Professur für Biogene Polymere
Campus Straubing für Biotechnologie und Nachhaltigkeit
Technische Universität München

Projektbeschreibung

Polyamide-polysiloxane-copolymers as examples for partially biobased thermoplastic elastomers

The research of thermoplastic elastomers (TPE) is a very prospective part of polymer chemis-try. They combine elastic rubber-like properties with the possibility for standard thermal processing techniques. TPEs are already used e.g. in medical applications (catheters; nylon based TPE) or in the automotive industry (e.g. for glass run and dynamic weatherstripping car profiles; siloxane based TPE). One specific type of TPE are block copolymers consisting of hard segments that can bond across chains and inert soft chains. A very promising combination for this purpose is nonpolar polydimethylsiloxane (PDMS) as the soft segment alternating with polyamides (PA, building hydrogen bonds between the chains). In consideration of sustainability and ecology, we created partially biobased TPEs by using amino acids for the polyamide segments, enabling a large proportion of biobased sections. The amino acids and additionally biobased diamines or dicarboxylic acids were used as precursors to build up alternating polyamide-polysiloxane-block copolymers. Through hydrosilylation, peptide synthesis and click-chemistry techniques, we derived interesting systems for the development of new biobased TPE materials. The advantage of designing a process for TPEs using amino acids is the facile subsequent screening of the impact of different side groups in the hard segments on the thermal and mechanical properties of the materials. Additional investigations on the effects of different lengths of the PDMS and the PA blocks on the performance of the polymer will enable designing materials adjusted to particular applications, such as 3D-printing or injection molding of parts for the automotive industry, while using already established manufacturing processes.

Technische Universität München
TUM Campus Straubing
M.Sc. Maria Haslböck
Schulgasse 16, 94315 Straubing
Tel. +49 9421 187-459
maria.haslboeck@tum.de
www.cs.tum.de
www.tum.de