(Bio)degradation of Polymeric Materials Containing PHA and their Synthetic Analogues

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Anionic ring opening polymerization (ROP) of β-butyrolactone (the monomer which could be obtained using synthetic gas derived from coal or waste biomass gasification) has been reported over twenty years ago.[1] The polymer chain growth proceeds regio-selectively and stereo-selectively entirely *via* carboxylate anions. Propagation on carboxylate active centers (much less sensitive to impurities than any other anionic species) enables scaling up the anionic ROP process of β-butyrolactone to atactic poly[(R,S)-3-hydroxybutyrate] (a-PHB), a synthetic amorphous analog of n-PHB.

Synthetic a-PHB undergoes heterogeneous enzymatic attack (by PHB depolymerse) in the presence of second crystalline polymer which can be in form of component of binary blend or block in a-PHB containing block copolymer. Moreover, the heterogeneous enzymatic hydrolysis of a-PHB occurred both when the crystalline component was itself susceptible to enzymatic attack as well as when it was non-biodegradable by the PHB depolymerase employed. The enzymatic degradation of a-PHB can be induced also by its blending with amorphous polymers with high glass transition temperature, e.g. atactic poly(L,D-lactic acid). The plain a-PHB could be degraded to the mixture of monomer, dimer and trimer in the presence of PHA depolymerases purified from *Paucimonas lemoignei* (*PhaZ7*) as well as *Acidovorax* Sp. TP4 ($PhaZ_{aci}$).[2, 3]

Review of innovative results concerned with (bio)degradation of atactic PHB will be presented. Novel results concerned with evaluation of the environmental degradation of polyester blends containing a-PHB will be discussed.[4] Moreover, the ability to control thermal degradation and stability of a-PHB as well as of its blends *via* concentration of the carboxylate polymer end groups will be demonstrated.[5]

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