Influence of stretch ratio on the dielectric response of polymer composite, consisting multiwall carbon nanotubes

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Composite materials based on the organic polymers with carbon nanotubes (CNT) are the object of many scientific investigations according to promising of their application during creation of novel broadband absorbing and reflecting electromagnetic wave materials [1]. Insertion of nanotubes in the composition of composite material allows producing materials, which have variable dielectric and magnetic properties. Materials with such properties can be demanded during creation of electromagnetic shields with definite absorption coefficients [2].

Influences of stretch ratio on the dielectric properties of obtained composite materials are propose in the present work. Composite materials were produced using CNT, which were produced by chemical vapor deposition method. Concentrations of nanotubes in the samples were varied from 0.1% to 2%. Polystyrene was used as a matrix of composite material. Obtained samples were mechanicaly stretched up to 30%. For comparison with experimental results polystyrene sample without nanotubes were espoused under the same conditions. The homogeneous of derived composite materials were investigated by optical microscopy methods. The dielectric response of samples was measured by double-electrode method. Investigation of stretch influence on the value of dielectric permittivity show that rick of composite material lead to decrease of dielectric permittivity of which is a result of orientation changes of nanotubes in the samples. It was detected that dielectric permittivity proportional decrease in comparison with stretch ratio.

[1] P. Saini, V. Choudhary, B.P. Singh, R.B. Mathur, S.K. Dhawan, *Materials Chemistry and Physics* **113**(2-3), 919 (2009).

[2] M.C. Paiva, B. Zhou, K.A.S. Fernando, Y. Lin, J.M. Kennedy, Y.-P. Sun, *Carbon* **42**, 2849 (2004).