

Ranumas Thipmanee 2010: Preparation and Properties of Poly(lactic Acid) / Epoxidized Natural Rubber / Organoclay Nanocomposites. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging Technology and Materials. Thesis Advisor: Ms. Tarinee Nampitch, D.Eng. 82 pages.

Poly(lactic acid) (PLA) is well suited for packaging application because of its biodegradability. However, PLA is brittleness. The poly(lactic acid) was blended with epoxidized natural rubber (ENR) to increase toughness of poly(lactic acid) by melt compounding in twin-screw extruder. The 90/10 composition of the PLA/ENR blend gave the highest tensile strength, modulus and elongation at break as 18.67 MPa, 1232.2 MPa and 2.92 % respectively; therefore, this composition was selected to blend with organoclay. The addition of both organoclay, Cloisite® 25A (C25A) and twice functionalized organoclay (TFC), improved the tensile strength, modulus and impact strength of the PLA/ENR blend because the organoclay acted as reinforcing agent. The addition of TFC greater improved tensile strength, modulus and elongation at break than C25A, especially at TFC content of 5 and 7 wt%. This result suggested that the epoxy group grafted onto TFC could react with functional group of both PLA and ENR, then resulting in increased the compatibility of PLA and ENR. Furthermore, the morphology, thermal properties, water vapor transmission rate and oxygen permeability of organoclay nanocomposites were investigated and compared with unfilled polymer matrix.

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Thesis Advisor's signature