

Nalin Ploypetchara 2014: Anti-microbial Film from Nano Titanium Dioxide Based Polypropylene/Poly(Lactic Acid) Blend for Urine Drainage Bag Prototype. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging and Materials Technology. Thesis Advisor: Assistant Professor Chiravoot Pechyen, Ph.D. 105 pages.

This study consists of two main parts including investigation of polypropylene (PP)/poly (lactic acid) (PLA) weight ratios affect to the properties of blend films and influence of nano titanium dioxide content on the properties of nano composite films. Fabrication of blend films and nanocomposite films were performed by melt mixing technique and cast film extrusion. In PP/PLA blend system, polypropylene-grafted-maleic anhydride was required as a compatibilizer to improve the miscibility between PP and PLA. Increasing of PLA content from 40 to 60 wt.% resulting in decreased melting temperature and crystallinity from 158 °C to 154 °C and 38% to 31%, respectively. For tensile properties, modulus and tensile strength increased with increasing the PLA content, while elongation at break was decreased. The barrier properties indicated that incorporation of PLA into PP tend to increased water vapor permeability while oxygen permeability was decreased. From the morphology, thermal, mechanical, and barrier results, the optimal blend ratio for medical packaging application was PP/PLA blend 50:50. In case of nanocomposite films, thermal and mechanical properties were improved by adding of nano titanium dioxide at up to 1 phr, and decreased at more than 1 phr. Nevertheless, there were no significant changes in barrier properties with increase of nanoparticles loading. The results of anti-microbial testing showed that nanocomposite films have low anti-microbial activity.

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Thesis Advisor's signature