

Structure and electrical properties of composite materials based on polymer matrices with a various content of shungite and taunite

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Abstract

Researches of electrophysical characteristics, structure and physical properties of experimental samples of CNT-based composite materials containing shungite, taunite and other additives are carried out. The optimum ratio and specific amount of shungite and taunite content in polymer matrices are revealed. It is shown that introducing of 5% of shungite and 1% of taunite into the polymer matrix allows us to obtain a composite material with an uniform distribution of CNT by volume.

The shielding properties of the obtained composite materials against the electromagnetic radiation depending on the frequency of the radiation, etc. were also studied and measured. The current-voltage characteristics of our samples have a linear dependence, meaning that these materials have the metal type of conductivity.

Influence of temperature on the electrical properties of the obtained CNT-based composite materials is also investigated. Conductivity of the obtained composite materials increases monotonically when temperature increasing from 70°K to ~300°K. Dependence of conductivity on temperature shows that for composite material based on polymer matrix with 5% of shungite and 0.99% of taunite (Sample 1) the maximum of conductivity is observed at temperatures ~330-340°K (Figure 1). For composite material based on polymer matrix with 10% of shungite and 0.98% of taunite (Sample 2) there is a small peak at ~295°K and maximum of conductivity shifts to temperatures ~360-370°K (Figure 2). The value of conductivity at this maximum is more for the first sample.

References

[1] Komarov F.F. et al. The Eighth International Kharkov Symposium on Physics and Engineering of Microwaves, Millimeter and Submillimeter Waves (MSMW'13). Kharkov, 2013. P.100-102.

Figures

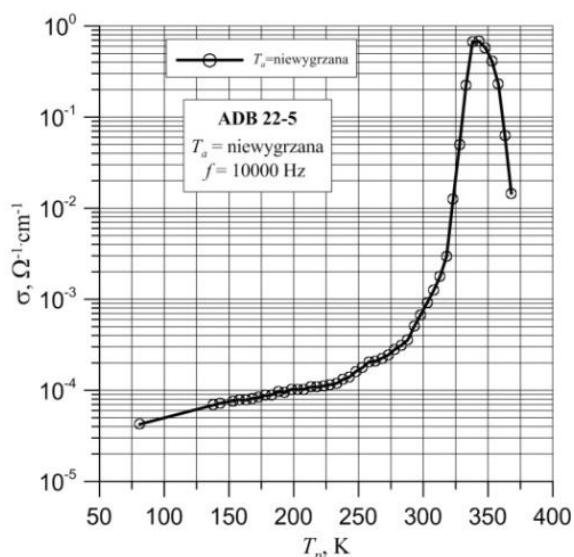


Figure 1 – Dependence of conductivity on temperature for composite material with 5% of shungite and 0.99% of taunite

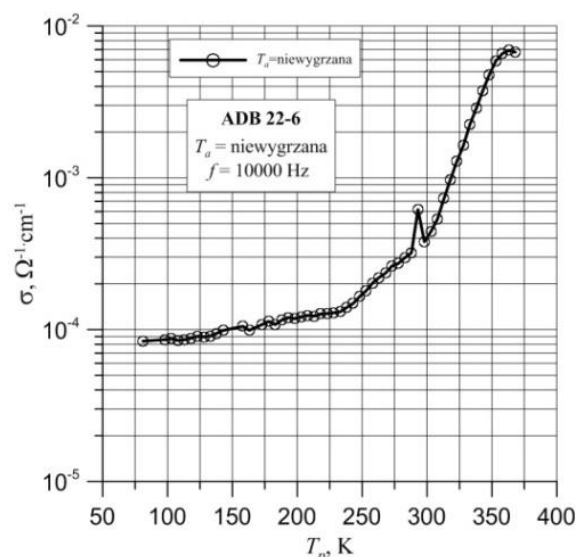


Figure 2 – Dependence of conductivity on temperature for composite material with 10% of shungite and 0.98% of taunite