

Structure and properties of highly toughened biodegradable polylactide/ZnO biocomposite films

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Abstract

Zinc oxide (ZnO) powder was investigated in terms of its use as filler in order to improve the inherent properties of PLA. Biocomposite films of PLA with different loadings of ZnO were prepared by solution casting method. Morphological analyses using SEM and POM showed that the ZnO particles were well dispersed at low ZnO loading, with starfish-like morphology. However, ZnO agglomeration was found at higher ZnO loadings. Tensile testing showed improvements in strength and a moderate improvement in toughness at 2 wt% ZnO loading. This is consistent with the homogeneous dispersion of ZnO particles in the PLA matrix. ZnO particles incorporation improved the thermal stability of PLA. In summary, ZnO particles were shown to have the potential as a toughener in the preparation of biocomposites with better integrity, although other approaches, such as the use of compatibilizer in the surface modification of ZnO will be needed for the concurrent improvement of PLA properties.