

Nanocomposites and nanomaterials

The electrical and thermal properties of hybrid composites based on graphite nanoplatelets with multiwall carbon nanotubes

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This paper presents the results of changes in electrical resistivity and thermal conductivity of new hybrid polymer composites with graphite nanoplatelets (GNPs) upon the addition the second filler of electric type and cylindrical shape - nano-sized filler - multiwall carbon nanotubes (MWCNTs). Graphite nanoplatelets were obtained by ultrasonic dispersing of thermally expanded graphite. Their diameter is about 0.2-30 μm and their thickness is about 5-65 μm (Fig. 1a). The multiwalled carbon nanotubes, purchased from Cheap Tubes Inc. with purity $\geq 90\%$ (Fig.1b).

Epoxy resin Larit285 (viscosity of 600 – 900 mPa s) with hardening agent H285 (viscosity of 50 – 100 mPa s) was used as the polymer matrix. The content of two different carbon fillers in CMs varied from 1 to 10 wt. %. The electric resistance of the samples was measured by two-probe ($R = 10^4\text{--}10^9 \Omega$) and four-probe ($R \leq 10^4 \Omega$) method or teraohmmeter E6-13 ($R = 10^9\text{--}10^{13} \Omega$). Thermal conductivity was measured by dynamic calorimeter method in the temperature range 150-425 K.

a)	b)
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Figure 1. SEM images for the (a) - GNP, (b) – MWCNT.

1. Szeluga U., Kumanek B., Trzebicka B. Synergy in hybrid polymer/nanocarbon composites. A review // Compos. Part A-Appl. S. – 2015.-73.-P. 204-231.