Polym. Bull.
DOI 10.1007/s00289-016-1853-6

ORIGINAL PAPER

Mechanical, electrical and thermal properties of multi-walled carbon nanotubes/epoxy composites: effect of post-processing techniques and filler loading

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Received: 25 July 2016 / Revised: 30 October 2016 / Accepted: 2 November 2016

Abstract In this study, MWCNT/epoxy composites were fabricated via combination of ultrasonication with two post-processing techniques namely, casting and hot-pressing, respectively. The effect of these two post processing techniques and MWCNT loading ranging from 0 to 1.0 vol% on the mechanical, electrical and thermal properties of MWCNT/epoxy composites were investigated. The addition of MWCNT in epoxy reduced the tensile strength and tensile modulus of the MWCNT/epoxy composites compared to unfilled epoxy. However, the MWCNT/epoxy composites prepared by hot-pressing technique improved the tensile strength and tensile modulus at 0.4 vol% MWCNT loading as confirmed by morphological analysis. The DMA properties of MWCNT/epoxy composites prepared by both post-processing techniques showed no significant change in storage modulus and T_g values. The increment of MWCNT loading slightly increased the electrical and thermal properties of MWCNT/epoxy composites via the hot-pressing technique. These findings indicate that different post-processing techniques and filler loading govern the properties of MWCNT/epoxy composites.

Keywords Polymer-matrix composite (PMC) · Multi-walled carbon nanotubes (MWCNT) · Mechanical properties · Electrical properties · Thermal properties

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Published online: 07 November 2016