Improvement of mechanical and impact performance of poly(lactic acid) by renewable modified natural rubber

Poly(lactic acid) or PLA, is one of the biodegradable and compostable plastics. However, its brittleness limits its widespread applications. Several attempts have been made at using elastomeric material to reinforce PLA properties. Natural rubber (NR), which is considered a green and renewable elastomer, is a good candidate for toughening PLA. The low efficacy of NR toughened PLA is achieved because of the poor interfacial adhesion between the dispersed NR phase and the PLA matrix.

In this research, a two-step chemical modification of NR using hydrogenation, followed by epoxidation reaction was performed in latex stage. The epoxide segment of the modified NR would provide an interfacial interaction of the two components, while the saturation segment was expected to increase thermal stability of the polymer blend system during a melt-blending process. The results demonstrated the significant improvement in tensile and impact performance of PLA by the addition of the modified NRs.

This research work fits into the Sustainable Development Goals (SDGs) number 9 and 12. Please visit reference for more details.

Reference: Wasan Tessanan, Ratana Chanthateyanonth, Masayuki Yamaguchi and Pranee Phinyocheep*
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