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Properties and mechanisms of self-sensing carbon nanofibers/epoxy composites for structural health monitoring

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Abstract

In this paper, carbon nanofibers (CNFs) with high aspect ratio were dispersed into epoxy matrix via mechanical stirring and ultrasonic treatment to fabricate self-sensing CNFs/epoxy composites. The mechanical, electrical and piezoresistive properties of the nanocomposites filled with different contents of CNFs were investigated. Based on the tunneling conduction and percolation conduction theories, the mechanisms of piezoresistive property of the nanocomposites were also explored. The experimental results show that adding CNFs can effectively enhance the compressive strengths and elastic moduli of the composites. The percolation threshold of the CNFs/epoxy composites is 0.186 vol% according to the modified General Effective Media Equation. Moreover, the stable and

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