Heat resistant phosphate materials containing pure and nitrogen- and boron-doped carbon nanotubes: effectiveness of electromagnetic interference shielding in microwave

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We report on the comparative study of the effectiveness of electromagnetic (EM) interference shielding in microwave range (26-37 GHz) provided by pure, as well as boron and nitrogen doped multi-walled carbon nanotubes (CNTs) dispersed in heat resistant phosphate ceramics. The series of pre-percolative and close-to-percolation threshold samples made in five different concentrations (0.25, 0.5, 1, 1.5 and 2 wt.%) were fabricated on the basis of thermal stable phosphates, consisting of aluminium-phosphate binder and filler containing corundum (Al_2O_3) and aluminium nitride. SEM and differential thermal analysis of obtained materials have been carried out. The inhibition effect of phosphate binder on the oxidation process of CNTs has been established. The experimental data collected in microwave frequency range demonstrate the prospects for utilizing of phosphate adhesive compositions for the preparation of heat-resistant electromagnetic coating both on the basis of pure CNTs and B- and N-doped CNTs, in favor of pure ones. This conclusion was supported by DC analysis showing high DC conductivity of fabricated composites at room temperatures, when filler concentration is not less than 1 wt.%.

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Investigation of the interaction of carbon nanotubes and the most commonly used polymers

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Every day we need more and better materials. All new types of materials press oneself into our lives, in our everyday life. Nanotubes - a unique material, they are considered an ideal reinforcing material, including, for polymeric materials. Carbon nanotubes in polymer matrices have a great influence on the electrical conductivity, viscosity, shear and other transport properties, as the hybrid nano-sized fillers and additives. We carried out a theoretical study of the interaction of nanotubes with a few monomer units most common polymers. Mechanisms of interaction processes and characteristics, resulting in a material.

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