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*“Break the Barriers, Design the Future”*

# **Conversion of plant biomass to liquid biofuels and chemicals via integrative biorefinery concept**

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## **Abstract**

Due to economic, social, and environmental concerns, research focusing on alternative/renewable fuel, chemical and material sources have gained interest. Conversion of lignocellulosic agricultural biomass to biofuels, biochemical, and biomaterials is a promising sustainable alternative platform industry to the current petroleum-based industry with the advantages on renewable and carbon-neutral nature of the starting materials. This so-called “biorefinery” industry has received great attention as a new economic driver in bioeconomy worldwide. Currently, it is a major challenge to convert lignocellulosic biomass to chemicals or fuels at high selectivities and yields at costs compatible to those derived from fossil resources due to the recalcitrance of lignocellulosics to undergo conventional chemical transformations. Lignocellulose is a complex structure comprising cellulose microfibrils connected to hemicellulose matrix which formed networks to the lignin shield, making plant cell wall recalcitrant to chemical or biological decomposition. Pretreatment/Fractionation of lignocellulose components is an important initial pre-requisite step in integrated biorefineries where the individual separated biopolymers are processed to a spectrum of products using multi-disciplinary technology with a near-zero waste concept. After this process, cellulosic compounds (i.e. cellulose and hemicelluloses) can be converted chemically and/or biochemically to a wide range of products. Similarly, isolated lignin can be efficiently utilized in several approaches. This chapter reviews the important conversion processes as well as the potential products from lignocellulosic biomass. In addition, a case study of Thailand as an agricultural-based country to place several biomass conversion technologies as a promising strategy to be less dependent on imported petroleum while increase value of by-products from agricultural sectors is introduced.

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