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Poly lactide cellulose-based nanocomposites

编号	020020403
推送时间	20190916
研究领域	林产化工
年份	2019
类型	期刊
语种	英语
标题	Poly lactide cellulose-based nanocomposites
来源期刊	International journal of biological macromolecules
期	第204期
发表时间	20190325
关键词	Bacterial cellulose; Blend; Cellulose nanocrystal; Cellulose nanofiber; Foam; Nanocomposite; PLA; Poly(lactic acid); Poly lactide; Review;
摘要	Among biopolymers, polylactide (PLA) is considered as the most appropriate substitute for the petroleum-based polymers which are widely used in various commodity and engineering applications. PLA, however, also suffers from series of shortcomings such as slow crystallization rate and low melt strength which result in poor processability, formability and foamability which substantially limit its production and usage. Recently, the use of biobased/biodegradable cellulose nanoparticles such as cellulose nanocrystals (CNC), cellulose nanofibers (CNF), and bacterial nanocellulose (BC) have been proposed to manufacture fully green PLA-based biocomposites while they could resolve some of the noted drawbacks of PLA. However, due to their high hydrophilicity and the presence of hydrogen bonding cellulose nanoparticles are not compatible with hydrophobic polymers. Therefore, the dispersion of these nanoparticles in thermoplastics still remains as the main challenge to process/develop their nanocomposites. This article reviews the studies conducted on these challenges of developing PLA cellulose-based nanocomposites including the difficulties of their processing and possible enhancements of their rheological, thermal, and mechanical properties. The investigations that have been conducted on PLA-CNC, PLA-CNF, and PLA-BC nanocomposites are separately discussed in this review article, while the studies on the development of PLA-nanocellulose blend nanocomposites and PLA-nanocellulose microcellular foams are also highlighted.
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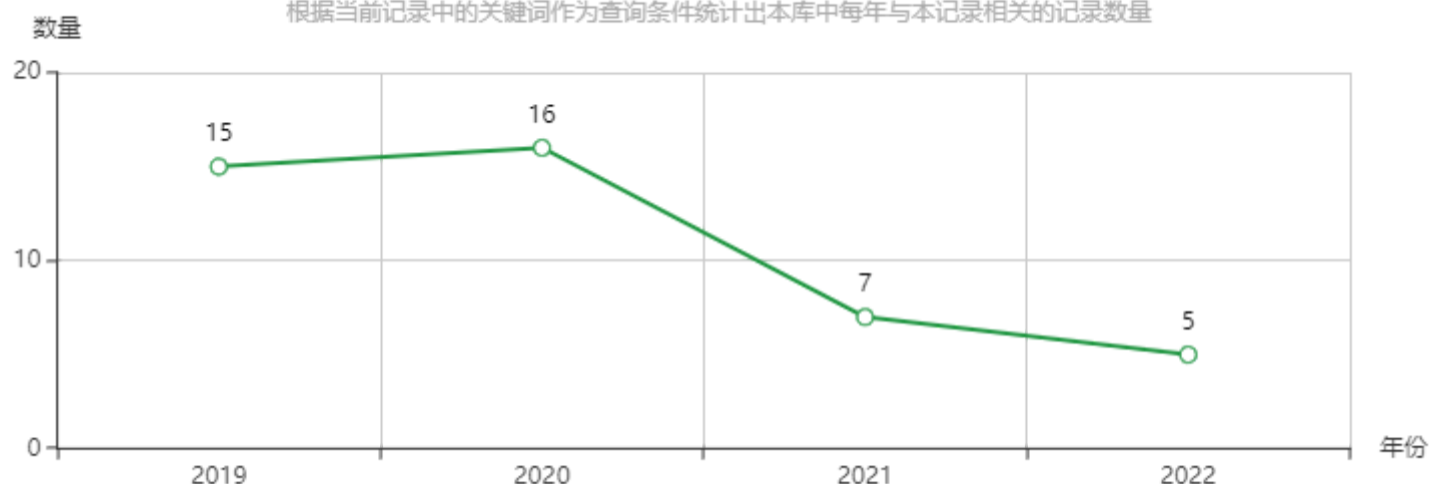
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