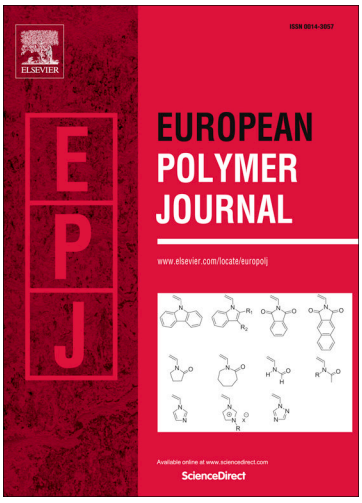

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Inhibited crystallization of polyhydroxybutyrate by blending with aliphatic-aromatic copolyester

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Abstract

Polyhydroxybutyrate (PHB) is highly crystalline thermoplastic made by biological fermentation from renewable carbohydrate feedstocks. Its poor mechanical properties is mostly due to high crystallinity. We succeeded to control crystallizability of PHB by blending with aliphatic-aromatic copolyester to such extend that only a small fraction of the material crystallizes during cooling. The blends are phase separated even at low concentration. Crystallization of PHB in blends is strongly retarded during cooling as compared to pure PHB. It is caused by a dramatic decrease in number of primary nuclei initially present in PHB that migrated to copolyester component during compounding. At low temperature during cooling from the melt the PHB component is subjected to strong homogeneous nucleation. These homogeneous embryos become active at around 30^{o}C during heating. Elastic moduli of the blends are significantly decreased as compared to pure PHB, the energy stored by blends during deformation is increased, however, all blends show brittle fracture and the plastic flow is not reached. The blends are biodegradable because both components are biodegradable.

Key words: polyhydroxybutyrate; blends; crystallization; nucleation; migration of nuclei;

1. Introduction

Dramatic increase in consumption of polymers resulted from their superior mechanical properties, resistance to chemical and biological attacks, low costs and uncomplicated but complete processing, that brings ready –made articles with finished