1. Record Nr. UNINA9911019343403321

Autore	Kuila Arindam
Titolo	Production of Biobutanol from Biomass
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2023 ©2023
ISBN	9781394172887 1394172885 9781394172870 1394172877
Edizione	[1st ed.]
Descrizione fisica	1 online resource (376 pages)
Altri autori (Persone)	MukhopadhyayMainak
Disciplina	662.88
Soggetti	Butanol Fermentation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Chapter 1 Biobutanol: An Overview -- 1.1 Introduction -- 1.2 General Aspects of Butanol Fermentation -- 1.2.1 Microbes That Produce Butanol, Both in Their Wild Type and After Genetic Modification -- 1.3 Clostridium Species That Produce ABE and Their Respective Metabolic Characteristics -- 1.4 Traits of the Molecularly Developed Strain and the ABE-Producing Clostridia -- 1.5 Substrate for ABE Fermentation in Research -- 1.6 Problem and Limitation of ABE Fermentation -- 1.7 The Development of Butanol from Designed and Modifying Biomass -- 1.8 Butanol Production Enhancement Using Advanced Technology -- 1.8.1 Batch Fermentation -- 1.8.2 Fed-Batch Fermentation -- 1.8.3 Continuous Fermentation -- 1.8.4 ABE Fermentation with Butanol Elimination -- 1.9 Utilizing Pre-Treatment and Saccharification to Produce Butanol from Lignocellulosic Biomass -- 1.10 Eliminating CCR to Produce Butanol -- 1.11 Butanol Production from Alternative Substrate to Sugar -- 1.12 Economics of Biobutanol -- 1.13 Future Prospects -- 1.14 Conclusion -- References -- Chapter 2 Recent Trends in the Pre-Treatment Process of Lignocellulosic Biomass for Enhanced Biofuel Production -- 2.1 Introduction -- 2.2 Composition of

