Electrical Conduction Mechanism in Chemical Vapour Deposition Grown Multi-Wall Carbon Nanotubes Film

By: Al-Hazmi, FS (Al-Hazmi, F. S.)

View ResearcherID and ORCID

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Abstract

Multi-walled carbon nanotubes are interesting systems where different aspects of conduction are observed, mostly due to their low dimensionalities and small dimensions. Electrical conduction mechanism in multi wall carbon nanotubes film is studied. The studied multi-walled nanotubes are grown by a low pressure chemical vapour deposition system. To understand the conduction mechanism in these nanotubes, temperature dependence of conductivity of the multi wall nanotubes film over a temperature range of (400-200 K) is studied. On the basis of the results, one may suggest the thermally activated conduction mechanism for the temperature range (400-300 K). The low temperature data is fitted with the hopping conduction for the transport of charge carriers in the temperature range of 300-200 K. This hopping conduction mechanism is characterized by variable range hopping (VRH), which shows complete agreement with the Mott's type of VRH mechanism. Applying this model, a number of Mott's parameters such as density of states, hopping distance, hopping energy are calculated. The calculated values of all the studied parameters matches well the reported results on other multi-wall nanotubes film.

Keywords

Author Keywords: Multi Wall Carbon Nanotubes; Electrical Conduction Mechanism; Conductivity; Mott's Parameters; Raman Spectra; FESEM

KeyWords Plus: RANGE-HOPPING CONDUCTION; NON-CRYSTALLINE SYSTEMS; AMORPHOUS-CARBON; ELECTRONIC-PROPERTIES; ROOM-TEMPERATURE; TRANSPORT; SEMICONDUCTORS; INTERFERENCE; STATES

Author Information

Reprint Address: Al-Hazmi, FS (reprint author)

+ King Abdulaziz Univ, Dept Phys, Jeddah 21589, Saudi Arabia.

Addresses:

+ [1] King Abdulaziz Univ, Dept Phys, Jeddah 21589, Saudi Arabia

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