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Synthesis of bioplastics and the effects of additives on the mechanical, thermal and biodegradable properties
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Abstract
The mounting global concern over the environmental consequences of petroleum-based plastics has prompted significant research into sustainable alternatives, with bioplastics emerging as a forerunning solution. This systematic review elucidates the multifaceted synthesis processes of bioplastics, which are derived from renewable sources such as plant starches, cellulose, and waste materials. The synthesis encompasses stages from raw material selection, pre-treatment, to the incorporation of various additives, with the aim to achieve specific properties in the resultant bioplastics. A substantial focus of this review lies in comprehensively understanding the role of additives, which serve as the pivotal agents in tailoring the mechanical and thermal characteristics of bioplastics. Additives, including cross-linking agents, plasticizers, fillers, compatibilizers, and reinforcement agents, are critically examined for their influence on attributes such as tensile strength, flexibility, thermal stability, and biodegradability. Factors such as intermolecular interactions, hydrogen bonding, and moisture content, play a determining role towards the resultant properties. The prospects for bioplastics are rapidly expanding, signalling a transformative shift in various applications ranging from eco-friendly packaging to advanced biomedical devices. This article serves as a comprehensive guide to both researchers and industry stakeholders, providing deep insights into the synthesis of bioplastics and the transformative role additives play in their functional properties. © The Author(s) 2024.

Author Keywords
additives; biodegradable plastic; Bioplastic; properties; systematic review; thermoplastics

Index Keywords
Crosslinking, Gasoline, Petroleum additives, Plasticizers, Reinforced plastics; Bio-plastics, Biodegradable plastics, Environmental consequences, Mechanical, Property, Raw material selection, Renewable sources, Synthesis process, Systematic Review, Thermal; Tensile strength

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