Preface

Lignocellulosic materials refer to the organic matter produced by trees, shrubs, and agricultural crops and are major feedstock for the pulp & paper industry, composite industry and packaging material. Renewable sources of lignocellulosic materials are natural fibers, agricultural residues and forest products. These agricultural wastes and forest feedstocks are sufficiently abundant and generate very low net greenhouse emissions. Forest wood products contain more lignin and less ash content, which makes them attractive to cost-effective transportation in comparison to agricultural residues. Lignocellulosics are being used in food packaging, composites and textile industries due to their advantages over other traditional materials which include low cost, renewability, non-toxicity, biodegradability etc. Lignocellulosic biomass is a main raw material for many industrial processes, but it usually displays a very poor microbial and moisture resistance. Lignocellulosic materials are attractive materials for a variety of potential applications such as soil conservation, textile applications, as alternate materials especially wood substitutes in the construction market and as reinforcement in composite materials to produce automotive structural components. Lignocellulosic materials possess sufficient strength and stiffness but are difficult to use in load bearing applications by themselves because of their fibrous structure. In fiber-reinforced composites, fibers gave strength and stiffness to the structure while the plastic matrix serves as the binder to hold the fibers in place.

Physical, chemical and biological pretreatments of lignocellulosic fibers stop moisture absorption, increase surface roughness and improve other properties also. The main objective of this book is to explicate some important features of lignocellulosic materials, their characterization, properties, and applications, pretreatments of lignocellulosics and lignocellulosics reinforced composite materials. First chapter of this book discusses about lignocellulosic materials, their characterization and applications in polymer composites. Chapter "Retting Process as a Pretreatment of Natural Fibers for the Development of Polymer Composites" aims to provide a classification and an overview of the retting process that have been developed during years and are applied to extract mainly bast fibers. Various physical, chemical, mechanical, enzymatic and microbiological retting techniques

are discussed in this chapter. Physical, chemical and biological pretreatments of natural fibers and their effect on properties of natural fibers are discussed in Chapter "Pretreatments of Natural Fibers for Polymer Composite Materials".

Chapter "Mechanical and Thermal Properties of Less Common Natural Fibres and Their Composites" addresses with morphological, chemical and physical properties of less common natural fibers. Thermoplastic and thermosetting composites reinforced with the less common natural fibres are reviewed and compared with the traditional and common natural fibres. The development of cellulose-based nanocomposites is also discussed here.

Chapter "Lignocellulosic Fibres Reinforced Thermoset Composites: Preparation, Characterization, Mechanical and Rheological Properties" highlights the origin, structure and chemical composition of lignocellulosic fibers. This chapter also includes the preparation, characterization, mechanical and rheological properties of lignocellulosic fiber reinforced thermoset composites. Applications of lignocellulosic fiber composites in automobile industry and building sector are also discussed here. Chapter "Pineapple Leaf Fiber: From Waste to High Performance Green Reinforcement for Plastics and Rubbers" deals with extraction methods of pineapple leaf fibers. The reinforcing potential of pineapple leaf fibers in polymer matrix composites is also discussed in this chapter.

Chapter "Lightweight Wood Composites: Challenges, Production and Performance" discusses the production and performance of lightweight wood composites. Fiberboards, particleboards, extruded particleboards, and sandwich panels are included in this chapter. The fabrication techniques of natural fiber polymer composites are discussed in Chapter "Design and Fabrication of Kenaf Fibre Reinforced Polymer Composites for Portable Laptop Table". This chapter also deals with design and fabrication of kenaf fiber reinforced polymer composites for portable laptop table. Chapter "Lignocellulosic Materials for Geotextile and Geocomposites for Engineering Applications" presents an extensive overview of potential methods for enhancement of durability of lignocellulosic materials. Designing and testing parameters for lignocellulosic materials based geotextiles and geocomposites are also discussed. Chapter "Lignocellulosic Fibres-based Biocomposites Materials for Food Packaging" highlights the applications of lignocellulosic fibers-based biocomposites materials for food packaging. Chapter "Lignocellulosic Fibres Reinforced Polymer Composites for Acoustical Applications" includes the acoustical applications of lignocellulosic fiber reinforced polymer composites. Factors affecting the sound absorption coefficients of lignocellulosic fiber reinforced composites are also discussed in this chapter.

All the chapters in this book are contributed by renowned researchers from academia and research laboratories across the world. This book will prove to be a very useful for scientists, academicians, research scholars, material engineers and industries. This book will be supportive for undergraduate and post graduate students in Institutes of Materials Science & other Technical Institutes, and Technologists & Researchers from R&D laboratories working in this area.

The Editor would like to express their gratitude to all contributors, who have provided excellent contributions in this book. The Editor would like to thank his

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