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(ABSTRACT)

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CONDUCTION ESR SIGNAL TRANSFORMATION AT GRAPHITE INTERCALATION PROCESS: CAUSE AND EFFECTS

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The nature of variation and disappearance of graphite conduction ESR (CESR) signal during the intercalation of graphite plate up to now are not unambiguously determined. On one version[1] the phenomenon under consideration takes place because of displacement of Firm level. On another hypothesis[2], CESR signals of graphite and product of intercalation are observed from different regions of pristine graphite plate. However, if this is the case, it is incomprehensible, why the averaging of conduction electron states of non- and intercalated regions of graphite plate is not observed?

In this reports the results of an *in situ* CESR study by two-zone vapour transport method of SbF_5, HNO_3, Br_2 and F_2 molecules intercalation process into graphite galleries are presented. Nor in one of these experiments we did not find facts, which confirmed version on fluent (gradual) transformation of graphite signal in the GIC resonance signal. At the same time the new data on accessories of graphite and graphite intercalation product CESR signal to different regions of initial graphite plate have been obtained. CESR spectrums of these areas are not averaged because of presence between them of high-ohmic barrier. In particular, this conclusion supported by the fact, that the increase of intensity of CESR signal from intercalated areas of graphite plate stops nearly at the same time, when the intercalation front (the interface between the initial stage and the pristine graphite) travels a distance, which is approximately equal to the GICs skin - depth.

Earlier[3] from the analysis of dependency of graphite CESR line shape from geometric sizes of sample it was installed presence of contribution to the spin relaxation of conduction electrons of effects of their interaction with the sample surface. However hitherto systematic study of this effects were restrained by the difficulty of fabrication of thin graphite plates in (a,c) plane. Formation of high-ohmic barrier across front of introduction of "guest" molecules into graphite plate opens new possibilities for study the surface spin relaxation effects of graphite conduction electrons. Really, at intercalation of graphite plate thickness of its non-intercalated part continuously decreases up to the zero. So, contribution to the spin relaxation of conduction electrons effects of their interaction with the graphite - intercalate interface will increase as the front of intercalation advances from a plate surface into a graphite plate centre. Discovered in experiment on intercalation of nitric acid into graphite plate with sizes near in three skin-depth quick increase of graphite CESR signal linewidth with a sample exposure time confirms this conclusion.

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