

Nano-biocomposites based on synthetic aliphatic polyesters and nanoclay

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Abstract

This article gives an overview of the recent developments in the preparation, characterisation, properties, crystallisation behaviour, and melt rheology of clay-containing composites of biodegradable synthetic aliphatic polyesters such as poly(butylene succinate) (PBS) and poly[(butylene succinate)-co-adipate] (PBSA). In recent years, these composite materials have attracted substantial interest primarily due to their sustainable production and use, with regards to the environment. A summary of the clay type used in the preparation of these nanocomposites is given, with montmorillonite being the most commonly used. Various nanocomposite structures arising from the incorporation of clay, both pristine and organically modified, into the neat PBS and PBSA matrices is highlighted. Good dispersion of the layered silicates, especially the organically modified clays, tends to result in an improvement in a number of properties of the nanocomposites, when compared with the neat polymers. Such improvement includes higher storage modulus, both in solid and molten states, higher tensile modulus, higher gas barrier properties, faster degradability, and better thermal stability. Therefore, this review aims to highlight the findings of various research endeavours in the nano-biocomposites based on PBS and PBSA and clay—from preparation methods to how the structures of the nanocomposites affect their properties.