

Abstract

Biodegradable polymer blends of poly(lactic acid) (PLA) and poly(butylene succinate-co-adipate) (PBSA) were prepared with the objective to improve the toughness of PLA. However, the phase separation of both polymer components are still the main problem. Therefore, the study of additives to improve the compatibility and distribution of PBSA in the PLA matrix is needed. In this research we had prepared the polymer blends of PLA:PBSA with ratios of 90:10, 80:20, 70:30 and 60:40. The addition of PBAT with amount 10-50 % by weight resopected to the polymer blends as compatibilizer using twin screw extruder was studied.

The polymer blends prepared were subjected to thermal analysis using differential scanning Calorimetry technique. It was found the separation of melting temperature (T_m) of three polymer components with slightly moving close to each other indicated some small parts of compatibility. The melt flow index (MFI) of polymer blends showed higher value for all ratios of PLA/PBSA. After addition of PBAT it was found that with small amount of PBAT the MFI increased gradually but after 30 phr of PBAT the MFI was decreased. All blends showed acceptable range of MFI for blown film process.

The morphology analysis using scanning electron microscopy technique revealed well mixing of 3 polymer components. However, the blend of ratio of PLA/PBSA at 80/20 by weight with PBAT showed round particles of PBAT in the PLA/PBSA matrix. The particle sizes increased with increasing amount of PBAT which confirmed the phase separations of polymer components. The highest value of tensile strength, Young's modulus and elongation at break were found with the polymer blends of PLA/PBSA of 90/10 and 80/20 and PBAT 20 phr. The analytical results showed satisfied properties of polymer blends of PLA/PBSA/PBAT that can be applied to processing of environmental friendly products.