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# Preparation and characterization of poly (lactic acid) (PLA)/polyamide 6 (PA6)/graphene nanoplatelet (GNP) blends bio-based nanocomposites (Article)

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## Abstract

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Biodegradable PLA is commonly derived from renewable resources and benign to the environment. It is a brittle thermoplastic with high strength and modulus; thus a suitable candidate for replacing conventional petroleum-based plastic. However, due to its limitation, PLA needs to be blended with other polymers and fillers for properties modifications. The aim of this work was to prepare PLA/PA6/GNP nanocomposites and characterize on the mechanical, thermal, chemical and dispersion of nanofiller in binary blend systems. PLA/PA6/GNP nanocomposites were blended by using a Haake twin screw extruder via melt intercalation method. The ratio of the polymer matrix was fixed at 20:80 and the processing temperature was in the range of 205 °C to 260 °C. Graphene nanoplatelet fillers were then loaded in the PLA/PA6 blends with 0.5, 1.0, 3.0 and 5.0 wt%. It was found that PLA/PA6/GNP (5.0) nanocomposites were the overall highest in terms of thermal and mechanical properties. PLA/PA6/GNP nanocomposites improved the mechanical properties in terms of elongation at break and maximum stress as well as improved the degradation temperature. The property improvement in the nanocomposites was due to the dispersion of GNP in the polymer matrix. It was also found that there was no chemical interaction between a functional group of nanocomposites. It can be concluded that nanocomposites were incompatible and immiscible with PA6. © 2019 IOP Publishing Ltd.

## Author keywords

graphene nanoplatelet | nanocomposites | PA6 polyamide | PLA

## Indexed keywords

Engineering controlled terms: Blending | Dispersions | Fillers | Graphene | Intercalation | Mechanical properties | Nanocomposites | Processing

Engineering uncontrolled terms: Chemical interactions | Degradation temperatures | Melt intercalation method | Nanoplatelet | Processing temperature | Property improvement | Thermal and mechanical properties | Twin screw extruders

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