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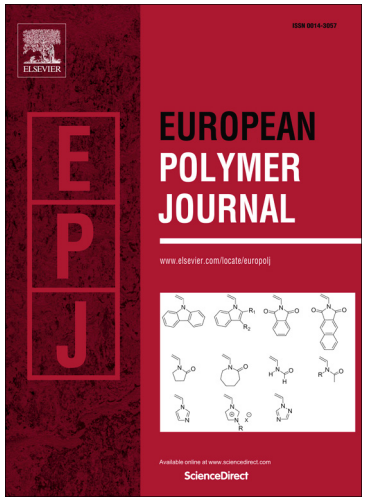

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Conformational features of poly-L- and poly-D,L-lactides through molecular optics and hydrodynamics

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Abstract

Poly(*L*-lactide) and poly(*D,L*-lactide) samples have been synthesized through ring-opening polymerization. The homological series of two poly(lactide)s have been studied in 1,4-dioxane solutions by a complex of methods: molecular hydrodynamics, molecular optics, NMR, and optical rotation. The 1H and 13C NMR spectroscopy and optical rotation proved the different stereo isomeric composition of poly(*L*-lactide) and poly(*D,L*-lactide) polymer series. The P-*L*-LA series are isotactic polymers, whereas the P-*D,L*-LA polymer series are atactic or syndiotactic ones. The hydrodynamic volume of poly(*L*-lactide) macromolecules was found to be larger than that for poly(*D,L*-lactide) macromolecules. Hydrodynamic studies were performed for P-*L*-LA series in the range of molar masses: $3.5<M\times10^{-3}$, g/mol<81, whereas for P-*D,L*-LA series in the range: $1.6<M\times10^{-3}$, g/mol<200. Poly-*L*-lactide chains in solution exhibit higher equilibrium rigidity than poly-*D,L*-lactide chains, which is explained by different chain tacticity. For the first time the birefringence of solution of two investigated types of poly(lactide) macromolecules in mechanical and electrical fields was studied. Both birefringence methods demonstrate the net differences between optical properties of P-*L*-LA and P-*D,L*-LA chains and confirm the conclusion made from the hydrodynamic study. Comparisons with the literature data concerning intrinsic viscosity values and chain rigidity parameters have been made.

Keywords: poly(lactid)s, ring opening polymerization, macromolecular hydrodynamics, flow and electric birefringence, chain conformation, statistical segment length

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