

## **Influence of Rubber Content on Mechanical, Thermal, and Morphological Behavior of Natural Rubber Toughened Poly(Lactic Acid)–Multiwalled Carbon Nanotube Nanocomposites**

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### **ABSTRACT**

The effects of natural rubber (NR) on the mechanical, thermal, and morphological properties of multiwalled carbon nanotube (CNT) reinforced poly(lactic acid) (PLA) nanocomposites prepared by melt blending were investigated. A PLA/NR blend and PLA/CNT nanocomposites were also produced for comparison. The tensile strength and Young's modulus of PLA/CNT nanocomposites improved significantly, whereas the impact strength decreased compared to neat PLA. The incorporation of NR into PLA/CNT significantly improved the impact strength and elongation at break of the nanocomposites, which showed approximately 200% and 850% increases at 20 wt % NR, respectively. However, the tensile strength and Young's modulus of PLA/NR/CNT nanocomposites decreased compared to PLA/CNT nanocomposites. The morphology analysis showed the homogeneous dispersion of NR particles in PLA/NR/CNT nanocomposites, while CNTs preferentially reside in the NR phase rather than the PLA matrix. In addition, the incorporation of NR into PLA/CNT lowered the thermal stability and glass-transition temperature of the nanocomposites.

**KEYWORDS:** biopolymers & renewable polymers; graphene and fullerenes; mechanical properties; nanotubes; rubber; thermal properties

**DOI: 10.1002/app.44344**