

## Enhancing the Properties of Poly(lactic acid)/Poly( $\epsilon$ -caprolactone)/ Polyhedral oligomeric silsesquioxane Blend-Nanocomposites

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### Abstract

This research aims to improve thermal stability of poly (lactic acid)/poly ( $\epsilon$ -caprolactone) (PLA/PCL) blend–nanocomposite thin films by adding trisilanol isobutyl polyhedral oligomeric silsesquioxane (POSS) nanoparticles. Blending polymer with nanoparticle requires a solvent that can dissolve all components. In order to determine an appropriate solvent, dichloromethane, chloroform, tetrahydrofuran and toluene had been used for solubility test. The results show that the suitable solvent is chloroform. PLA/PCL blend-nanocomposite thin films were then prepared by using chloroform as solvent. The thin films were carried out by solution casting process. Functional groups of the film samples were characterized by fourier transform infrared spectroscopy (FT-IR). Morphology and thermal properties of the films were characterized by scanning electron microscopy (SEM) and differential scanning calorimetry (DSC). Thermal stability and mechanical properties of the films were carried out by thermogravimetric analysis (TGA) and tensile testing. Incorporation of POSS into PLA/PCL blends increase 5% weight loss Temperature ( $T_{d5}$ ) of the blends. However, mechanical properties, i.e. percentage strain, tensile strength, young's modulus were found to nonsignificantly change with respect to the blends.

**Keyword:** Polymer blend, Nanocomposite, Poly(lactic acid), Poly( $\epsilon$ -caprolactone), Polyhedral oligomeric silsesquioxane