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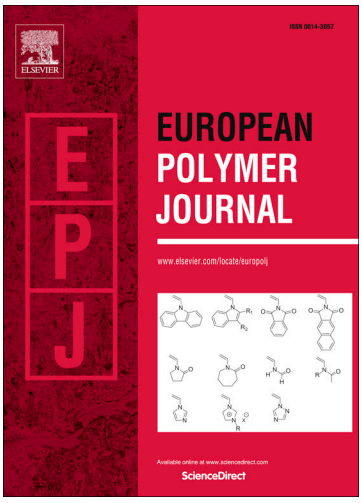


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# Redefining polyamide property profiles via renewable long-chain aliphatic segments: Towards impact resistance and low water absorption

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**ABSTRACT**

A series of renewable, long-chain, fatty acid-derived polyamides (PA) ranging from PA 6,14 to PA 6,18 were synthesized via polycondensation, yielding very high molecular weights and a remarkable property profile distinct from short-chain commercial grades. Most notably, synthesized polyamides exhibited good impact resistance, excellent stiffness-to-toughness balance and very low water absorption yet high oxygen and water vapour permeability; with this property profile being exemplified by PA 6,18. The increased repeating unit length and reduced number of amide linkages able to participate in interchain hydrogen bonding imparted a strong influence on material properties. The data highlights the benefits and technical advantages of utilising long-chain polyamides, while also significantly expanding the repertoire, knowledge and property profile of the long-chain aliphatic polyamide family, and providing a basis for further development of polyamides from renewable sources.

**KEYWORDS**

Polyamide, molecular weight, renewable, impact strength, water absorption