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Toughness enhancement of pla/natural rubber blend by melt compounding with clays

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Poly(lactic acid) (PLA) is an aliphatic polyester that possesses various advantageous physical and thermal properties compared to other commercial biopolymers. It is thermally stable and biodegradable which promises a great processability for industrial applications while its brittleness limits usages. In this study, natural rubber was added to PLA to make up brittleness of PLA. Depending on the distribution of the rubber phase and the compatibility between rubber and PLA, the brittleness is able to be limitedly improved. On the other hand, organically modified clays were added in order to induce compatibilization and to enhance mechanical properties. Clays were introduced to PLA/NR blend with a weight fractions, 0-10 wt%. With a small amount of clays, the size of the dispersed Natural rubber phase was effectively decreased to sub-micronsize which seems compatibilize between the matrix PLA and the rubber phase. Then, the extendibility was improved (Figure1). Furthermore, the content of natural rubber was varied from 10 to 50% to observe the toughening effect. Mechanical properties including tensile strength and elongation breakage, rheological properties including storage and loss modulus as well as morphology were observed.

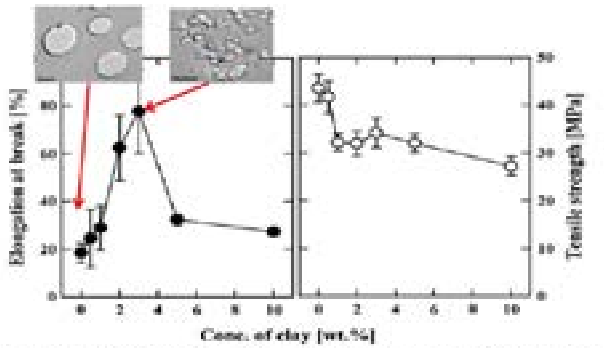

Figure 1. Elongation at break and tensile strength of the PLA/Rubber and PLA/Rubber/Clays blend-composites measured at room temperature.(Ock et al. 2016)

Biography

Joung-Sook Hong received the B.S. degree in chemical engineering from Jeju National University, Jeju, Korea, in 1995, and the M.S. and Ph.D. degrees in chemical engineering from the Seoul National University, Seoul, Korea, in 1997 and 2005, respectively. She was a Research Associate at the University of Queensland in 2006, a Research Assistant Professor at Korea University in 2007, a Senior Researcher at Research Center, Samsung Cheil Industry, in 2008-2009, and an Assistant Professor in the Department of Chemical Engineering, Soongsil University, in 2009 through 2015. She is currently a Research Professor in the Center for nano-structured polymer processing technology, Seoul National University. Her current interests include the dispersion of particles in a non-Newtonian fluid and emulsion, interfacial rheology, microfluidics, and nanocomposite.

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