

Poly (Lactic Acid)/Poly (Butylene Adipate-Co-terephthalate) Films Reinforced with Polyhedral Oligomeric Silsesquioxane Nanoparticles

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Abstract : In the context of the growing interest in renewable polymers, this study presents an innovative approach to environmental conservation through the development of an eco-friendly structure. The research focused on enhancing the compatibility between two immiscible polymers, poly (lactic acid) (PLA) and poly (butylene adipate-co-terephthalate) (PBAT), using polyhedral oligomeric silsesquioxanes (POSS) nanoparticles with an epoxy functional group (Epoxy-POSS). This was achieved through a solution casting method. The study found that the modulus in the glassy region for blends containing Epoxy-POSS was significantly higher than that of the PLA/PBAT blend without Epoxy-POSS. However, in the transition and rubbery regions, the modulus of the Epoxy-POSS-containing blends was only marginally greater. From a mechanical properties' perspective, the study demonstrated that the incorporation of POSS-EPOXY at varying concentrations enhanced the tensile strength of the PLA/PBAT blend by 30%, thereby acting as a reinforcement. This finding underscores the potential of this approach in the development of renewable polymers.

Keywords : Polyhedral oligomeric silsesquioxane, mechanical behavior, PLA, PBAT, nanocomposite

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