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| Nota di contenuto | Introduction to Wood and Natural Fiber Composites; Contents; Series Preface; Preface; Acknowledgments; 1 Wood and Natural Fiber Composites: An Overview; 1.1 Introduction; 1.2 What Is Wood?; 1.3 Natural Fibers; 1.3.1 Fibers; 1.3.2 Lignocellulosic Materials; 1.3.3 Worldwide Lignocellulosic Fiber Resources; 1.3.4 Wood as a Teaching Example; 1.4 Composite Concept; 1.4.1 Composites Are Important Materials; 1.4.2 What Is a Composite?; 1.4.3 Taxonomy of Matrix Composites; 1.4.4 Laminar Composites; 1.4.5 Taxonomy of Wood and Natural Fiber Composites; 1.4.6 Composite Scale; 1.5 Cellular Solids 1.5.1 Natural and Synthetic Cellular Solids1.5.2 Relative Density; 1.6 Objectives and Organization of This Book; References; 2 Lignocellulosic Materials; 2.1 Introduction; 2.2 Chemical Composition of Lignocellulosic Materials; 2.2.1 Polymers: Structure and Properties; 2.2.2 Lignocellulose; 2.2.3 Cellulose; 2.2.4 Hemicelluloses; 2.2.5 Pectins; 2.2.6 Lignin; 2.2.7 Extractives and Extraneous Materials; 2.3 The Woody Cell Wall as a Multicomponent Polymer System; 2.3.1 Skeletal Framework Polymers; 2.3.2 Reinforced Matrix Theory; 2.3.3 |

Cell Wall Ultrastructure

2.3.4 Cell Wall Structure Dictates Physical Properties 2.3.5 Cell Wall Structure from Molecular to Anatomic Level; 2.4 Anatomical Structure of Representative Plants; 2.4.1 Plant Cell Walls Are Not Solitary Entities; 2.4.2 Structure of Grain Crop Stems; 2.4.3 Structure of Herbaceous Biomass Crop Stems; 2.4.4 Structure of Bast Fiber Stems; 2.4.5 Structure of Woody Monocotyledons; 2.4.6 Wood; 2.5 Comparison of Representative Plant Stems; 2.6 Cellular Solids Revisited; References; 3 Wood as a Lignocellulose Exemplar; 3.1 Introduction 3.2 Wood as a Representative Lignocellulosic Material: Important Physical Attributes 3.3 Moisture Interactions; 3.3.1 Moisture Content; 3.3.2 Hygroscopicity; 3.3.3 States of Water in Wood; 3.3.4 Capillary or Free Water; 3.3.5 Shrinking and Swelling due to Moisture Flux; 3.4 Density and Specific Gravity of Wood; 3.4.1 Density of Wood; 3.4.2 Specific Gravity of Wood; 3.5 Wood: A Cellular Solid; 3.5.1 Relative Density of Wood; 3.6 Mechanical Properties; 3.6.1 Compression Strength; 3.6.2 Compression Strength of Wood versus Relative Density; 3.6.3 Mechanical Properties in Context 3.7 Wood Is the Exemplar: Extending Principles to Other Plant Materials References; 4 Consolidation Behavior of Lignocellulosic Materials; 4.1 Introduction; 4.2 Synthetic Crystalline and Amorphous Polymers; 4.2.1 Polyethylene; 4.2.2 Polystyrene: Isotactic, Syndiotactic, and Atactic; 4.2.3 Degree of Crystallinity, Revisited; 4.2.4 Thermal Softening of Amorphous Polymers: Glass Transition Temperature, T_g ; 4.3 Glass Transition Temperature of Wood Polymers; 4.3.1 Glass Transition Temperature of Wood Polymers: Empirical Data; 4.3.2 Kwei Equation: Modeling T_g of Wood Polymers 4.4 Viscoelastic Behavior of Lignocellulosic Materials

Sommario/riassunto

"Bringing together widely scattered information on the fundamental concepts and technological applications for the manufacture of wood and natural fiber composites, this reference provides a much needed overview of this rapidly evolving field in a way that is accessible for advanced undergraduates, graduate students, and practicing professionals alike. After first covering the fundamental concepts, the book then moves on to discuss technical applications and finally concludes with a discussion on environmental considerations, sustainability, and methods of evaluating product properties and performance"--

"This book brings together widely scattered information on fundamental concepts and technological applications for the manufacture of wood- and natural fiber composites, providing a much needed and accessible overview of this rapidly evolving field"--