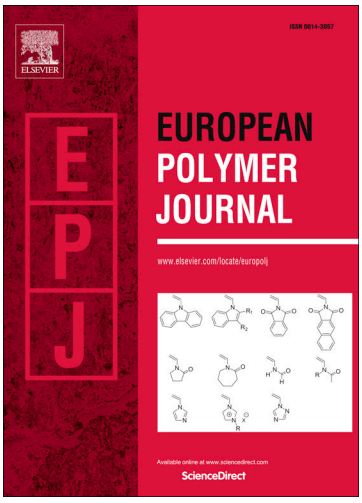

Fully biobased thermoplastic elastomers: Synthesis of highly branched star comb poly(β-myrcene)-graft-poly($_L$-lactide) copolymers with tunable mechanical properties

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Fully biobased thermoplastic elastomers: Synthesis of highly branched star comb poly(β-myrcene)-graft-poly($_L$-lactide) copolymers with tunable mechanical properties

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Abstract

Biobased thermoplastic elastomers from renewable resources are gaining increasing attention from academia and industry in recent years. Herein, highly branched star comb graft copolymers consisting of star poly(β-myrcene) (SPM) backbone and semicrystalline poly($_L$-lactide) (PLLA) branches were successfully synthesized. The structure-properties relationships of the resultant graft polymers varied with graft density and branch length were investigated by DSC, WAXD, POM, SAXS, TEM, AFM and stress-strain test. The microphase separated structure and the relative properties of the copolymers were explored. It was found that the macromolecular architectures had a profound influence on the performances of these obtained graft materials. The crystallization ability of PLLA depended on the content of rubbery backbone and the graft density of these graft copolymers. Besides, the graft density and the branch length influence the tensile toughness of these materials. At the identical PM fraction, the elongations at break of the star comb graft copolymers were larger than that of the linear comb analogues.

Key words: Biobased; Thermoplastic elastomers; Star comb; Polylactide; Poly(β-myrcene)

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