Contribution ID: **184** Type: **not specified**

STUDY OF THE ABSORPTION AND SHIELDING EFFICIENCY OF TWO-LAYER POLYMER COMPOSITES FROM NON-IONIZING AND IONIZING RADIATION

Due the widespread use of electromagnetic radiation in human activities, research on technologies for reducing electromagnetic noise in closed spaces is relevant. Also, the development of techniques using gamma radiation, for example in medicine, energy and high-energy physics, creates situations where it is necessary to reduce the intensity of ionizing radiation. Research into radiation shielding and absorption technology is currently focused on the creation of new composite materials using polymer matrices. This choice is due to the high technological efficiency of polymers, outstanding chemical properties, low production costs and low physical density. This paper studies the radar absorbing and radar shielding properties in the microwave range of particulate composites with a matrix of polystyrene and ferrimagnetic fillers of the MeFe2O4 type, where Me is Mn, Zn, Ni. The main dependences of the electromagnetic characteristics of such composites on the concentration of the filler and its electrical and magnetic characteristics are shown. In addition, study of the electromagnetic characteristics in the microwave range of particulate polymer composites filled with PbO, Bi2O3, WO3, TeO2 and their combined oxides was done. For the configuration of the absorber on a metal sheet, the reflection coefficient on a metal plate of two-layer absorbers was simulated. The first layer was a composite with an additive of metal oxides with a high atomic number, and the second layer was a composite with ferrimagnetic inclusions. Using mathematical calculations, the specific attenuation coefficient of gamma radiation was also estimated for both layers. Finally, the influence of oxide filler concentration on the elastic modulus and flexural strength was studied through mechanical compression and bending tests.

Section

Energy and materials science (Section 2)

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Track Classification: The V International Scientific Forum "Nuclear Science and Technologies": Energy and materials science (Section 2)