

Characterization of toughened Poly (lactic acid) PLA/ Polycaprolactone (PCL) with bio-plasticizers (TEC and PEG3)

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Abstract : Triethyl citrate (TEC) and poly (ethylene glycol) (PEG3) were used as plasticizer for Polylactic acid (PLA)/ polycaprolactone (80PLA/20PCL) blends. The treated and plasticized 80PLA/20PCL blends at various concentrations of plasticizers were analyzed by differential scanning calorimetry (DSC), thermogravimetric analysis (TGA) and dynamic mechanical analysis (DMA). Differential scanning calorimetry was used to evaluate the crystallinity and thermal property of all the samples. It was found that the glass transition temperature (T_g) and the melting temperature (T_m) decreased as the amount of plasticizers increased. Additionally, the presence of TEC or PEG3 tended to increase the crystallinity of PLA. DMA of plasticized PLA indicates that a decrease in T_g is obtained with increasing plasticizer content, Plasticizing effect was also shown by decrease in the dynamic storage modulus and viscosity of plasticized mixtures compared to the treated 80PLA/20PCL blends. The TGA results indicated that PEG3 and TEC promoted a decrease in thermal stability of the 80PLA/20PCL.

Keywords : Poly lactic acid (PLA), Polycaprolactone (PCL), Plasticizers vegetable, Biodegradable