

MONOMERS AND POLYMERS FROM BIOMASS AND FROM WASTE OF AGRO-FOOD INDUSTRIES

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There is today a clearly detectable increasing interest in exploitation of non-food biomass and industrial wastes. Moreover, academic and industrial research is interested in the preparation of bio-based polymers, i.e. polymers obtained from renewable resources, in order to substitute the traditional petro-based polymers.

By the combination of these two necessities, we have developed some research activities which are focused on the exploitation of biomass and agro-food wastes to prepare bifunctional monomers, mainly for the polyester synthesis.

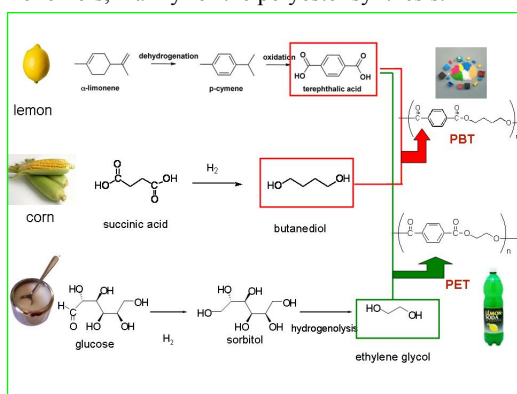


Fig. 1 Synthesis of bio-PET and bio-PBT (Figure by M. Colonna)

An example of such activity is the development of a chemical route which starts from terpenes (in particular, from limonene, which is a raw material of juice industry) to prepare terephthalic acid (TPA) and derivatives (see Fig. 1). TPA is an important monomer, from which poly(ethylene terephthalate) (PET) and poly(butylene terephthalate) (PBT), some of the most important commercial polymers, are produced. For the first time, it was possible to prepare fully biobased PET and PBT. Moreover, other monomers, derived from biomass, such as vanillic acid, resorcinol, 2,5-furan dicarboxylic acid, ricinoleic acid, have been used as building block to obtain new bio-based polymeric structures. The new materials are often

characterized by excellent properties, in terms, for example, of gas barrier or antibacterial properties.

MAIN PUBLICATIONS

Colonna M., Berti C., Fiorini M., Binassi E., Mazzacurati M., Vannini M., Karanam S. (2012) Synthesis and radiocarbon evidence of terephthalate polyesters completely prepared from renewable resources. *Green Chemistry* 13, 2543-2548.

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RESEARCH PROJECTS

EU H2020-BBI.VC3.D5Project: Agrimax, Agri & food waste valorization co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high added value applications. (2016-2020)

EU H2020 RIA, Waste-7. Project: NoAW, No Agro Waste Innovative approaches to turn agricultural waste into ecological and economic assets. (2016-2020).

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