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Natural tannins: potential applications in plastics

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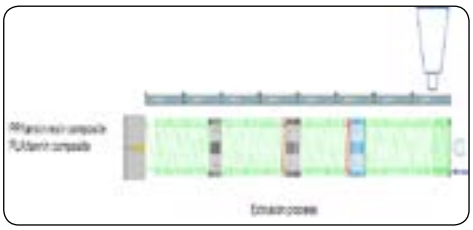
This study presents a polypropylene-based composite processed with tannin resin, which is an eco-friendly thermoset resin with excellent properties, by a dynamically extruded method with the present of maleic anhydride grafted polypropylene (MA-g-PP) as a compatibilizer. The effects of tannin resin content on morphological, mechanical, thermal, and rheological properties were investigated. Tannin resin was successfully dispersed into PP matrix and reinforced the polypropylene matrix. The morphology, which was observed by optical microscopy and scanning electron microscopy (SEM), confirmed that tannin resins were well dispersed in PP matrix as fine particles in diameter range 5-45 μm. The mechanical properties of the composites, studied by tensile and impact test, displayed excellent Young's modulus as the increment of tannin resin content, while negative effects can be found in tensile and impact strengths. The obtained data from dynamical analysis (DMTA) and differential scanning calorimetry (DSC) shown that tannin resin slightly affect the glass transition and melting point. However, low tannin resin content increased the crystallization of the PP matrix. As analyzed by thermogravimetric analysis (TGA), tannin resin enhance the thermal stability of polypropylene. The melting rheological data show that complex viscosity, storage modulus(G'), loss modulus(G") with increasing tannin resins content except 30% tannin resin. Furthermore, tannin resin has the capacity to retard the decompose of PP polymer chains. Recently, poly(lactic acid) /tannins composite filament has been successful used to 3D printing



Recent Publications:

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Biography

Jingjing LIAO has a background of wood science. Her passion is to broaden the usage of a kind of biopolymer -- tannin. This biopolymer can be easily extracted from a highly abundant residues from wood bark. Tannin resin, which is an eco-friendly thermoset resin with excellent properties, have been used for wood bonding since last century. However, it is rarely found the application beyond wood composites. She tried to use tannin resin, a natural thermoset resin, as a polypropylene component based on the research about thermoplastic and thermoset blending.

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