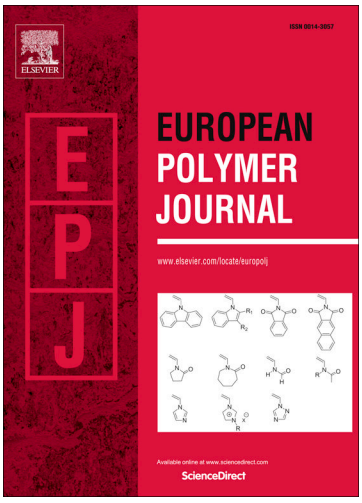

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Printability of co-polyester using fused deposition modelling and related mechanical performance

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Abstract

The aim of this study is to investigate the printability conditions of a copolyester based polymer that has not received yet much attention. This material presents several advantages over PLA and ABS including its food contact compliance and BPA (Bisphenol A) free formulation. The determination of optimal conditions to print copolyester with FDM process was done by quantifying the influence of printing temperature on thermal behavior and tensile properties including Young's modulus, yield stress, tensile strength, ultimate properties, and fracture toughness. Analysis of damage mechanisms through the observation of fracture surfaces of printed copolyester were also performed using SEM. The results indicate a strong relationship between thermal cycling, tensile properties and printing temperature. It is shown also that the mechanical behavior of printed copolyester is significantly affected by the filament arrangement within the meso-structure. Particular fracture patterns are revealed, which suggest the simultaneous action of three main damage mechanisms triggered by the inhomogeneous change in the filament morphology at the rupture point.