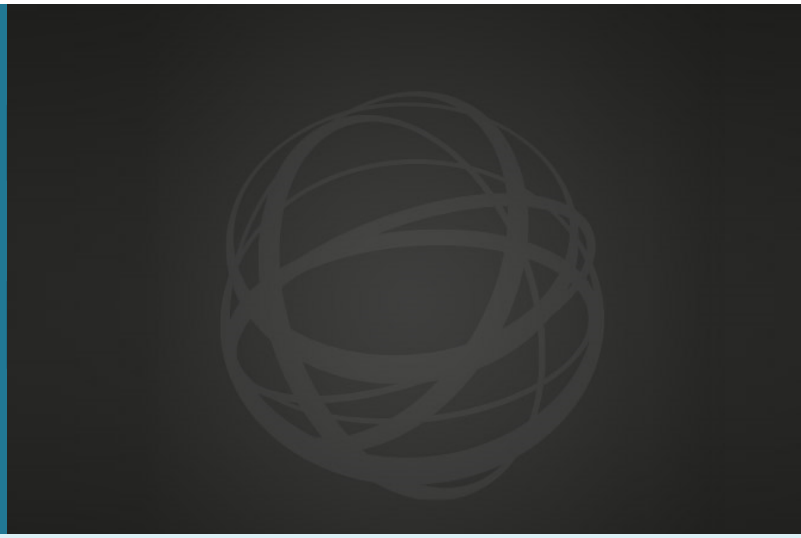
RESEARCH GROUP

www.list.lu/en/materials/sustainable-polymeric-composite-materials/group/polymer-processing-biobased-materials-group/

Polymer Processing & Biobased Materials



Bio-based polymers, also called bioplastics, are organic materials issued from renewable carbon, i.e. from biomass, thus from not fossil/petroleum-based resources. Bio-based polymers and related functional composite materials display a remarkably high potential and hold the promise to be the materials of the future. Accordingly renewable bio-resources are now considered as a unique platform of key-components for designing and producing high added value multifunctional polymeric and (nano)composite materials.

Our research challenges

A large range of high performance and multifunctional polymers and (nano)composites are investigated from their design, synthesis, processing to their in-depth characterization. For so doing, chemistry represents the main driving tool, which includes polymerization and copolymerization reactions, polymer functionalization, macromolecular engineering as well as reactive processing such as reactive extrusion. More specifically at LIST we study: 1/ bio-based thermoplastics such as polyesters, polyamides and polyurethanes; 2/ bio-based thermosetting resins: epoxies, benzoxazines and phenolics; 3/ bio-based elastomers like chemically modified natural rubber and plasticized (co)polyesters. A special attention is also drawn on bio-based additives like plasticizers, antioxidants, (cellulosic) biofiber, (nano)fillers (e.G. lignin-based, etc.), surface functional agents or other processing aids.

Our research team is strongly involved in the field of polymer blends: for instance AS-produced by Reactive extrusion (REx), with a control over the Phase morphology but also blends reinforced/compatbilized by surface-functionalized nanoparticles as well as the production of bio-based (Nano)foams, etc. Another activity relies upon Structural composites based on (Nano)filled polymers, Filler/fiber surface-functionalization, Interfacial compatibilization and (Nano)coatings.

Our competencies

Our competencies portfolio spans from polymer chemistry, macromolecular engineering, surface treatment to (reactive) processing.

Our technology services cover the synthesis of new polymers and related (nano)composites, identification (inverse methods) of polymer blends and composite material parameters, (reactive) processing of rubber and thermoplastic materials, with a particular interest for reactive extrusion (REx), production and characterization (from molecular level to physico-chemical and thermomechanical properties) of bio-based thermosets. Importantly, combination of bio-based polymers/additives/(nano)fillers to any other (more conventional) petroleum-based counterparts is also of prime interest and represents an important activity of our research group. Such an approach is fully justified by the unique set of functionalities that bio-based key-components bring to the materials, etc.

Application areas

Automotive, public transportation, aeronautic, electronic, construction, textile, sport, packaging, biomedical, etc.

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