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NANOMATERIALS for LOW VISIBLE AIRPLANE CONSTRUCTION

Among the requirements for a modern airplane is a requirement of their low visibility, i.e. low reflectivity with respect to electromagnetic radiation. The reflectivity of the airplane is determined primarily by their construction and dielectric properties of their surface materials. The urgency of such studies caused nontrivial physical properties of sets of small particles and disperse systems, as well as the possibility of their use in the new set of effective absorbing and scattering surface materials with new optical properties for the purposes of such promising areas as nanophysics, optoelectronics airplane construction materials.

On the basis of carbon nanotubes the devices reacting to the total spectrum of an optical range of electromagnetic waves is developed. Installation for measurement of infrared non-monochromatic irradiation of composites poly-tetrafluorethylene (F4) - CNT with different percentage of CNT, consisted of a metal sample – standard Al and metal sample - Al sensor on which a thin layer or as a flattened tablets of investigated samples F4 - CNT with different concentration of CNT were layered. Both metal samples Al - standard and sensor connected to a multimeter using differential thermocouple. The flow of electromagnetic irradiation that was generated and emitted by filament bulb interacts with Al-standard and composite F4-CNT. As a result of this interaction in substances generated by the flow of free charge carriers, which leads to thermoelectric force which values are recorded using a multimeter. Received values of voltage of standard and investigated composite F4 - CNT are transferred in values of temperature, using graduated table for thermocouple chromel-alumel.

During a mechanical compression of the sample F4-5% CNT with different thickness, orientation of carbon nanotubes changed from vertical to, mostly, horizontal, CNT oriented along the sample surface. As a result of F4-CNT sample anisotropy the intensity of irradiation which absorbed and passed through sample started to change and began to depend on the size and orientation of particles in composite F4-5% CNT. So, the dielectric and reflected properties of composites change also.

As a result of the investigation we can conclude that with decreasing thickness of the composite with carbon nanotubes F4-CNT rapid drop of intensity of passing monochromatic infrared irradiation is observed in the range of sample thickness from 0.1 nm till 0.6 mm, due to reorientation of CNT from chaotic to the direction along the sample surface F4-CNT. This leads to increasing of the efficiency of monochromatic infrared irradiation absorption by composites. The dielectric and reflective properties of composites change also.

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