MECHANICAL AND ELECTRICAL PROPERTIES OF CARBON BASED NANOCOMPOSITES DURING DYNAMIC TESTING

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ABSTRACT

Up to date, research related to the piezoresistive effect and stress and damage sensing of carbon black and carbon nano tubes in polymer matrices has been focused on static conditions. Conversely, only little literature on the time-dependency and dynamic response of the DC electrical properties of these materials is available[1-3]. For applications which require conductive polymer composites to act as internal sensors in aircraft components or wind blades, the aforementioned effects become significant, as these structures are often submitted to the presence of vibrations and cyclic stresses. In this work, we study the time and temperature effects on the piezoresistive response of carbon nanofiller/epoxy composites under dynamic load. Dynamic mechanical thermal analysis (DMTA) is carried out with *in situ* monitoring of the DC electrical resistance of the samples, with variation of parameters like loading frequency, strain rate and temperature. In accordance to the publication of Wichmann *et al.*[4], we further improve the basic understanding of the piezoresistive effect towards its applications for health monitoring in big composite structures. Both aspects, basic understanding and applications will be also addressed in the presentation.

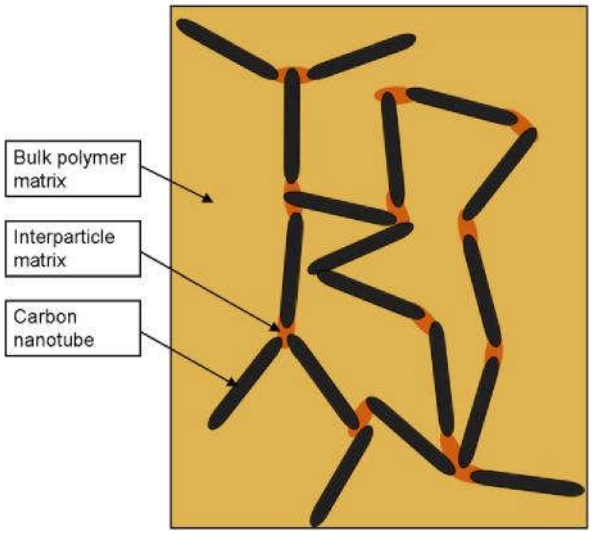

Fig. 1: Schematic block of MWCNT/epoxy nanocomposite under tensile deformation

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