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Synthesis, processing and application of renewable and/or biobased polymeric products

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The development of new (or improved) chemical products finds its starting point in the definition of a chemical structure for a given application. Already at this stage of the design process, sustainability-driven consideration can be taken into account. In the last 20 years, a clear trend can be detected in the use of monomeric units derived from biomass for the design of new polymeric materials. However, "going green" might not provide an exhaustive answer to the sustainability issue as it could still result in the use of polluting polymeric products. The case of polyethylene produced from ethanol (via ethylene) is paradigmatic in this context. The combination of biomass derived synthetic strategies with relatively novel concepts from the polymer world, such as self-healing and re-workability (conceptually linked to the underlying concept of thermally reversible networks), represents a viable option. In this work we will provide an overview of our current research activities at the University of Groningen dealing with the synthesis, processing and application of renewable and/or biobased polymeric materials. Starting with the use of starch in bioplastics and the corresponding "green" processing strategy (in supercritical CO_2), the concept of thermally reversible networks will be subsequently introduced. Application of the latter to oil-based resins (e.g. epoxy) and then to bio-based ones (e.g. vegetable-oil derivatives) will be discussed in terms of the necessary synthetic steps and the final product properties (including reworkability).

Biography

F.Picchioni has completed his PhD in 2000 from the University of Pisa (Italy) and postdoctoral studies from the Technical University of Eindhoven (The Netherlands). Since 2013 he is full professor and chair of the group Chemcial Product Engineering at the University of Groningen (The Netherlands). He has published more than 100 papers in reputed journals.

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