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Editors: Bo Zhang (Wuhan Institute of Technology, China/ North Carolina A&T State University, USA), Yong Wang (Voiland School of Chemical Engineering & Bioengineering, Washington State University, USA/ Pacific Northwest National Laboratory, USA)

Book Description:

Biomass presents an attractive source for the production of fuels and chemicals, mainly due to the concerns over the depleting fossil fuel, growing awareness of environmental issues associated with fossil fuel consumption, and increasing world energy demand. Biomass resources include agricultural and forest residues, energy crops, livestock residues as well as municipal solid waste. These biomass resources are first processed into a conversion-friendly form, followed by the transformation to a wide range of energy and/or chemical products using two primary biorefinery platforms: biochemical and thermochemical. This book covers the most recent advances in biomass processing, biochemical and thermochemical conversion technologies, and thus, serves as a useful reference to agriculture engineers, chemical engineers, biotechnology engineers and engineering students.

The contents of the book are divided into three sections: biomass overview and processing, biomass thermochemical and biochemical conversion technologies, and integrated biorefinery processes. Section 1 provides an overview of biomass concepts, supply logistics, and processing technologies. This section begins with a chapter on different biomass

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sources along with their compositions and properties (Chapter 1), followed by discussions on lignocellulosic feedstock supply logistics (Chapter 2), biomass resources in Canada and U.S. (Chapter 3), the harvesting system for biomass and drying (Chapter 4), and biomass size reduction (Chapter 5). This section ends with a chapter on techniques for biomass pelletization (Chapter 6).

Section 2 focuses on biomass conversion technologies and biomass-derived fuels/products. This section starts with the overview of three primary thermochemical conversion technologies: pyrolysis (Chapter 7), liquefaction (Chapter 8), and gasification (Chapter 9). Steam gasification of biomass is used as an example for hydrogen production (Chapter 10). Three chapters (Chapters 11-13) in this section provide different aspects of pyrolysis oil/biofuel upgrading, including hydrodeoxygenation and catalytic cracking of pyrolysis oils. Recent advances in bio-diesel production from seed oil and microalgae are summarized in Chapters 14-16. Chapter 17 summarizes the current status in the thermochemical conversion of fermentation-derived oxygenates to fuels. Biochemical conversion includes microbial conversion of bio-based chemicals (Chapter 18), pretreatment technologies (Chapter 19) for the conversion of cellulosic biomass to ethanol (Chapter 20), and biodegrading lignocellulosic feedstocks using thermophilic and anaerobic bacteria (Chapter 21).

Section 3 emphases the importance of integrated biorefinery concept and applications. The issues covered in this section are economic analysis of municipal solid waste to power (Chapter 22), process design for biological conversion of cattails to ethanol (Chapter 23), and green biorefining of green biomass (Chapter 24).(Imprint: Nova)

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