophiles** Pratibha Dheeran, Sachin Kumar, 2023-04-07 This book Extremophiles Wastewater and Algal Biorefinery explores the potential of extremophiles extremotolerant organisms in wastewater treatment biorefining of algal biomass and in the treatment of industrial waste effluent The book provides a holistic overview about the current status of extremophiles in waste water treatment and various industrial processes The chapters comprehensively cover the scientific and research findings on various industrial applications of extremophiles such as biofuels extremozymes electricity generation biofilms microbial corrosion and waste water treatment etc This book is an integrated source of literature for the scientists engineers academicians and students working in the area of extremophiles microbial technology and biorefinery

**Marine Bioactive Compounds** Maria Hayes, 2011-11-19 The aim and scope of this book is to highlight the sources isolation characterization and applications of bioactive compounds from the marine environment and to discuss how marine bioactive compounds represent a major market application in food and other industries It discusses sustainable marine resources of macroalgal origin and gives examples of bioactive compounds isolated from these and other resources including marine by product and fisheries waste streams In addition it looks at the importance of correct taxonomic characterization

**Environmental Sustainability**

**Using Green Technologies** V. Sivasubramanian, 2016-09-15 Environmental Sustainability Using Green Technologies explains the role of green engineering and social responsibility in the development of chemicals processes products and systems Examining the relationship between economy ecology and equality key factors in developing a sustainable society this book covers several aspects of environmental sustainability explores ways to use resources and processes more responsibly and describes the tools required to overcome various challenges It outlines the biotechnological applications techniques and processes needed to secure sustainable development and ensure long lasting future success Insightful and highly comprehensive this body of work addresses Wastewater treatment technologies Nanomaterials in environmental applications Green synthesis of ecofriendly nanoparticles The role of phytoremediation in maintaining environmental sustainability Algal biosorption of heavy metals Mass production of microalgae for industrial applications Integrated biological system for the treatment of sulfate rich wastewater Anaerobic digestion of pharmaceutical effluent Treatment of textile dye using bioaccumulation techniques Production of biosurfactants and their applications in bioremediation Biodegradable polymers Microbial fuel cell MFC technology Biodiesel from nonedible oil using a packed bed membrane reactor Production of ecofriendly biodiesel from marine sources Pretreatment techniques for the enhancement of biogas production A review of source apportionment of air pollutants by receptor models and more Environmental Sustainability Using Green Technologies provides excellent reference material that aids and supports sustainability and offers practical guidance for professors research scholars industrialists biotechnologists and workers in the applied field of environmental engineering

**Diatom Cultivation for Biofuel, Food and High-Value Products** Vandana Vinayak, Richard Gordon, 2025-04-15 This unique book examines the techno economic prospects of diatom cultivation the design and implementation of algal reactors and the potential of diatoms as a source of biofuel and other value added products Diatom Cultivation for Biofuel Food and High Value Products covers the scientific economic and practical aspects of using diatoms for multiple purposes It explores an integrated approach to diatom cultivation including discussions on techniques harvesting methods and innovative technologies The book discusses the potential of these techniques for improving the efficiency and yield of diatom based biofuels as well as the challenges and ethical considerations associated with genetic engineering Readers of the book will discover a wealth of information including The adaptation of chitosan based harvesting methods for microalgae flocculation the trends scope and techno economic prospects of diatom cultivation including the design and implementation of algal reactors and the potential of diatoms as a source of biofuel and other value added products Advanced applications and innovative techniques in the field of diatoms and microalgae such as an in depth analysis of the pigments and proteins found in *Phaeodactylum tricornutum* the nature and applications of diatom cell walls including their purification processes and industrial uses the biochemical engineering of diatoms for health and biorefinery concepts highlighting the potential of diatoms in producing biofuels and other high value products the metabolic and transcriptomic stress and

engineering of diatoms to enhance lipid production exploring the stress conditions that can increase oil yield explores the genetic engineering techniques such as CRISPR/Cas9 and RNA interference The environmental and industrial applications of diatoms for low value products such as diatom as a prospective green anode material diatom cell disruption and milking via a nano biorefinery for biofuel production utilizing techniques like pulsed electric fields high pressure homogenization ultrasonication etc genetic engineering and metabolic engineering in diatoms for oil production the use of diatoms for heavy metal bioremediation exploring the mechanisms of heavy metal uptake by diatoms including biosorption and bioaccumulation the transesterification of diatom oil and parameters for optimization diatom harvesting for lipid production like bubble wrap Bubble Farming Audience The book serves as a guide for researchers and scientists in phycology biology ecology environmental science biofuels bioengineering as well as nutritionists and dieticians who design functional foods and nutraceutical products

