

Biopolymers

August 04-05, 2016 Manchester, UK

Constrained amorphous interphase and mechanical properties of bio- based polyesters

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Bio-based polymers belonging to the polyesters group, as poly(L-lactic acid) and poly(3- hydroxybutyrate), are semi-crystalline materials, whose properties must be explained by taking into account the contribution of both the crystalline and the amorphous phases. The classical description of semi-crystalline polymers, which considers only two distinct phases, has been replaced in recent years by a more complete one, which takes into account also the constrained amorphous nano-phase present at the amorphous/crystal interface. A detailed description of the micro- and nano-phase structure is decisive for a full understanding of the physical properties of semi-crystalline polymers. Indeed, it has been recently proved that many macroscopic properties, as for example mechanical and gas permeability properties are defined not only by the degree of crystallinity, but also by the percentage of constrained amorphous interphase. The quantification of this nano-phase is therefore a crucial step in the characterization of a polymeric material, since different processing conditions affect in different ways the evolution of the crystalline and amorphous fractions. The subject of the presentation will be the evolution, during solidification, of the constrained amorphous interphase in poly(L-lactic acid) and in poly(3-hydroxybutyrate). Also the effect of the physical ageing on the mechanical properties of poly(3-hydroxybutyrate) will be interpreted in the light of the rigid amorphous nano-phase content.

Biography

Maria Cristina Righetti, who received her PhD from the University of Bologna (Italy), has many years of experience in materials characterization. She has devoted her research activity mainly to the study of the correlations between molecular structure and physical properties of polymers, biopolymers, blends and composites, through thermal, morphological, mechanical and viscoelastic characterization. She is author of 70 publications in international ISI journals (50% as corresponding author) and 6 book chapters.

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