

The effect of starch amylose content on the morphology and properties of melt-processed butyl-etherified starch/poly[(butylenesuccinate)-co-adipate] blends

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ABSTRACT:

In this study, butyl-etherified waxy and high amylose starches were melt-processed with biodegradable poly[(butylene succinate)-co-adipate] (PBSA) to improve the long-term stability of the starch-based materials. Butyl-etherification was believed to improve the compatibility of starch with PBSA matrix. Scanning electron microscopy results demonstrated that highly branched amylopectin structures in butyl-etherified starch have better chemical interaction with the PBSA matrix compared to linear amylose structures. Thermogravimetric analysis revealed that the thermal stability of the blends decreased with increasing starch loading for all starch types with varying amylose content; however, the nature of the starch controlled the mechanical properties of the blends. Furthermore, the differential scanning calorimetric and polarised optical microscopic results demonstrated that the degree of crystallinity of PBSA decreased with increasing loading of amylopectin content in starch. Therefore, this work reveals the possibility of improving the inherent properties of starch by blending with PBSA through careful selection of the amylose content in starch.