Flexural electromechanical properties of multilayer graphene sheet/carbon nanotube/vinyl ester hybrid nanocomposites

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Abstract

The electrical, mechanical and piezoresistive responses of vinyl ester nanocomposites made of two types of multilayer graphene sheets (GSs) and multiwall carbon nanotube hybrid fillers at different relative concentrations is presented. Two types of GSs are used in order to evaluate the role of their physicochemical properties. The best mechanical properties were achieved with hybrids at 75% relative concentration of GSs. Collaborative effects were also observed in the electrical conductivity of the hybrids at this relative concentration. The flexural piezoresistive response yielded low sensitivity (with both, positive and negative gage factors) at the compression side of the flexural coupon. On the contrary, the tensile side of the coupon always presented positive resistance changes and significantly higher piezoresistive sensitivity. The highest piezoresistive sensitivity was found for hybrid materials with 75% relative concentration of GSs, using the graphenic sheets with larger lateral dimensions and higher structural quality (lower Raman I-D/I-G ratio).

Keywords

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