

Thermal, Mechanical and Rheological Properties of Poly(lactic acid)/Epoxidized Soybean Oil/Organoclay Nanocomposites

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In order to develop an environmentally friendly material, many efforts have been made to solve problems generated by plastic waste. Currently, most of research attention is focused on the replacement of petro-based commodity plastics by biodegradable polymer with competitive mechanical properties. Poly(lactic acid) (PLA) is produced from renewable resources and is readily biodegradable. Due to the brittleness of PLA, it has limited usage in the packaging and structural applications which require flexibility. In our previous study, PLA was successfully plasticized by using epoxidized soybean oil (ESO). In this study, plasticized PLA/organoclay nanocomposite was prepared by melt mixing the PLA with an organo-modified montmorillonite (Cloisite® 30B) in an internal mixer. X-ray diffraction and transmission electron microscopy analysis revealed that exfoliated nanocomposites were formed. It was observed as clay content increases, modulus and glass transition temperature increased while elongation-at-break was slightly decreased accompanied with yielding. Melt rheological analysis showed that shear thinning behavior was observed as clay content increases.