N1-P-032301

COMPOSITE STRUCTURES BASED ON POLYMERS, WITH THE ADDITION OF NANOMATERIALS

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To ensure the safe operation of electronic and optoelectronic systems, as well as optical devices under conditions of natural and artificial electromagnetic radiation (EMR), to eliminate electromagnetic interference, to ensure the electromagnetic compatibility of individual components of high-frequency equipment, composite materials based on polymer compositions with carbon nanotubes, graphene and other carbon nanomaterials. In these radio absorbing materials, in particular, multilayer broadband microwave absorbers based on composite materials, the principle of converting electromagnetic energy into heat is used. These materials should provide the necessary degree of attenuation of the EMR reflectivity of the near and far fields for various objects with different angles of incidence and polarization.

Products made of composites based on polymers filled with carbon nanomaterials have aroused great interest in recent years also as antireflection systems in the UV, visible, and IR ranges of the spectrum. The area of their application covers a wide range of products from spacecraft objects (solar cells, optoelectronic and optical systems), military equipment to household appliances. Thus, the topic of the work is relevant and timely.

Work has been carried out to create composites for the above purposes based on such polymers as polyurethane, epoxy resin and elastomer - Dimethylpolysiloxane compound "Silagery 8030" (Russia). Various types of multilayer carbon nanotubes and graphene produced by OOO NanoTechcenter (Tambov), as well as finely dispersed particles of metals and their oxides, were used as additives.

The experimental base of the laboratory of A.N. Sevchenko Institute of Applied Physical Problems of Belarusian State University provided a full scope of technological work, as well as studies of the composition, structure of composites, electrical and optical properties in a wide temperature and frequency ranges.

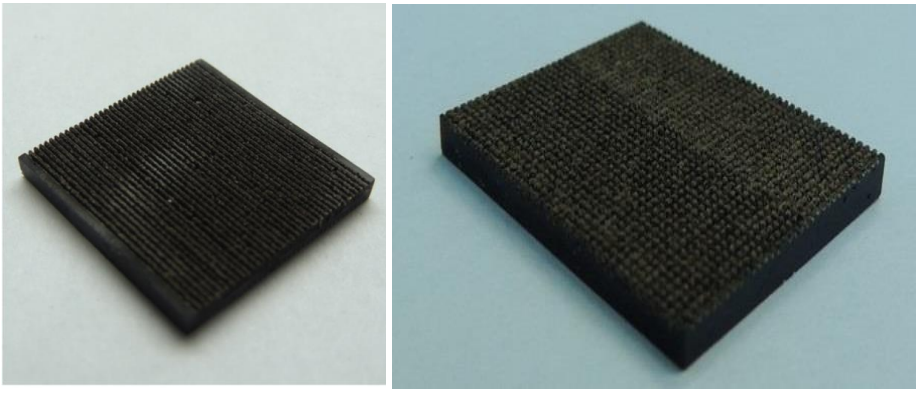

Fig.1. Samples of anti-reflection coatings with laser surface treatment.

The effect of composite's surface in the visual and near IR regions modification by to pulse laser treatment on light reflectivity has been studied. The possibility of creating innovative non-reflective surfaces of the composite samples in the visual and near-IR ranges is demonstrated.

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