

Nanocomposites and nanomaterials

Functionalized by UV/Ozone treatment graphite nanoplatelets as an improved filler for electrical conductive epoxy-matrix composites.

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In the present work we have investigated electrical conductivity concentration dependences of graphite nanoplatelets (GNP)/epoxy nanocomposites were evaluated after UV/O₃ treatment of filler. The content of nanocarbon filler in varied from 1 to 10 wt. %. Before incorporation into the epoxy resin, the GNP were subjected to UV/O₃ treatment at 20 min UV exposure. The electric resistance of the samples was measured by 2- or 4-probe method, and teraohmmeter E6-13.

Several characterization techniques were employed to identify the mechanisms behind the improvements in electrical properties, including SEM and IK-spectrum analysis, as a function of UV/O₃ treatment time (5 min, 10 min, 20 min, 30 min). It is established that the redistribution of the relative intensities of the bands indicates that increasing the exposure time is the destruction of the carboxyl group COOH and "lead" group OH. UV/O₃ treatment improved the electrical conductivity by improving the GNP–epoxy interfacial adhesion, which is attributed to ameliorating changes in GNP surface chemistry and morphology [1]. As shown in Fig. 1, electrical conductivity of composites have percolation character and GNP (UV/O₃ 20 m) addition leads to a decrease percolation threshold of 0.44 vol.% and increasing values of electrical conductivity (by 2-3 orders of magnitude) after the percolation threshold in comparison with CMs - GNP/L285.

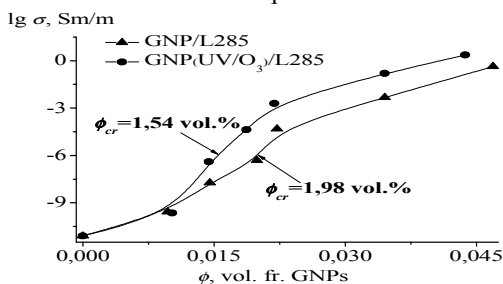


Fig. 1. Concentration dependence of the logarithmic electrical conductivity of composite materials with GNP and GNP (UV/O₃).

1. *Sham M. L., Li J. et al.* Cleaning and functionalization of polymer surfaces and nanoscale carbon fillers by UV/Ozone treatment: A review // *J. Compos. Mater.* – 2009.-43.-N 14.-P. 1537-1564.