

Magnetic relaxation experiments in CNT-based magnetic nanocomposite

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Abstract. In this work, we discuss the relaxation of the magnetic moments in a novel carbon nanotube (CNT)-based nanocomposite synthesized by using chemical vapor deposition process. The material consists of a matrix of CNT filled by Fe-based nanoparticles. This structure is seen clearly by scanning and transmission. X-ray diffraction and Raman spectroscopy are used to detect the predominant Fe₃C phase and the CNT presence in the sample, respectively. The results obtained from both hysteresis cycles, M(H), and zero field cooled-field cooled (ZFC-FC) measurements confirm that the material is characterized by both a strong ferromagnetic exchange and random magnetic anisotropy. For the first time, we have been able to fit the magnetic relaxation data, M(t), by using both the two distributions of nanoparticles data deduced from the ZFC-FC data and the temperature dependence of the magnetic anisotropy obtained from the law of approach to saturation in random magnets.

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