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Extended Abstract
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Biopolymer Congress 2018: Natural tannins: potential applications in plastics - Jingjing LIAO - Universite de Lorraine

Jingjing LIAO
Universite de Lorraine, France

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.

Tannin, also called tannic acid, is a part of a group of pale yellow to light brown amorphous substances in the form of powder, flakes or a spongy mass, widely distributed in plants and used in tanning of cu la fabric dyeing, ink making and various medical applications. The tannin solutions are acidic and have an astringent taste. The tannin is responsible for the astringency, color and flavor of the tea. Tannins are commonly found in the roots, wood, bark, leaves and fruits of many plants, especially in the bark of oak species and in sumac and myrobalan. They also occur in galls, insect attacks from pathological growths.

In addition to the application of the manufacturer and dyeing of leather, tannins are used in the clarification of wine and beer, as well as in the viscosity of the drilling mud for oil constituents, and in the boiler water to prevent scale formation. Tannin has been utilized in treating tonsillitis, pharyngitis, hemorrhoids and rashes due to its styptic and astringent properties. Soluble in water, the tannins form of dark blue or dark green solutions with iron salts, a property used in the manufacture of many applications.

Coagulation is essential for the treatment of surface water and industrial wastewater. This is a well-known process in which the aggregation of colloids and other suspended substances is the promoter and the larger flakes. Usually, the coagulants used are derived from inorganic compounds such as ferric chloride (FeCl3) or aluminum sulfate (Al2 (SO4) 3). However, researchers are looking for new and natural sources of coagulants, usually from plant extracts. Plant based representation of

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coagulants is an alternative to those based on inorganic metals, which are beneficial because they allow for the production of biodegradable sludge

The use of natural tannins has also been optimized by mixing them with other reagents. This is the case for tannins extracted from Acacia mearnsii from Wild which have been combined with NH4Cl and formaldehyde for water purification and wastewater treatment. This mixture has proven to be a useful tool for avoiding pollution by surfactants and dyes from wastewater. The cationic coagulants for the variable parameters were the temperature and the tannin-NH4Cl ratio, the latter being more influential than the former. The optimal parameters were found at 2 g / g using 25% C for the removal of dyes and 36 ° C for the removal surfactants. Finally, the last step is to apply this configuration to a combined and optimized coagulant in a natural environment. This final approach was tested on dye and surfactant.