

Effect of Modified Oil on Thermal Properties and Mechanical Properties of Poly(lactic acid) Compressed Sheet

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Abstract

In this study, an eco-friendly plasticizer, i.e. castor oil, was applied with the aim of poly(lactic acid) (PLA) plasticity enhancement. Chemical modification of castor oil was employed in order to improve the effectiveness of plasticization. Effects of the plasticizers on thermal property and mechanical property of PLA compressed sheet were investigated. First, the castor oil was chemically modified by esterification reaction with maleic anhydride. Chemical structure of the successfully modified oil was characterized by FTIR. Then, PLA was compounded with the plasticizers in various contents by using twin-screw extruder. PLA compounded sheet was compression-molded at 2500 psi, 185°C for 8 min. Thermal properties and mechanical properties of PLA compounded sheet were characterized by using differential scanning calorimeter and universal testing machine, respectively. Glass transition temperatures of PLA compounded sheets were decreased with addition of the castor oil either with or without modification. Young's modulus and tensile strength of PLA compounded with the modified castor oil were found to increase with the amount of the additives.

Keywords : Poly(lactic acid), Castor oil, Thermal property, Mechanical Property