



## Innovative Biobased Polyurethanes from Cradle to Cradle

L. Avérous

*BioTeam/ICPEES-ECPM, UMR CNRS 7515, Université de Strasbourg, 25 rue Becquerel,  
67087 Strasbourg Cedex 2, France*

*[\\*luc.averous@unistra.fr](mailto:luc.averous@unistra.fr)*

Nowadays, the use of renewable biobased carbon feedstock from different resources, such as vegetable oils, is highly taken into consideration because it offers the intrinsic value of a reduced carbon footprint with an improved life cycle analysis, in agreement with a sustainable development. Besides, compared to conventional fossil-based materials, innovative macromolecular architectures with improved or additional properties can be obtained.

In this presentation, we report two decades of active research on the synthesis, characterization, and processing of several innovative and renewable polyurethanes (PUR, PIR, TPU and NIPU)<sup>1,2</sup>, with controlled macromolecular architectures to elaborate different designs and morphologies (membranes, foams)<sup>3</sup>, for a large range of green applications. These materials are synthesized from different biobased building blocks, which can be directly extracted from biomass or obtained from white biotech (fermentation): (i) Aliphatic structures from different glycerides and derivate (dimer fatty acids), sugar-based molecules, bacterial polyesters ... (ii) Aromatic structures from lignins<sup>4,5</sup>, tannins<sup>6</sup> and furans. A large range of materials with improved properties and durable applications have been developed/synthesized for a greener and durable future. The end of life of these materials is now also considered, by e.g., bio-recycling<sup>7</sup>, from cradle to cradle.

**Keywords:** Polyurethane, Foam, biobased, TPU, NIPU, polymer

### References

1. Tremblay-Parrado, K.-K.; Avérous, L. ChemSusChem 2020
2. Carré, C. at al. ChemSusChem 2019.
3. Peyrton, J.; Avérous, L. Mater. Sci. Eng. R Rep. 2021
4. Laurichesse, S.; Avérous, L. Prog. Polym. Sci. 2014, 39, 1266–1290.
5. Duval, A. at al. Mater. Today Chem. 2022
6. Arbenz A. ; Avérous, L. Green Chem. 2015
7. Magnin A. et al. ChemSusChem 2021