Poly(L-Lactic Acid)

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Poly(L-lactic acid) is a semicrystalline polyester produced by ring-opening polymerisation of the cyclic lactide, and the L prefix fixes the stereochemistry of the repeat unit. The stereocentre matters, because a random mixture of the two enantiomers gives an amorphous polymer while the pure enantiomer crystallises [1]. The melting point and the crystallinity depend on the content of the opposite enantiomer, and a small amount of it lowers both [2]. Hydrolytic degradation proceeds by random chain scission in the bulk, and the rate is accelerated by the acidic products that accumulate inside a thick part [3]. Blending with a flexible polyester improves the toughness but reduces the strength, and the two phases separate unless a copolymer is formed [4]. Stereocomplexation between the two enantiomers raises the melting point by about fifty degrees and improves the heat resistance [5].

polylactide | ring-opening polymerization | stereochemistry | crystallinity | hydrolytic degradation | stereocomplex | enantiomer

References

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