Microwave Frequency Characteristics of Magnetically Functionalized Carbon Nanotube Arrays

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Abstract: This paper reports the results of a comprehensive study of the interaction of electromagnetic radiation (EMR) of the wide frequency range (8-12, 26-37, and 78-118 GHz) with arrays of vertically aligned and disordered carbon nanotubes (CNTs) which have been obtained by the floating catalyst chemical vapor deposition method. The obtained nanotubes represent a composite of multiwall CNTs with encapsulated magnetic nanoparticles of iron phases, i.e., magnetically functionalized nanotubes (MFCNTs). MFCNTs were formed on silicon substrates, and

disordered arrays in the form of powder were obtained by separating the MFCNT arrays mechanically from the walls of the quartz reactor. The frequency dependences of the reflection and transmission coefficients of EMR of MFCNTs of two types were investigated. The high electromagnetic shielding efficiency (40 dB) of MFCNTs associated with the reflection of electromagnetic waves was detected. Possible mechanisms of attenuation of electromagnetic signals by aligned and disordered MFCNTs were discussed.

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