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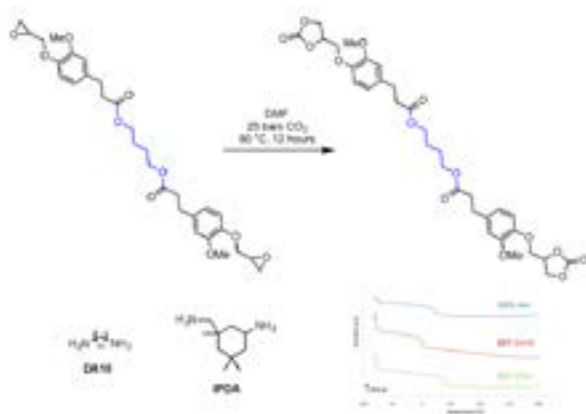
# 5<sup>th</sup> International Conference on Bioplastics and 6<sup>th</sup> World Congress on Biopolymers

September 07-09, 2017 | Paris, France

## How ferulic acid can be turned into a biobased Non-Isocyanate PolyUrethane?

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Over the last decade, chemical industries seek to develop new building bricks to produce biopolymers using sustainable carbon sources. Lignin is one of the most available and cheapest by-products in biorefineries where it is currently burnt to produce energy. Polyurethanes are a family of polymers mainly used as foams or elastomers. They are usually made from isocyanate monomers which are toxic. This study proposes the synthesis of new polyurethanes made of ferulic acid derived from lignin. A macrobisphenol is firstly synthesized from ferulic acid by a chemo-enzymatic process. It is then turned into a bisepoxide monomer. After a carbonation step, the resulting biscarbonate is cured with a diamine. Two Non-Isocyanate Poly Urethanes (NIPU) were synthesized: one with an aliphatic diamine (1,10 diaminodecane) and the other with a cyclic diamine (isophoronediamine). They are hereafter called BDF-DA10 and BDF-IPDA. BDF-DA10 and BDF-IPDA were mixed together at a 1:1 ratio, in a single-screw extrusion process at 70°C and 25 rpm. The resulting material (NIPU-mix) was quite brittle at ambient temperature and became very ductile above its glass transition temperature (25 °C). A Confocal Raman Imaging experiment confirmed a good mixing of the two NIPU by following the dispersion of the cyclic diamine in the final material. Fluorescence spectroscopy revealed differences of fluorescent properties between BDF, BDF-DA10 and BDF-IPDA. Investigations were led to determine the influence of the chemical bonds and that of the spatial configuration of polymeric chains on the fluorescence.



### Biography

Antoine Gallos is a Postdoctoral Researcher in Dr. Florent Allais group at chaire-abi-agroparistech. He has 6 publications in peer-reviewed journals and 7 oral communications & 4 posters. His Research interest lies in Reactive extrusion and extrusion processes of composites and nanocomposites, Upscaling of the extrusion processes of polymeric materials.

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