PLA-PET COPOLYMER FOR FOOD PACKAGING APPLICATION

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The aim of this work is to synthesize a copolymer based on polylactic acid (PLA) and polyethylene terephthalate (PET). This would allow the synthesis of a new and biodegradable material with improved properties compared to PLA alone. In food packaging, in general, the use of biopolymers is only suitable for a few types of food that do not require high barrier properties. No sustainable material that can replace petrochemical polymers with the standards of the latter still exists. This study shows the design of a biodegradable material for flexible packaging with improved barrier and mechanical properties compared to a biopolymer, where a nanocrystalline structure that preserves transparency could be still achieved. Existing studies on PLA-PET blends [1] demonstrated that it is possible to obtain a transesterification between low molecular weight PLA and PET, though a reactive mixing. The reaction would be aided by a suitable temperature and the presence of a catalyst. A low molecular weight PET and PLA were melt compounded in a nitrogen atmosphere. Several ratios PLA:PET were studied so that the resulting copolymer contained a high biodegradable fraction. Thermogravimetric analysis (TGA) was carried out to analyse the reaction products that were generated from the reactive mixing studying the degradation behaviour. Fourier transform infrared spectroscopy (FTIR) were employed to study the degree of the reaction. In particular, a deconvolution analysis of the carbonyl peak showed some changes in the chemical structure. Analytical chemistry investigation (Gas Chromatography and Liquid Chromatography–Mass Spectrometry) validated the results of previous analysis. Calorimetric and rheological properties also were investigated to better characterised the copolymer obtained. Finally, compostability test was carried out following the ISO standard. The results obtained show that the interaction between the two polymers is capable of generating different reaction products than the physical mixture, also encouraged by the presence of the catalyst, characterized by good compostability properties.

Keywords: *copolymer, sustainability, compostability, biopolymer, food packaging*

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