

Innovative Biobased polyurethanes from biomass: our overview

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PUs is nowadays one of the most consumed family of polymers in the world, widely used in numerous fields. The performances and properties of PUs are extensively tailored by the chemical nature of the reactants as well as the processes used. Nowadays, the use of renewable biobased carbon feedstock is highly taken into consideration with improved life cycle analysis (LCA), in agreement with a sustainable development. In this presentation, we report a brief overview of more than 12 years of research @University of Strasbourg (France), on the synthesis and characterization of several innovative and biobased polyurethanes (PUs, TPUs and NIPUs), with controlled macromolecular architectures

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With a production of around 20,000 KTons/year and a market of around 50 billions \$ (2016), Polyurethanes are more and more often biobased, since polyols and polyisocyanates can be biobased. Various researches were particularly focused on biobased polyols, however, isocyanates from renewable resources were also obtained. All these recent developments show that fully biobased PUs could be largely produced in a close future. Biobased PUs do not mean health friendly products. In this way, the second generation of environmental friendly PUs must also be non-toxic and health friendly, with a low impact on the environment. New trends are emerging with e.g. the elaboration of NonIsocyanate PolyUrethanes (NIPUs), since isocyanates are suspected to be carcinogen. Different Biobased NIPUs have been elaborated in perfect agreement with a green chemistry (e.g. without solvent or catalysts).

They are synthesized from different biobased building blocks: (i) aliphatic structures from e.g. PHA, modified glycerides, dimer fatty acids, or sugar-based molecules (isosorbide, sorbitol,) ... (ii) and aromatic structures from lignins, tannins and furans. A large range of nice properties and durable applications with the elaboration of membranes and foams can be developed from these different architectures, for a greener and durable future.

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