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Synthesis of “Green” Polyurethanes Starting from Polyester Polyols obtained from Bio Sourced Polyols

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The overall purpose of this study was to obtain polyester polyols from renewable resources in the attempt of partial or total replacement of polyols obtained from petroleum resources. There are numerous literature studies, in which commercial polyols (obtained from petroleum), necessary to obtain polyurethane foams were replaced with polyols synthesized from natural oils such as: castor oil, soybean oil, sunflower oil, rapeseed oil; herein olive oil was used. The obtained polyols were further used to obtain “green” flexible polyurethane foams. The synthesis process consisted of the following steps:

1. Epoxidation of olive oil. The chemical structure of olive oil was considered to be a triglyceride with three chains of oleic acid (oleic acid - approximately 83%).
2. Synthesis of the polyols from epoxidized olive oil by ring opening with: acetic acid, ethanol and diethyl amine. The best conversions were achieved for ethanol and acetic acid. The obtained polyols were checked for viscosity and characterized by NMR, FTIR, GPC, TGA and DSC.
3. Synthesis of polyurethane foams using commercial diisocyanate. Attempts to obtain flexible polyurethane foams with 100% oil-derived polyol have failed and therefore, partial replacement of commercial polyol was tested. As a result, formulation of PU foams containing 5, 10, 15, 25 and 35% oil-derived polyol were obtained and characterized by FTIR, TGA, DSC.

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Biography:

Alina Elena Coman is a PhD student at University POLITEHNICA of Bucharest, Faculty of Applied Chemistry and Materials Science. During her studies she had published 3 articles as main author and 3 as co-author. She had participated in more than 10 international conferences and she is an author of 3 patent applications filed in 2019. In 2018 she was awarded with the 1st prize at the international conference “Priorities of Chemistry for a Sustainable Development PRIOCHEM - 14th Edition” for the best oral presentation. In 2019 she had attended an internship for 3 months at the University of Strasbourg, France, under the coordination of Prof. Luc Averous.