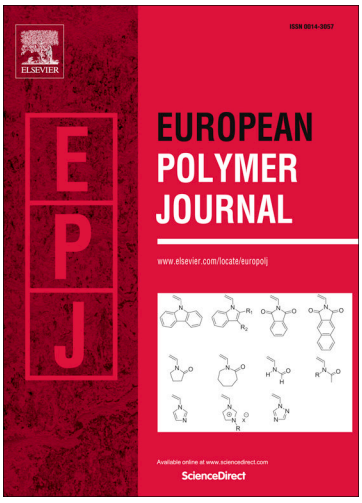
Accepted Manuscript



Synthesis and characterization of environmentally-friendly waterborne poly(urethane-urea)s

Iñigo Díez-García, Arantzazu Santamaría-Echart, Arantxa Eceiza, Agnieszka Tercjak

PII: S0014-3057(17)31869-4
DOI: https://doi.org/10.1016/j.eurpolymj.2017.12.026
Reference: EPJ 8213

To appear in: *European Polymer Journal*

Received Date: 20 October 2017
Revised Date: 19 December 2017
Accepted Date: 23 December 2017

Please cite this article as: Díez-García, I., Santamaría-Echart, A., Eceiza, A., Tercjak, A., Synthesis and characterization of environmentally-friendly waterborne poly(urethane-urea)s, *European Polymer Journal* (2017), doi: https://doi.org/10.1016/j.eurpolymj.2017.12.026

Synthesis and characterization of environmentally-friendly waterborne poly(urethane-urea)s

Iñigo Díez-García, Arantzazu Santamaría-Echart, Arantxa Eceiza*, Agnieszka Tercjak*

Group `Materials + Technologies´, Department of Chemical and Environmental Engineering, Faculty of Engineering, Gipuzkoa, University of the Basque Country (UPV/EHU), Pza Europa 1, 20018 Donostia-San Sebastian, Gipuzkoa, Spain

*arantxa.aceiza@ehu.eus, agnieszka.tercjaks@ehu.eus

Abstract

In this work, corn-based 100% renewable carbon poly(trimethylene ether glycol) (P3MG), biodegradable and biocompatible poly(ethylene oxide) (PEO), 4,4´-diphenylmethane diisocyanate (MDI) and sodium 2,4-diamino-benzenesulfonate (SDBS) were used to synthesize novel biobased waterborne poly(urethane-urea) (WPUU) dispersions following an environmentally-friendly process, which avoids the use of organic solvent. The particle size of WPUU dispersions were determined by dynamic light scattering. The molar ratio of PEO/P3MG polyols was varied to identify the WPUU dispersion with the optimum equilibrium between renewable content and final properties. Increase of P3MG content in polyol mixture led to smaller particle size, what could be related to the hydrophilic character of PEO. All investigated WPUU films were characterized by means of their physicochemical, thermal and mechanical properties, as well as their morphology by atomic force microscopy. Higher P3MG content in the WPUU films led to phase separation at the nanoscale, higher glass transition temperature and T_1 endotherm temperature induced by the decrease in the hydrogen bonding between soft segment and hard segment. Moreover, higher P3MG content also resulted in higher modulus and elongation at break of the WPUU films.