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Nota di contenuto	Handbook of Biopolymer-Based Materials: From Blends and Composites to Gels and Complex Networks; Contents; Foreword; List of Contributors; 1 Biopolymers: State of the Art, New Challenges, and Opportunities; 1.1 Introduction; 1.2 Biopolymers: A Niche For Fundamental Research in Soft Matter Physics; 1.3 Biopolymers: An Endless Source of Applications; 1.4 Topics Covered by the Book; 1.5 Conclusions; References; 2 General Overview of Biopolymers: Structure, Properties, and Applications; 2.1 Introduction; 2.2 Plant Cell Wall Polysaccharides; 2.2.1 Cellulose; 2.2.1.1 Cellulose Extraction 2.2.1.2 Nanocellulose2.2.1.3 Microfibrillated Cellulose; 2.2.1.4 Cellulose Nanowhiskers; 2.2.2 Hemicelluloses; 2.2.2.1 Galactomannans; 2.2.2.2 Konjac Glucomannan; 2.2.2.3 Xylan; 2.2.2.4 Xyloglucan; 2.2.3 Pectins; 2.3 Biocomposites; 2.3.1 Natural Fiber Composites; 2.3.2 Cellulose Composites; 2.3.3 Cellulose-Polymer

Interactions; 2.3.4 Semi-Solid Composites; 2.4 Future Outlook; References; 3 Biopolymers from Plants; 3.1 Introduction; 3.2 Lipid and Phenolic Biopolymers; 3.2.1 The Biopolymer Cutin; 3.2.1.1 Cutin Monomers: Biosynthesis and Physicochemical Characteristics 3.2.1.2 Molecular Architecture of Cutin 3.2.1.3 Cutin Biosynthesis; 3.2.2 Lignin; 3.2.2.1 Monomer Precursors and Chemical Reactivity; 3.2.2.2 Lignin Biosynthesis; 3.2.3 Suberin; 3.2.3.1 Chemical Composition; 3.2.3.2 Biosynthesis and Fine Structure; 3.3 Carbohydrate Biopolymers: Polysaccharides; 3.3.1 Structural Polysaccharides; 3.3.1.1 Cellulose; 3.3.1.2 Hemicellulose; 3.3.1.3 Pectin; 3.3.2 Storage Polysaccharides; 3.3.2.1 Starch; 3.3.2.2 Fructans: Inulin; 3.3.3 Other: Gums (Guar Gum, Gum Arabic, Gum Karaya, Gum Tragacanth, and Locust Bean Gum); 3.4 Isoprene Biopolymers: Natural Rubber 3.4.1 cis-Polyisoprene 3.4.1.1 Occurrence; 3.4.1.2 Composition, Structure, and Properties; 3.4.1.3 cis-1,4-Polyisoprene Biosynthesis; 3.4.1.4 Applications; 3.4.2 trans-Polyisoprene; 3.5 Concluding Remarks; References; 4 Bacterial Biopolymers and Genetically Engineered Biopolymers for Gel Systems Application; 4.1 Introduction; 4.1.1 Nucleic Acid Biopolymers: Central Dogma; 4.2 Microbial Polysaccharides as Biopolymers; 4.2.1 Synthesis and Applications; 4.3 Microbial Biopolymers as Drug Delivery Vehicle; 4.3.1 -Poly-L-Lysine (-PL) and Its Applications 4.3.2 Polyhydroxyalkanoates and Its Applications 4.4 Polyanhydrides; 4.5 Recombinant Protein Polymer Production; 4.6 Recombinant Genetically Engineered Biopolymer : Elastin; 4.7 Collagen as an Ideal Biopolymer; 4.7.1 Microbial Recombinant Collagens: Production in *Pichia Pastoris*; 4.8 Biopolymers for Gel System; 4.9 Hydrogels of Biopolymers for Regenerative Medicine; 4.9.1 Polysaccharide Hydrogels; 4.9.2 Cellulose-Derived Biopolymers-Based Hydrogels; 4.9.3 Protein Biopolymers-Based Hydrogels; 4.10 Supermacroporous Cryogel Matrix from Biopolymers; 4.10.1 Protein Cryogel 4.11 Biopolymers Impact on Environment

## Sommario/riassunto

This first systematic scientific reference in the area of micro and nanostructured biopolymer systems discusses in two volumes the morphology, structure, dynamics, properties and applications of all important biopolymers, as well as their blends, composites, interpenetrating networks and gels. Selected leading researchers from industry, academia, government and private research institutions around the globe comprehensively review recent accomplishments in the field. They examine the current state of the art, new challenges, opportunities and applications, discussing all the synthetic routes