**Sustainable Downstream Processing of Microalgae for Industrial Application** Kalyan Gayen, Tridib Kumar Bhowmick, Sunil Kumar Maity, 2019-09-05 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

Phycology-Based Approaches for Wastewater Treatment and Resource Recovery Pradeep Verma, Maulin P. Shah, 2021-11-25 Algal and phycology based approaches for wastewater treatment have recently gained interest Phycology Based Approaches for Wastewater Treatment and Resource Recovery highlights advanced algal

based technologies developed or being considered for wastewater treatment along with the opportunities that existing technologies can provide at an industrial scale It covers recent findings on algal based approaches for the removal of heavy metals organic pollutants and other toxicities from sewage and industrial effluents and supplies in depth analysis on technologies such as biosorption and bioaccumulations Advanced mathematical modeling approaches to understand waste removal and resource recovery from wastewater are illustrated as well The book Provides exhaustive information on the use of algae for the simultaneous treatment and resource recovery of wastewater Discusses algae microalgae and cyanobacteria applications in detail Presents critical insight into limitations of the prevalent technologies Reviews methodology of advanced technologies Includes illustrations and interesting trivia boxes throughout the book This book is of interest to researchers graduate students and professionals in phycology microbiology bioremediation environmental sciences biotechnology wastewater treatment resource recovery and circular economy

**Fundamentals of Biocatalysts** F. Xavier

Malcata,2025-02-07 This textbook covers the essentials of cells as biocatalysts including cell morphology cell genetics cell metabolism cell operation cell stoichiometry cell engineering and cell interaction A pragmatic and systematic approach is provided to all such topics from the point of view of a biological engineer illustrated by criteriously selected and carefully solved problems proposed at the end of each section In the first part of this textbook readers will find a brief historical review of biotechnology and in the second part the author explores the performance of biocatalysts in terms of native features and upon rational manipulation thereof Whenever appropriate mathematical derivations are put forward that are easy to follow step by step even by students holding only elementary mathematical and biochemical backgrounds and are developed at a pace suitable for self learning Furthermore the functional forms and meanings of the expressions produced are explored and the final germane formulae are duly highlighted and graphically interpreted in dimensionless form to facilitate the perception of major trends and asymptotic patterns Therefore this book offers a valuable resource for both instructors and undergraduate graduate students as an aid to grasp and relate basic concepts dealing with living cells as catalysts designed for bioreactors rather than engaging in cumbersome descriptions of their physiological behaviour This textbook together with the companion volumes Operation Fundamentals in Bioreactor Engineering and Modelling Fundamentals in Bioreactor Engineering fill the gap between qualitative approaches focused on biochemistry and technological approaches which often resort to empirical correlations unlikely to support a fundamental understanding of the essential concepts

**Marine**

**Biochemistry** Se-Kwon Kim,2022-10-12 This book provides the latest comprehensive methods for isolation and other novel techniques for marine product development Furthermore this book offers knowledge on the biological medical and industrial applications of marine derived medicinal food substances There has been a tremendous increase in the products derived from marine organisms for commercial application in industries every year Functional foods of medicinal value are particularly in demand as new technology allows the stabilization of natural ingredients and their availability in pure forms to solve various



human diseases Marine flora and fauna have essential elements and trace minerals that nurture various hormones produced in the endocrine system to regulate the respective metabolisms thereby providing a safe and healthy life to humans The overall presentation and clear demarcation of the contents by worldwide contributions is a novel entry point into the market of medicinal foods from the sea The exploration of marine habitats for novel materials are discussed throughout the book The exploration and exploitation of the biochemistry of sea flora and fauna are limited and this book extends the research possibilities into numerous marine habitats Various approaches for extracting and applying the flora and fauna are discussed This book will be of value to researchers marine biotechnologists and medical practitioners due to the vast information as well as industrial and medical applications of marine substances all in one place **Start-Up Creation F.**

