

Composites Part B: Engineering

Influence of nanoparticles and their selective localization on the structure and properties of polylactide-based blend nanocomposites

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Abstract

This article critically reviews the influence of different nanoparticle localization on the final structure-property relationships of polylactide (PLA)-based blend nanocomposites. The effects of kinetics and thermodynamic parameters on the final localization of the nanoparticles are discussed. The different mechanisms of the stabilizing effect of nanoparticles are reviewed with respect to their final localization as well as their size/shape characteristics. Alternatively, the effects of localization of various types of nanoparticles on the morphological, rheological, electrical, and mechanical properties of PLA-based blend nanocomposites are elaborately discussed. The sensitivity of the final performance of the PLA-based blend nanocomposites is explored with regard to the different localizations of different nanoparticles towards specific applications such as packaging and functional and sensory polymers. The recent progress in computer simulation on this topic is also addressed. In summary, this review provides new insight into the design and formulation of advanced PLA-based blend nanocomposites for a wide range of applications where the use of bioplastics and sustainability are critically considered.