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# Supramolecular aromatic interactions to enhance biodegradable film properties through incorporation of functionalized cellulose nanocrystals

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**ABSTRACT:** Cellulose nanocrystals (CNC) were grafted with an aliphatic and an aromatic isocyanate (octadecyl and 4-phenylbutyl isocyanate) and composites of poly( butyleneadipate-co-terephthalate) – PBAT – with 5 and 10 wt% of modified and non-modified CNC were prepared through solvent casting. Rheological analysis confirmed that the degree of grafting contributed to CNC dispersion and allowed the formation of a percolated structure. The treated-CNC reinforced composites displayed improved mechanical properties, namely: an increase by 120% and 40% in the elastic modulus and the tensile strength, respectively. The best results were obtained with 4-phenylbutyl isocyanate-modified CNC, due to the  $\pi$ - $\pi$  interactions between the phenyl rings grafted onto the CNC molecules and the aromatic rings of the polymeric chain, as indicated by Raman spectroscopy. To the best of our knowledge, it is the first time that the CNC incorporation is studied in a PBAT pure matrix.

**KEYWORDS:** A. Polymer-matrix composites (PMCs);A. Nano-structures;B. Rheological properties;E. Surface treatments.

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