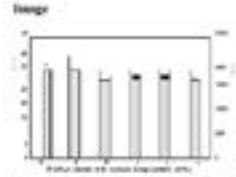
11th World Congress and Expo on **Recycling**

June 13-14, 2019 | Edinburgh, Scotland

Recyclability of TPS/PLA blend

Rangrong Yoksan, Nedchanok Chaibangyang and **Pattiya Rattanasuwan**
Kasetsart University, Thailand

Polylactic acid (PLA) is one of the most promising bio-based and biodegradable polyester, which can be converted into packaging and utensils; for example, cutlery, cup, tray, etc.; however it is brittle and expensive. Blending with thermoplastic starch (TPS) is a way to reduce the price of the final PLA-based products and to improve their flexibility. Although TPS/PLA blend is a biodegradable thermoplastic material, its recyclability is also important to meet sustainability. Until now, there is no any report relevant to the recyclability of TPS/PLA blend. Therefore, the aim of this research is to demonstrate the effect of injection-molded TPS/PLA blend scrap concentration on properties of the reformed TPS/PLA blend. TPS/PLA blend was prepared by a twin-screw extruder using a weight ratio of TPS:PLA of 60:40 and various concentrations of injection-molded TPS/PLA (60/40) blend scrap, i.e. 0, 20, 40, 60, 80 and 100 wt%. The blends were then converted into dumbbell-shaped specimens using an injection molding machine. The increased amount of scrap caused slightly increased tensile strength and elongation at break; however TPS/PLA blend with scrap concentration of 20 wt% had the highest tensile strength (24.2% improved). In addition, Young's modulus and Izod impact strength of the blend decreased with increasing scrap content. Glass transition temperature of TPS/PLA blend decreased from 59.7°C to 52.4-57.5°C when scrap concentration was increased. The results suggest that TPS/PLA blend can be recycled and suitably used for making injection-molded products, especially for the ones without food contact such as jardiniere, flowerpot, shovel, basket, stationary box, etc.



Recent Publications

1. Kong L, Yucel U, Yoksan R, Elias RJ and Ziegler GR (2018) Characterization of amylose inclusion complexes using electron paramagnetic resonance spectroscopy. Food Hydrocolloids 82:82-88.
2. Dang KM, Yoksan R (2016) Morphological characteristics and barrier properties of thermoplastic starch/chitosan blown film. Carbohydrate Polymers 150:40-47.
3. Khanoonkon N, Yoksan R, Ogale AA (2016) Morphological characteristics of stearic acid-grafted starch-compatibilized linear low density polyethylene/thermoplastic starch blown film. European Polymer Journal 76:266–277.
4. Khanoonkon N, Yoksan R, Ogale AA (2016) Effect of stearic acid-grafted starch compatibilizer on properties of linear low density polyethylene/thermoplastic starch blown film. Carbohydrate Polymers 137:165–173.
5. Dang KM, Yoksan R (2015) Development of thermoplastic starch blown film by incorporating plasticized chitosan. Carbohydrate Polymers 115:575–581.

Biography

Rangrong Yoksan has her expertise in chemical modification and characterization of bio-based polymers; processing, properties testing and packaging applications of bioplastics; polymer blends and composites; fabrication of polymeric and metal nanoparticles; encapsulation of bioactive compounds; and active packaging materials. She is currently working as a lecturer in the Department of Packaging and Materials Technology, Kasetsart University, Thailand.