Synergistic effect of polylactic acid(PLA)/poly(butylene adipate-co-terephthalate) (PBAT) blend and cellulose nanowhiskers for sustainable packaging applications

Reference	Presenter	Authors (Institution)	Abstract
04-037	Bianca Sanches Santos	MOURA, E.A. (INSTITUTO DE PESQUISAS ENERGÉTICAS E NUCLEARES); Santos, B.S. (Instituto de Pesquisas Energéticas e Nucleares); Oliveira, R.R. (Nuclear and Energy Research Institute); Rodrigues, R.C. (Lorena Engineering School, University of São Paulo);	Conventional food packaging is in general, not recyclable, based on practically undegradable petroleum-derived polymers, and consequently not selectively collected. Concerns over their environmental impact and sustainability issues posed by their production and disposal and trends have increased interest and driven the effort to generate biobased and biodegradable packaging to replace or complement the conventional ones. The aims of this work are to investigate the development of biocomposite films composed of biodegradable polylactic acid(PLA)/poly(butylene adipate-co-terephthalate) (PBAT) blend and cellulose nanowhiskers extracted from agro-waste and evaluate their potential use in sustainable food packaging application. Biocomposite films based on biodegradable PLA/PBAT blend containing 1-2 wt. % of cellulose nanowhiskers extracted from agro-waste were prepared by melt extrusion, using a twin-screw extruder machine and blown extrusion process. To evaluate the potential use in food packaging applications, the cellulose nanowhiskers' content on the morphological, mechanical and thermal properties of the as obtained biocomposite films has been assessed. In addition, cellulose nanowhiskers were characterized by TEM, DLS, XRD, and TG. The results showed that cellulose nanowhiskers addition leads to an important increase in thermal degradation temperature, melting enthalpy and tensile properties of biocomposite films. The increases in the melting enthalpy can be attributed to the increase in the crystallinity of PBAT/PLA biocomposite as a result of cellulose nanowhiskers' addition. Morphology and thermal tests were related to the properties of the films and confirmed that cellulose nanowhiskers were homogeneously dispersed into the matrix. Based on the results, this research demonstrated that the use of biodegradable polymer blend and cellulose nanowhiskers extracted from agro-waste represents an interesting alternative for the production of flexible biocomposite films for sustainable food packaging applications and for the development of eco-friendly technologies.

<< Back