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DISPERSION OF CARBON NANOTUBES IN POLY(LACTIC ACID)

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Carbon nanotubes (CNT) present excellent mechanical, electrical and thermal properties, and are expected to impart these properties into their composites. However, the CNT are grown as entangled bundles that are difficult to disperse in polymer matrices, or even in solvents. Several approaches have been tried for the efficient dispersion of CNT in polymer matrices, ranging from the CNT chemical modification to the use of different mixing methods. Previous studies have shown that the resulting filler dispersion is strongly dependent on the characteristics of the melt mixing equipment [1]. It is also known that the dispersion level of nanofillers strongly affects the final nanocomposite properties [2].

The present work reports the optimization of the CNT dispersion in poly (lactic acid) (PLA) using a small-scale twin-screw extruder. The CNT were chemically modified for improved interaction with PLA. The effect of varying the mixing parameters on the dispersion level of the CNT and functionalized CNT was evaluated using optical and electron microscopy. The electrical resistivity and mechanical properties of the composites were measured. It was observed that the incorporation of 1% (weight) of CNT reduced the electrical resistivity of the composite to 400 Ωm, and that 3% CNT rendered the composite conductive, with an electrical resistivity of 0.6 Ωm.

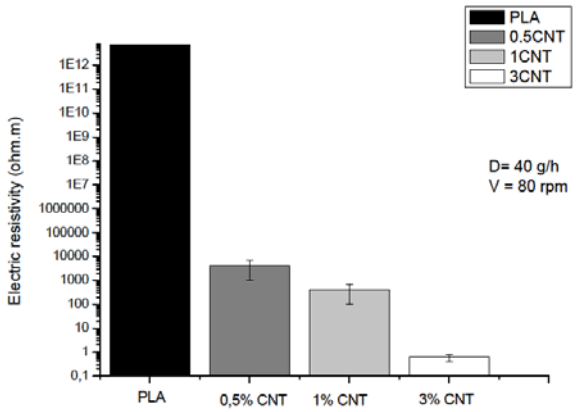

Fig. 1 Electrical resistivity of the PLA/CNT composites.

Acknowledgement: The authors acknowledge the financial support from the Portuguese Foundation for Science and Technology through project POCI/QUI/59835/2004 and PhD grant SFRH/BD/32189/2006.

Keywords: Carbon nanotubes; PLA; Dispersion.

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