

Nanocomposites and nanomaterials

Dielectric properties and AC conductivity of epoxy/hybrid nanocarbon filler composites

L.L. Vovchenko¹, L.L. Matzui¹, Yu.S. Perets¹, Yu.S. Milovanov²

¹*Department of Physics, Taras Shevchenko National University of Kyiv, Volodymyrska str., 64/13, Kyiv, 01601, Ukraine
E-mail: vovch@univ.kiev.ua*

²*Institute of High Technologies, Taras Shevchenko National University of Kyiv, Volodymyrska str., 64/13, Kyiv, 01601, Ukraine*

The electrical properties of epoxy composites filled with hybrid filler graphite nanoplatelets/carbon nanotubes (GNP/CNT) at different concentrations (0 – 5 wt. %) were measured using AC impedance spectroscopy with frequencies ranging from 1 kHz to 2 MHz. The complex impedance, real and imagine parts of permittivity and electrical conductivity were determined. It was found that dielectric permittivity and electrical conductivity increase with increasing content of hybrid carbon filler and are characterized by percolative behavior. It was found

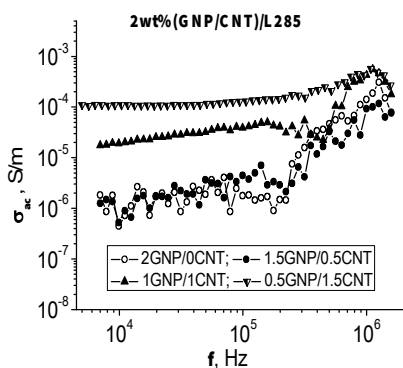


Figure 1. AC conductivity of epoxy composite with hybrid nanocarbon filler

that substitution of GNP particles by carbon nanotubes promotes the shift of percolation threshold into lower filler content and enhances the electrical conductivity, permittivity and dielectric loss (\tan) of CMs compared with CMs filled only GNPs (Fig. 1). The increase of CNT content in CMs increases the electrical conductivity and weakens its dependence on frequency (related to electron tunneling transport process in CMs [1]) due to more effective formation of a continuous carbon network.

1. Z. M. Elimat, M. S. Hamideen, K. I. Schulte, H. Wittich, A. de la Vega, M. Wichmann, S. Buschhorn. Dielectric properties of epoxy/short carbon fiber composites // J Mater Sci.-2010.-**45**.-P.5196–5203.