Effect of CNT dispersion and aspect ratio on mechanical and electrical properties of bio-based PA410/CNT nanocomposites

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Bio-based polymeric nanocomposites (NCs) were obtained by melt mixing a partially bio-based commercial polyamide 4,10 (PA410) with three different commercially available multi-walled carbon nanotubes (CNTs), namely Cheap Tubes 20-30, Nanocyl NC7000™ and Plasticyl™ PA 1503 (a masterbatch based on PA6 and Nanocyl NC7000™ CNTs). Mechanical and electrical properties of the resulting NC systems –i.e. PA410/CNT(1), PA410/CNT(2) and PA410/PA6/CNT, respectively– were studied. A considerably lower percolation concentration (p_c) (Figure 1), together with improved rigidity (Figure 2), was achieved with the addition of Nanocyl NC7000™ CNTs, both in the form of powder and masterbatch, in comparison to Cheap Tubes CNTs. The superior electrical and mechanical performance of these NCs was eventually atributted to the better dispersion level and the higher aspect ratio observed for Nanocyl NC7000™ nanotubes [1, 2].

References

[1] Haggenmueller, R., et al. Polymer, 2006. **47**(7): p. 2381-2388.
[2] Krause, B., Potschke, P., and Haeussler, L. Compos. Sci. Technol., 2009. **69**(10): p. 1505-1515.

Figures

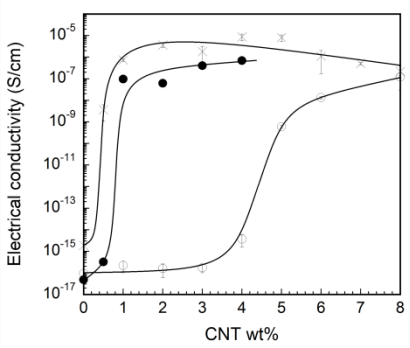

Figure 1. Electrical conductivity of PA410/CNT(1) NCs (○), PA410/CNT(2) NCs (x) and PA410/PA6/CNT NCs(●).

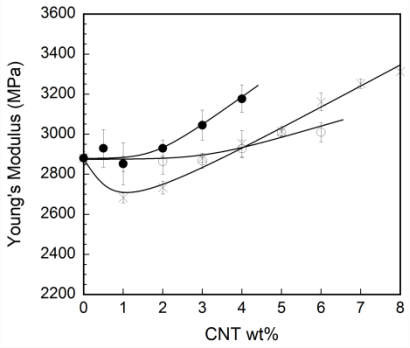

Figure 2. Young's modulus of PA410/CNT(1) NCs (○), PA410/CNT(2) NCs (x) and PA410/PA6/CNT NCs(●).