Lignocellulosic Biomass -- 2.3 Insight on the Pre-Treatment of LCB -- 2.4 Physical Pre-Treatment Method -- 2.4.1 Extrusion Method -- 2.4.2 Milling Method -- 2.4.3 Ultrasound Method -- 2.4.4 Microwave Method -- 2.5 Chemical Pre-Treatment Methods -- 2.5.1 Alkali Method -- 2.5.2 Acid Method -- 2.5.3 Organosolv Method -- 2.5.4 Ionic Liquids -- 2.5.5 Supercritical Fluids -- 2.5.6 Cosolvent Enhanced Lignocellulosic Fractionation -- 2.5.7 Low Temperature Steep Delignification -- 2.5.8 Ammonia Fiber Explosion -- 2.5.9 Deep Eutectic Solvents -- 2.6 Biological Pre-Treatment Methods.
2.6.1 Combined Biological Pre-Treatment -- 2.7 Future Prospects -- 2.8 Conclusion -- References -- Chapter 3 Current Status of Enzymatic Hydrolysis of Cellulosic Biomass -- 3.1 Introduction -- 3.2 Overview on Biofuels and Its Classification -- 3.2.1 First-Generation Biofuels -- 3.2.1.1 Advantage of First-Generation Biofuel -- 3.2.1.2 Limitation of First-Generation Biofuel -- 3.2.2 Second-Generation Lignocellulosic Biofuel -- 3.2.2.1 Different Types of Feedstocks for Second-Generation Biofuels -- 3.2.2.2 Advantages -- 3.2.2.3 Disadvantages -- 3.2.3 Third-Generation Biofuels -- 3.2.3.1 Advantages -- 3.2.3.2 Disadvantages -- 3.2.4 Fourth-Generation Biofuels -- 3.3 Pre-Treatment Methodologies for Hydrolysis of Lignocellulosic Biomass -- 3.3.1 Overview -- 3.3.2 Structural Analysis for Cellulosic Hydrolysis -- 3.3.3 Chemical Process for Pre-Treatment of Lignocellulose -- 3.3.3.1 Dilute Acid Pre-Treatment Process -- 3.3.4 Ionic Liquid as Pre-Treatment Agent -- 3.3.5 Pre-Treatment Process with Alkali Agents -- 3.3.6 Pre-Treatment with Ultrasonic Wave -- 3.4 Conclusion -- References -- Chapter 4 Present Status and Future Prospect of Butanol Fermentation -- 4.1 Introduction -- 4.2 Biobutanol Production -- 4.2.1 Microbes and Biobutanol Production -- 4.2.2 Substrate for Biobutanol Production -- 4.2.3 ABE Fermentation Process -- 4.2.4 Recovery of Biobutanol from Fermentation Broth -- 4.3 Perspectives -- 4.3.1 Substrate -- 4.3.2 Alleviate Carbon Catabolite Repression -- 4.3.3 Fermentation Improvement -- 4.3.4 Strain Development -- 4.3.5 Butanol Recovery -- 4.4 Conclusion -- References -- Chapter 5 Strategies of Strain Improvement for Butanol Fermentation -- 5.1 Introduction -- 5.2 Background -- 5.3 Microorganism -- 5.4 ABE Fermentation -- 5.4.1 The Obstacle in ABE Fermentation from Clostridium sp. -- 5.5 Selection of Biomass for the Production of Butanol.
5.6 Processes Improvement -- 5.7 Strain Improvement -- 5.7.1 Mutagenesis -- 5.7.1.1 Spontaneous Mutations -- 5.7.1.2 Induced Mutation -- 5.7.2 Strain Improvement Through Genetic Engineering -- 5.7.2.1 Recombinant DNA Technology -- 5.7.3 Genetic Engineering in Clostridial sp. for Improved Butanol Tolerance and Its Production -- 5.8 Production of Butanol From Bioethanol Through Chemical Processes -- 5.9 Advances in Genetically Engineered Microbes can Produce Biobutanol -- 5.10 Economics of Biobutanol Fermentation -- 5.11 Applications of Butanol -- 5.12 Butanol Advantages -- 5.13 Conclusion -- References -- Chapter 6 Process Integration and Intensification of Biobutanol Production -- 6.1 Introduction -- 6.2 Biobutanol -- 6.3 Biobutanol Production and Recovery -- 6.4 Process Intensification -- 6.4.1 PI Using Bioreactors -- 6.4.2 PI Using Membranes -- 6.4.3 PI Using Distillation -- 6.4.4 PI Using Liquid-Liquid Extraction -- 6.4.5 PI Using Adsorption -- 6.5 Process Integration -- 6.6 Conclusion -- References -- Chapter 7 Bioprocess Development and Bioreactor Designs for Biobutanol Production -- 7.1 Introduction -- 7.2 Steps in Biobutanol Production -- 7.3 Feedstock Selection -- 7.4 Microbial Strain Selection -- 7.5 Solvent Toxicity -- 7.6 Fermentation Technologies -- 7.7 Butanol Separation Techniques -- 7.8 Current

