Tailor-Made Onion-Like Stereocomplex Crystals in Incompatible Enantiomeric Poly(lactic acid) Containing Block Copolymer Blends

LEI ZHU, LU SUN, Institute of Material Science and Department of Chemical, Materials and Bimolecular Engineering, University of Connecticut, Storrs, CT 06269-3136, LIXIA RONG, BENJAMIN HSIAO, Department of Chemistry, State University of New York at Stony Brook, Stony Brook, NY 11794-3400 — Stereocomplexes formed by blending enantiomeric PLA block copolymers have demonstrated great potential for applications in biomedical devices. Here, we successfully synthesized well-defined enantiomeric PLA containing block copolymers by living ring-opening polymerization of L- and D-lactides from hydroxyl-terminated hydrophilic [poly(ethylene oxide) or PEO] and hydrophobic [poly(ethylene-co-1,2-butylene) or PEB] oligomers. Quantitative stereocomplex formation was achieved by equimolar mixing of the incompatible PEO-b-PLLA and PEB-b-PDLA. Intriguingly, in the blend of PEB-b-PDLA and PEO-b-PLLA with different PEB and PEO molecular weights, onion-like stereocomplex crystals were observed because of unbalanced surface stresses caused by different PEO and PEB molecular weights.

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