

# Preface

Lignocelluloses are widely available and nonfood-based materials considered for the replacement of a major part of fossil-derived fuels and chemicals in the future. They have a high potential for the production of variety of products. However, lignocelluloses are naturally designed to protect plants against physical and biological attacks. Thus, their component separation as well as chemical and biological conversions is challenging and not easily possible. During the last decades, worldwide research resulted in the understanding of their characteristics, composition, components distribution, and linkage between different parts. Recently, processes, environmental issues, economy, policies, and challenges are the subject of a large number of studies.

Nowadays, uncountable studies are conducted on the production of valuable chemicals and biochemicals from lignocelluloses. Dominant constituents of lignocelluloses are cellulose, hemicellulose, and lignin. Once cellulose is separated it can be used for the production of a large number of products including pulp and paper, textiles, cellulose derivatives, and nanocellulose. Hemicelluloses can be used for the production of films, coatings, and hydrogels. Xylitol can also be produced from hemicellulosic xylose by both chemical and biological methods. Lignin has the potential for production of different valuable products including fuels, adhesives, dispersants, aromatics, carbon fiber, fillers, resins, and activated carbon.

Fermentable sugar mixtures can be produced by chemical or enzymatic hydrolysis from cellulose and hemicellulose. Biofuel production from lignocellulosic hydrolysates is among the most attractive routes. Production of bioethanol, biobutanol, bioacetone, and biodiesel not only reduces the need for fossil fuels but also controls environmental pollutions. Moreover, organic acids, polysaccharides, microbial biomass, and single-cell proteins and oils are other valuable products. Furthermore, without hydrolysis, it is possible to produce biohydrogen and biomethane from lignocellulose. Moreover, a large number of valuable materials, e.g., furfural, hydroxymethyl furfural, formic acid, levulinic acid, and syngas, can be produced from lignocelluloses by chemical conversions.

This book is aimed at researchers and engineers who need theoretical basis for technical knowledge of using lignocelluloses in different biofuels and chemicals. It is particularly prepared for teaching biofuel courses at graduate level and for those interested in conducting research on this topic.

I hope you enjoy reading this book.

October 2014

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Lignocellulose-Based Bioproducts

Karimi, K. (Ed.)

2015, IX, 328 p. 53 illus., 33 illus. in color., Hardcover

ISBN: 978-3-319-14032-2