Preface

Bio-based materials prove superior to conventional materials because of regenerable resources, a variety of structures (polysaccharide, protein, etc.), biocompatibility, controllable biodegradability, processability solely or as composite, and tuneable surface nature. These materials are in use in almost all engineering fields. Bio-based fillers for packaging items minimize the waste disposal problem and emerge as sustainable products for society. In recent times biomedical applications, such as tissue culture, orthopaedic implants, drug delivery, biosensing, etc., are utilizing more bio-based resources, given their preferred properties and biocompatibility. Employment of bio-based materials, such as cellulose, silk, chitosan, gums, etc., and their derived materials is increasing in their substitution of conventional engineering applications in the energy sector, electronics, mechanically stable product development, structural application, catalysis, etc. In view of that, *"Sustainable Bio-Based Materials: Biomedical and Engineering Applications"* depicts the various aspects of bio-based material-based technologies, including synthesis, extraction, processing, and application for selective fields. This book comprises of 16 chapters, which are cover various dimensions of bio-based materials in corroboration with recent upgradation. Chapter 1 demonstrates the need of bio-based materials and set the background of the book. This chapter is also unveils different types of biomaterials along with their properties and origin. Synthesis procedures of the bio-based materials, such as biopolymers and bio-based polymers, biomaterials, are discussed in Chapter 2 in accordance with current research works. Chapter 3 is comprises of information about cellulose polymers, which are bio-based in nature. It includes their properties, processing, and applications for various proposes, discussed in corroboration with recent upgradation of the bio-based polymers. Chitosan, which is an abundantly available biomaterial, is described in Chapter 4. It includes various forms of cellulose, extraction procedures, cellulose applications, and surface modification techniques for advance applications. A brief discussion on the future prospect of the material in the engineering and biomedical fields is also addressed in the chapter. Another prime bio-based material which has prospects in the biomedical and engineering application. A comprehensive discussion about bio-based biomaterials is included in Chapter 5 in accordance with recent developments. Chapter 6 is about bio-based materials in tissue culture. Utilization of bio-based materials for different fields are discussed in the following chapters: Chapter 7 additive manufacturing; Chapter 8 analysis of surface acoustic wave; Chapter 9 Fuel-cell applications of bio-based materials for electrode, membrane are demonstrated. In all these chapters recent upgradation in research involving bio-based materials are incorporated and discussed.

Some of the engineering applications got transformed and became more effective in use of bio-based substances. In this book some of those applications are also included in Chapter 10 and 11. Biomaterials to biorefinery in Chapter 12. Chapter 13 is based on biolubricants and its application in engineering. Bio-based systems in advanced separation process are discussed in Chapter 14.

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Modeling and computation techniques of bio-based systems are exhaustively discussed in Chapter 15. The bio-based materials for adsorption and catalysis and related authors' view towards bio-based material-oriented technologies, their difficulties, and possible modification techniques are discussed in Chapter 16.

This book contains valuable and high-quality information from different expertise in respective chapters, which can serve as reference for researchers and industry personnel. The authors believe that the precise and informative contents of the chapters of the book can catalyze the interest and engagement of bright minds and serve as encouragement future research in the field.

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