



Structural and electrical characteristics of carbon nanotubes/epoxy polymer composites

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Abstract:

In this work, we tried to identify the relationship between the electrical and structural characteristics of multiwalled carbon nanotubes dispersed into the polymer matrix of a resin. We have compared Power law exponents of the samples measured on Small angle neutron scattering and calculated from permittivity results obtained from impedance spectroscopy.¹ We show in a first step that the critical exponents describing the concentration dependence of the conductivity and the dielectric constant, obtained in the vicinity of the percolation threshold, are in good agreement with the theoretical values.² In a second step, analysis of the AC electrical conductivity of the carbon-nanotubes-filled polymer samples uncovered a fractal behavior with similar dimensionality as that obtained by neutron scattering. Despite of the difference in the length scales accessed by the two techniques, there is an interesting agreement, which represent a first, but necessary step in understanding the role of fractals in describing the structure and predicting the physical properties of carbon-nanotubes-containing composite materials.¹

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Contribution:

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