Abstract No 22

PROPERTIES OF PLA/TPS-BLENDS

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As a renewable polymeric material polylactide (PLA) is one of the most important biodegradable polyesters with a wide array of applications. Apart from biomedical applications PLA is expected to play a competitive role in the market for commodity applications. In this study thermoplastic starch (TPS) was introduced to PLA to improve its properties and reduce production cost. Different types of TPS were blended with PLA by means of a corotating, closely intermeshing twin screw extruder and test specimens were produced by injection moulding. The thermal, morphological, rheological, and mechanical properties of the blends were determined by thermal analysis (DSC, TGA), microscopy (optical microscopy and REM), rotational rheometry (DSR), tensile and impact testing, respectively. Furthermore, water absorption was investigated. The glass transition temperature (Tg), the crystallization temperature (Tc) as well as the melt temperature (Tm) of PLA/TPS-blends were influenced by the type and the content of the TPS. The incorporation of ethylene-co-acrylic acid (EAA) into the TPS (TPSEAA) resulted in better properties of the final PLA/TPS blends compared to common TPSGly, which was prepared only with glycerin to destruct and plasticize the native starch. Toughness and flexibility of EAA modified PLA/TPS blends improved significantly in comparison with blends modified only with glycerin. Microscopy manifested that the particle size of TPSEAA was much smaller and that TPSEAA was dispersed more regularly in the PLA matrix than TPSGly. This can be attributed to the similar rheological behavior of PLA and TPSEAA.

Keywords: Polylactide, Thermoplastic Starch, Blends