Status and Economics -- 7.9 Concluding Remarks -- References -- Chapter 8 Advances in Microbial Metabolic Engineering for Increased Biobutanol Production -- 8.1 Introduction -- 8.2 Metabolic Engineering -- 8.2.1 n-Butanol -- 8.2.2 Isobutanol -- 8.3 Microorganisms for Butanol Production -- 8.3.1 The Clostridium Species -- 8.3.2 Escherichia coli Species -- 8.3.3 Other Bacteria -- 8.3.4 Biochemistry and Physiology -- 8.4 Metabolic Engineering of Clostridia -- 8.4.1 Genetic Tools for Clostridial Metabolic Engineering.
8.4.2 Optimum Selectivity Techniques for Butanol Production -- 8.5 Metabolic Engineering of Escherichia coli -- 8.6 Microbial Strain -- 8.7 Butanol Tolerance Improvement Through Genetic Engineering -- 8.8 Economic Viability -- 8.9 Problems and Limitations of ABE Fermentation -- 8.10 Future Outlook -- 8.11 Conclusion -- Acknowledgment -- References -- Chapter 9 Advanced CRISPR/Cas-Based Genome Editing Tools for Biobutanol Production -- 9.1 Introduction -- 9.2 Microorganisms as the Primary Producer of Biobutanol -- 9.3 Acetone-Butanol-Ethanol Producing Clostridia and Its Limitations -- 9.4 CRISPR-Cas System for Genome Editing -- 9.4.1 CRISPR-Cas Mediated Strategies for Genome Editing for Biobutanol Production in Microorganisms -- 9.4.1.1 Inhibition of Contentious Pathways -- 9.4.1.2 Redirection of the Flux of Metabolic Pathways for Better Solvent Production -- 9.4.1.3 Enhancement of Substrate Uptake -- 9.4.2 Improvement of the Biofuel Production -- 9.4.2.1 Off Targets in CRISPR-Cas System -- 9.4.2.2 Using sgRNA Design to Reduce Off Target Effects -- 9.4.2.3 Cas9 Modifications to Reduce Off-Target Effects -- 9.4.3 Efficient and Modified Biomass "Designed" for Biobutanol Production -- 9.5 Conclusion -- References -- Chapter 10 Role of Nanotechnology in Biomass-Based Biobutanol Production -- 10.1 Introduction -- 10.2 Nanoparticles for Producing of Biofuel -- 10.2.1 Magnetic Nanoparticles -- 10.2.2 Carbon Nanotubes -- 10.2.3 Graphene and Graphene-Derived Nanomaterial for Biofuel -- 10.2.4 Other Nanoparticles Applied in Heterogeneous Catalysis for Biofuel Production -- 10.3 Factors Affecting the Performance of Nanoparticles in Biofuel's Manufacturing -- 10.3.1 Synthesis Temperature -- 10.3.2 Synthesis Pressure -- 10.3.3 Synthesis pH -- 10.3.4 Size of Nanoparticles -- 10.4 Role of Nanomaterials in the Synthesis of Biofuels.
10.5 Utilization of Nanomaterials in Biofuel Production -- 10.5.1 Production of Biodiesel Using Nanocatalysts -- 10.5.2 Application of Nanomaterials for the Pre-Treatment of Lignocellulosic Biomass -- 10.5.3 Application of Nanomaterials in Synthesis of Cellulase and Stability -- 10.5.4 Application of Nanomaterials in the Hydrolysis of Lignocellulosic Biomass -- 10.5.5 Use of Nanotechnology in Bioethanol Production -- 10.5.6 Upgradation of Biofuel by Using Nanotechnology -- 10.5.7 Nanoparticle Use in Biorefineries -- 10.6 Nanotechnology in Bioethanol/Biobutanol Production -- 10.7 Future Perspective -- 10.8 Conclusion -- Acknowledgment -- References -- Chapter 11 Commercial Status and Future Scope of Biobutanol Production from Biomass -- 11.1 Introduction -- 11.2 Biobutanol-Its Brief Background Story -- 11.3 Commercial Aspect of Biobutanol Production from Biomass: Strength Analysis -- 11.4 Commercial Aspect of Biobutanol Production from Biomass: Weakness Analysis -- 11.5 Commercial Aspect of Biobutanol Production from Biomass: Opportunities and Challenges -- 11.6 Discussion: Evaluating the Future Prospects of Biobutanol -- Acknowledgment -- References -- Chapter 12 Current Status and Challenges of Biobutanol Production from Biomass -- 12.1 Introduction -- 12.2 Overview of Biofuel -- 12.2.1 History for Biofuel -- 12.3 Classification of Bioethanol -- 12.3.1 First-Generation of

Ethanol -- 12.3.2 Second-Generation Bioethanol -- 12.3.3 Third-Generation Bioethanol -- 12.3.4 Fourth-Generation Bioethanol -- 12.4 Production of Biobutanol -- 12.4.1 Pre-Treatment Stages -- 12.4.2 Enzymatic Hydrolysis Stage -- 12.4.3 Fermentation Stage -- 12.4.4 Separation Stage -- 12.4.5 Production of Butanol from Genetically Improved Strains -- 12.5 Conclusion -- References -- Chapter 13 Biobutanol: A Promising Liquid Biofuel -- 13.1 Introduction. 13.1.1 First-Generation Biofuels.

Sommario/riassunto

This book provides an in-depth exploration of the production of biobutanol from biomass, detailing the processes, techniques, and technologies involved. Edited by Arindam Kuila and Mainak Mukhopadhyay, it covers topics such as butanol fermentation, microbial strain improvement, and process integration. Key subjects include the use of Clostridium species for ABE fermentation, advancements in microbial metabolic engineering, and the economic viability of biobutanol production. The book is intended for researchers, professionals, and students in the fields of bioscience, bioengineering, and renewable energy, offering insights into recent trends and future prospects in biofuel production.