

Organic/inorganic electroconducting composites based on pani and vermiculite

© Nikolay P. Shapkin,^{*†} Vladimir V. Korochentsev, Valentin K. Stepanovich, Valery I. Razov, Mikhail V. Tutov, and Elizaveta I. Karpova

Department of General, Inorganic and Elementorganic Chemistry. Far Eastern Federal University. Sukhanova St., 8. Vladivostok, 690091. Russia. E-mail: shapkin.np@dvfu.ru

*Supervising author; †Corresponding author

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Abstract

Obtained by the method of molecular layering composites based on Modifying the acid-fied natural vermiculite, phenylene diamine, acetylacetonate, chromium(III), and polyaniline.

Each resulting composite layer was studied by physicochemical methods (infrared, X-ray term and positron annihilation spectroscopy). Investigations of the structure of composites using X-ray analysis and electrical conductivity using impedance.

It was established experimentally that at the formation of the first layer and the ratio of the amount of carbon on the silicon surface equal vermiculites 1:2.2 – 2.5. The presence of magnesium, aluminum and iron in the spectra RES allows to conclude that the thickness of the coating contains 5 to 6 layers of polyvinylsiloxane. With the help of X-ray analysis shows that an increase in amorphous composite layers increases. At the stage of formation of the second layer, the total thickness of the composite is more than 5 nm, as evidenced by X-ray photoelectron spectroscopy data. The specific conductivity of the final composite was $0.4 \cdot 10^{-3} \text{ Ohm}^{-1}$ and is close to the conductivity of semiconductors. The positron annihilation spectroscopy were determined according to the specific volume of "traps" of positronium and the electrical conductivity of the composites on the nature of coating, calculated amounts "traps" of positronium (V_{ps}) and a positron (V_{e^+}). In the first stage processing vermiculite molecular layering the volume of "traps" sharply decreased. When comparing the results of positron annihilation spectroscopy for both vermiculites obtained direct dependence, which indicates that the same surface of a change, regardless of the source of the crystal lattice. When applying layer sulfenhlorida acetylacetonate chromium(III) size of the "traps" is growing due to the appearance on the surface of the SCl-groups. After appearing on the surface of the polymer film of polyaniline with ferriecyanide acid size "traps" almost did not change. Proceeding from the results it can be concluded that the lattice Koksharovskogo phyllosilicate deposits changes slightly and is more rigid in comparison with layered silicate Kovdorsky field.