Well-Defined Polymers from Lipid-Based Renewable Resources

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Thermoplastic are often prepared from fossile-based feedstock but the use of renewable resources has become of prime interest since the limited availability of such feedstock. Lipids represent a very promising source of sustainable resources if functionality of this compound can be mastered, to obtained difunctionnal monomers of high purity1. The straightforward approach is the modification of the telechelic methyl group of the fatty acid into a carboxylic function, giving rise to new monomers suitable for polycondensation reactions. Enzymatic oxidation of the alkyl chain end of oleic acid by Candida antarctica allows for the production of 1,18-(Z)-octadec-9-enedioic acid (D18:1), the diacid derivative2. Few valuations of this compound as monomer have been provided in the literature for the production of new polymers.

In the present work, our purpose is to develop new polymers based on D18:1 or its derivatives in order to produce new functional polymers with improved physical properties and using the highest green chemistry conditions. Polyesters with aliphatic, aromatic diol have been synthesized. A special focus was devoted to the use of diol from renewable resources, including the dianhydrohexitol derivatives issued from the glucochemistry. The architecture of the polymers is varied from a standard linear structure to well-defined hyperbranched structures, depending upon the reaction conditions and the monomers. Characterization of these new polymers is provided in order to shed more light on the structure-property relationship provide by these new compounds. Polymers designed for specific applications such as sensing or drug delivery will be described.

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