

Contents

Preface vii
Contributors ix

I

GENERAL 1

1. Principles of Biorefining 3
2. Life-Cycle Assessment of Biofuels 25
3. Thermochemical Conversion of Biomass to Biofuels 51
4. Biomass-derived Syngas Fermentation into Biofuels 79

II

PRODUCTION OF BIOETHANOL FROM LIGNOCELLULOSIC FEEDSTOCKS 99

5. Lignocellulosic Bioethanol: Current Status and Future Perspectives 101
6. Technoeconomic Analysis of Lignocellulosic Ethanol 123
7. Pretreatment Technologies for Lignocellulose-to-Bioethanol Conversion 149
8. Production of Cellulytic Enzymes for the Hydrolysis of Lignocellulosic Biomass 177
9. Production of Hemicellulytic Enzymes for Hydrolysis of Lignocellulosic Biomass 203
10. Hydrolysis of Lignocellulosic Biomass for Bioethanol Production 229
11. Production of Bioethanol from Agroindustrial Residues as Feedstocks 251
12. Fermentation Inhibitors in Ethanol Processes and Different Strategies to Reduce Their Effects 287

IIIA

PRODUCTION OF BIODIESEL FROM VEGETABLE OILS 313

13. Biotechnological Methods to Produce Biodiesel 315
14. Biodiesel Production in Supercritical Fluids 339

15. Production of Biodiesel Using Palm Oil 353
16. Biodiesel Production from Waste Oils 375

IIIB

PRODUCTION OF BIOFUELS FROM ALGAE 397

17. Production of Biodiesel from Algal Biomass: Current Perspectives and Future 399
18. Overview and Assessment of Algal Biofuels Production Technologies 415
19. Cultivation of Algae in Photobioreactors for Biodiesel Production 439

IV

PRODUCTION OF BIOHYDROGEN 465

20. Production of Biohydrogen: Current Perspectives and Future Prospects 467
21. Biohydrogen Production from Bio-oil 481
22. Biohydrogen Production from Industrial Effluents 499
23. Thermophilic Biohydrogen Production 525
24. Biohydrogen Production with High-Rate Bioreactors 537

V

PRODUCTION OF BIOBUTANOL AND OTHER GREEN FUELS 569

25. Butanol Fuel from Biomass: Revisiting ABE Fermentation 571
26. Production of Green Liquid Hydrocarbon Fuels 587

Index 609