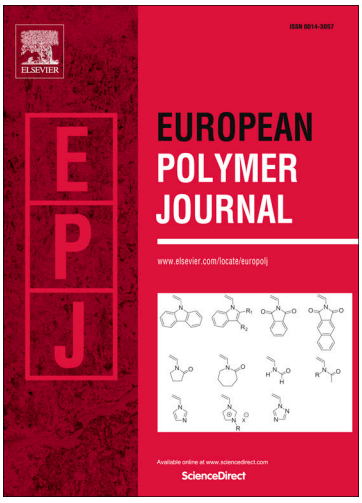

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Polyamides based on a partially bio-based spirodiamine

Aleksandra A. Wroblewska[a], Sophie Lingier[b], Jurrie Noordijk[a], Filip E. Du Prez[b], Stefaan M.A. De Wildeman[a], Katrien V. Bernaerts[a*]

[a] Bio-based Materials, Faculty of Humanities and Sciences, Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands, Email: katrien.bernaerts@maastrichtuniversity.nl

[b] Polymer Chemistry Research Group, Centre of Macromolecular Science, Department of Organic and Macromolecular Chemistry, Ghent University, Krijgslaan 281 S4bis, 9000 Ghent, Belgium

Keywords:

Spiroacetal, polyamides, polycondensation, Maldi-*ToF*, hydrolysis

Highlights

- Bio-based polyamides containing rigid spiroacetal moieties via salt polymerization
- Maldi-ToF confirms polymer structure and reveals side reactions during condensation
- The resulting polyamides are hydrolytically stable up to pH 3

Abstract

In this study novel, fully and partially bio-based polyamides containing spiroacetal moieties in the backbone derived from bio-glycerol and bio-ethanol were prepared and characterized. The renewable diamine employed to obtain a series of polyamides was synthesized by means of thiol-ene click chemistry and therefore contains flexible thioether as well as rigid spiroacetal moieties. Two different chemical pathways for the polymerization were investigated and evaluated. The polymerization of polyamide salts proved to be the most promising method and therefore salt polymerization was applied in the synthesis of polyamides with aliphatic and aromatic dicarboxylic acids. Subsequently, the structure of the polymers was confirmed by Maldi-*ToF* analysis and additionally thermal and mechanical properties were investigated revealing T_g's between 24 and 80 °C and ductile materials with moduli between 1.0 and 1.5 GPa. Both semicrystalline and amorphous polyamides were thermally stable and therefore suitable for thermal processing. In the end, degradation studies were performed on the acetal containing polyamides which showed that the polymers were stable up to pH 3.