Pacheco-Torgal,Erik Stavnsager Rasmussen,Claes G. Granqvist,Volodymyr Ivanov,Arturas Kaklauskas,Stephen Makonin,2016-05-14 Start Up Creation The Smart Eco efficient Built Environment provides a state of the art review on high technology applications and explains how these can be applied to improve the eco efficiency of the built environment Divided into four main parts the book explains the key factors behind successful startup companies that grow from university research including the development of a business plan the importance of intellectual property necessary entrepreneurial skills and innovative thinking Part Two presents the latest research findings on nano and bio based technologies and their application and use to the energy efficiency of the built environment Part Three focuses on the use of genetic algorithms Big Data and the Internet of Things applications Finally the book ends with an entire section dedicated to App development using selected case studies that illustrate their application and use for monitoring building energy efficiency Presents a definitive guide for startups that arise from college and university research and how the application of advanced technologies can be applied to the built environment Includes case studies on new advanced technologies and apps development Links startup creation to the eco efficient built environment through software applications **Air Pollution Prevention and Control**

Christian Kennes,Maria C. Veiga,2013-05-13 Over the past two decades the use of microbes to remove pollutants from contaminated air streams has become a widely accepted and efficient alternative to the classical physical and chemical treatment technologies This book focuses on biotechnological alternatives looking at both the optimization of bioreactors and the development of cleaner biofuels It is the first reference work to give a broad overview of bioprocesses for the mitigation of air pollution Essential reading for researchers and students in environmental engineering biotechnology and applied microbiology and industrial and governmental researchers *Phycobiotechnology* Jeyabalan Sangeetha,Devarajan Thangadurai,Saniyasi Elumalai,Shivasharana Chandrabanda Thimmappa,2021-03-01 Named 1 of 15 Best New Biotechnology Books to Read in 2021 by BookAuthority This volume explores and explains the vast uses and benefits of algae as food feed and fuel It covers the most advanced applications of algae in the food and feed industries and for environmental sustainability With chapters written by experts and which were extensively reviewed by many well known subject experts and

professionals Phycobiotechnology Biodiversity and Biotechnology of Algae and Algal Products for Food Feed and Fuel provides an abundance of valuable information Algae are a genetically diverse group of organisms with a wide range of physiological and biochemical characteristics that have unique capabilities in the fields of agriculture pharmaceuticals industry and environment Algae hold the potential to become the planet's next major source of energy and a vital part of the solution for climate change and dependence on fossil fuels Many varieties of algae are also known to be an abundant source of vitamins minerals and other nutrients that can boost the human immune system

**Algal Biorefinery** Sanjeet Mehariya, Bikash Kumar, Shashi Kant Bhatia, Obulisamy Parthiba Karthikeyan, 2025-03-21 Algal Biorefinery A Sustainable Solution for Environmental Applications focuses on algae's possibilities assets and functions as a renewable and sustainable resource that can act as an excellent alternative to withstand adverse environmental conditions to generate useful products Thus apart from helping reduce environmental pollution and the carbon footprint algae can help mitigate factors causing rapid climate change via concurrent bioremediation resource recovery and environmental sustainability This comprehensive book will examine dedicated state of the art information on the topic of how algae can act as a cushion against climate change It will also explain how algal based biorefineries can act as a potential solution to climate change lack of natural resources and environmental pollution Elucidates algal biorefinery as a sustainable solution for carbon emission reduction and fossil fuels alternatives Offers up to date information on algal based wastewater treatment and resource recovery to assist in climate change Provides flowcharts schematic diagrams and figures showing mechanisms and processes for the depiction of strategies for algal based technologies Examines the environmental impact assessment of existing and developing algal based technologies for future environmental sustainability

Handbook of Algal Technologies and Phytochemicals Gokare Ravishankar, Ranga Rao Ambati, 2019-07-12 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 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

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