## Nanocomposites and nanomaterials

# Structural and phase transitions in layers of intercalate in graphite intercalation compounds with bromine

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As is known in intercalates layers that are between the layers of graphite, structural and phase transformations at cooling or heating occur. These transformations are associated with the transition of intercalate from quasiliquid to quasicrystalline state or with formation of commensurate or incommensurate quasicrystalline phases of intercalate. For bromine, in addition to the mentioned transitions, also phase transitions, associated with a change of the number of bromine atoms in the chains of intercalates, are observed. In presented work the peculiarities of phase transformation in bromine layers and its influence on the electrotransport properties of graphite intercalation compounds (GICs) with bromine are investigated. The structural and phase transformation in GICs are investigated with methods of X-R diffraction and Raman spectroscopy. The electrotransport properties of GICs (resistivity, thermopower, magnetoresistance and Holl voltage) were measured in temperature interval from 4.2K to 293K and in magnetic field up to 2.5T.

It was found that during the cooling-heating process a cascade of phase and structural transformations occurs in layers of bromine. These transformations not only affect the character of the charge carriers scattering in the graphite layers, that is typical for GICs. Revealed phase transitions result in the change of accommodation coefficient, i.e. the amount of the additional charge that is transferred from intercalates molecules to graphite layers.

Based on obtained experimental data in the terms of simple two-dimensional electron structure model of GICs the accommodation coefficient, charge carriers concentration and Fermi energy for GICs with bromine were estimated. It is revealed that these parameters change abruptly at temperature of phase transitions in bromine layers and independent on temperature above and below the phase transition temperature.