

# The Electrical Properties of Nanofluids Based on Motor oil mixed with Carbon Nanotubes and Graphite

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This work presents a systematic prediction of nanofluids prepared by dispersing carbon nanotubes (CNTs) and graphite (Gt) in motor oil. The impedance spectroscopy formalism was used to measure the dielectric parameters of various samples over the temperature range from 300 to 400 K and frequency range from 100 Hz to 1 MHz. The frequency dependence of alternating-current (AC) conductivity is characterized by a low frequency region of constant conductivity followed by a gradual transition at higher frequencies to a frequency dependent conductivity, this behavior can be approximated by the Jonscher power law. In the real and imaginary parts of impedance spectrum, a relaxation phenomenon was induced in the nanofluid comparing to the neat oil and these relaxations changed with increasing of CNTs. These results suggest that the presence of the CNTs greatly affect the dielectric properties of the oil as a result of polarization phenomenon induced by these nanoparticles.

**Keywords:** Nanofluid, motor oil, carbon nanotube, graphite, dielectric relaxation.