Investigation of the Properties of Different Types of MWCNTs Polymer Composites

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Abstract

Multi Walled Carbon Nanotubes (MWCNTs) nanocomposites due to their tunable ability play a major role in numerous applications. Some of these are: electromagnetic interference (EMI) shielding, radar absorption materials (RAM), electrostatic painting for car body panels and mirror housings, electronic components and elastomers, airplane tire for antistatic dissipation, capacitors for charge storage, on-body antenna design and satellite and automotive applications.

Carbon Nanotubes (CNTs) and, in particular, Multi Walled Carbon Nanotubes (MWCNTs) is used intensively as a filler in a variety of polymers. Their outstanding mechanical, electrical, and thermal properties allow them to enhance the properties of the material in which they are used as filler for matrix reinforcement. Also, this increase in performance takes place even at low percentages of MWCNTs.

The realization of nanocomposites filled with various types of MWCNTs, and their electrical characterization for DC and microwaves frequencies are studied. Various samples of nanocomposites based on different polymers filled with different weight fractions of MWCNTs inside polymer matrix are prepared. The dispersion of MWCNTs inside the polymer is a crucial point for samples homogeneity and can effect on their electrical characterizations. The dispersion of MWCNTs inside polymer matrix is investigated by Field Emission Scanning Electron Microscopy (FESEM) analysis.

The Nanocomposites resistivity is measured by a two point probe (TPP) method. The complex permittivity is measured in the frequency band (200MHz-20GHz) by using a Network Analyzer (E8361A) and a commercial coaxial open-ended probe (Agilent 85070D). The relationship between MWCNTs physical dimensions and the complex permittivity values of the Nanocomposites is investigated.