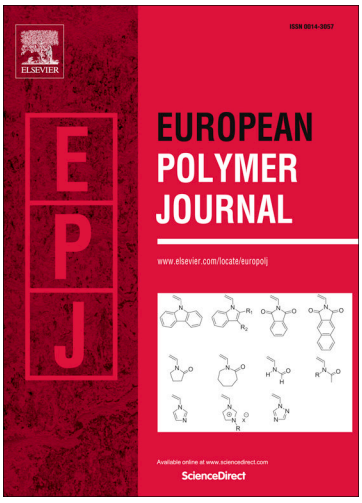

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Accelerated crystallization of high molar mass poly(L/D-lactic acid) by blending with low molar mass poly(L-lactic acid)

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Abstract

The crystallization kinetics of poly(L/D-lactic acid) (PLLA) with a molar mass of around 120 kDa and containing 4% of D-isomers is sizably improved by blending with low amount (<10 m%) of a PLLA of high stereoregularity, made of pure L-isomer, and molar mass of 4 kDa. Blends of the two PLLA's are prepared by solution mixing. The blends are homogeneous in the melt and display a single, composition-dependent glass transition. Increasing concentration of the highly stereo-regular low-molar mass component in the blends results in an earlier onset of crystallization and a higher crystal growth rate. The blend composition affects the crystal polymorphism of PLLA, as increasing content of the highly stereoregular and low molar mass polymer favors growth of α-crystals at lower temperatures than typically observed in unmodified PLLA. It is suggested that the short PLLA molecules of the low-molar mass component start to crystallize at higher temperature than the long molecules of the high-molar mass component, acting as crystal nuclei for the subsequent crystal growth that involves both species.

Keywords: Blends, crystallization kinetics, PLLA, crystal growth rate

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