Polymers

an Open Access Journal by MDPI

CiteScore: 9.7
Indexed in PubMed
Impact Factor: 4.9

Special Issue Reprint

Advances in Biocompatible and Biodegradable Polymers, 4th Edition

Edited by: José Miguel Ferri , Vicent Fombuena Borràs and María Fernanda López Pérez

This Reprint compiles nine studies on sustainable, biocompatible, and biodegradable polymer systems, covering design, processing, functionalization, and applications from molecular to material scales. Key matrices include poly(lactic acid) (PLA) and poly(3-hydroxybutyrate) (PHB): PLA/PHB composites with inorganic filler balanced flame retardancy and biodegradation, while steam sterilization and recycling of 3D-printed PLA affected mechanical reliability and surface morphology. Solvent-free extrusion of isotactic PHB blends widened processing windows and improved ductility, enabling greener production. Natural and waste resources were valorized: biochar and artichoke cellulose enhanced PLA composites' thermal stability and stiffness; avocado seed starch films reinforced with nanocrystals improved mechanical and barrier properties and disintegrated rapidly in compost. Functional materials included cross-linked PMMA nanocomposites with melamine, CuO nanoparticles, and activated carbon, showing superior thermal stability and antibacterial behavior. Extracellular polymeric substances from Rhodococcus were analyzed as lipid- and polysaccharide-rich matrices supporting biofilm formation and hydrocarbon resistance. The Reprint concludes with a review of strategies for synthesizing and functionalizing biodegradable, biocompatible polymers, highlighting smart systems and sustainable uses in medicine, packaging, and environmental remediation. Collectively, these works advance eco-efficient, high-performance materials merging biodegradability, biocompatibility, and functionality.

mdpi.com/books/reprint/12171