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**Synthesis and characterization of novel poly(ethylene furanoate-co-adipate)
random copolyesters with enhanced biodegradability**

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Abstract

In this study, copolymers based on poly(ethylene furanoate) (PEF) and poly(ethylene adipate) (PEAd) were synthesized by melt polycondensation using 2,5-dimethyl furan dicarboxylate (DMFD), adipic acid (AA) and ethylene glycol (EG) in different proportions. The success of the reaction, crystallographic characteristics, molecular weight and thermal properties were determined with Nuclear Magnetic Resonance Spectroscopy (¹H-NMR), Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA). The results confirm the successful synthesis of random copolymers, with high thermal stability, which exceeds 300 °C. Also, isodimorphic cocrystallization was concluded from both XRD patterns and DSC thermograms. The enzymatic hydrolysis rate of the copolyesters depended on comonomer ratio. Copolymers with 95 and 90 mol% of ethylene adipate (EAd) were completely degraded after 30 days.

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