ELECTRON PARAMAGNETIC RESONANCE IN GRAPHENE STRUCTURES

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Graphene is fast becoming a key instrument in nanotechnology, which in a number of cases can replace carbon nanotubes, thus competing with silicon [1].The electron paramagnetic resonance (ESR) is a widely used method for studying carbon nanostructures [2-5]. A major advantage of this method is that it allows you to detect unpaired electrons even at very low concentrations in samples, without destroying or modifying them, and at the same time characterize their energy states or localization.

The findings of this research provide insights for a simple and informative method for analyzing inhomogeneously broadened EPR lines, whose broadening is due to the addition of individual EPR lines of the sample under study. These include different values of intensity, g-factors and EPR line widths.

It eliminates marked drawbacks, allowing you to get a technical result. The study offers some important insights into a review of the line connecting the maximum and minimum of the EPR spectrum of the sample under study, inflection points are analyzed on it, which allows determining the number of components that make up the spectrum, their ratios and their magnitudes and g - factors. This study has identified the method of preparation of graphene structures under the influence of an ultrasonic field on graphite with aromatic hydrocarbons.

The aim of the work is the study of the paramagnetic properties of a graphene structures by the method of electron paramagnetic spectroscopy. In this case, the examination was carried out on the example of a non-uniformly widened EPR line of the graphene structures obtaining by under the influence of an ultrasonic field on graphite with aromatic hydrocarbons. The properties of graphene structures are largely determined by the way they are produced.

This figure shows fractures line is divided into three parts, each of which is characterized by it's a g-factor value and size. As is evident from the figure, the relation between the values determined by plots of 3:5. 8:4. This suggests that the resulting thin carbon film is due to three components. On the caption to picture presented magnitude of the magnetic field and the value of g-factors corresponding to the selected points on the spectrum.

The first plot has g = 2.00416, which is typical for of the EPR spectrum of graphene and its compounds. The second plot is g = 2.0028. With such a g-factor of carbon components can be caused by carbon nanotubes.

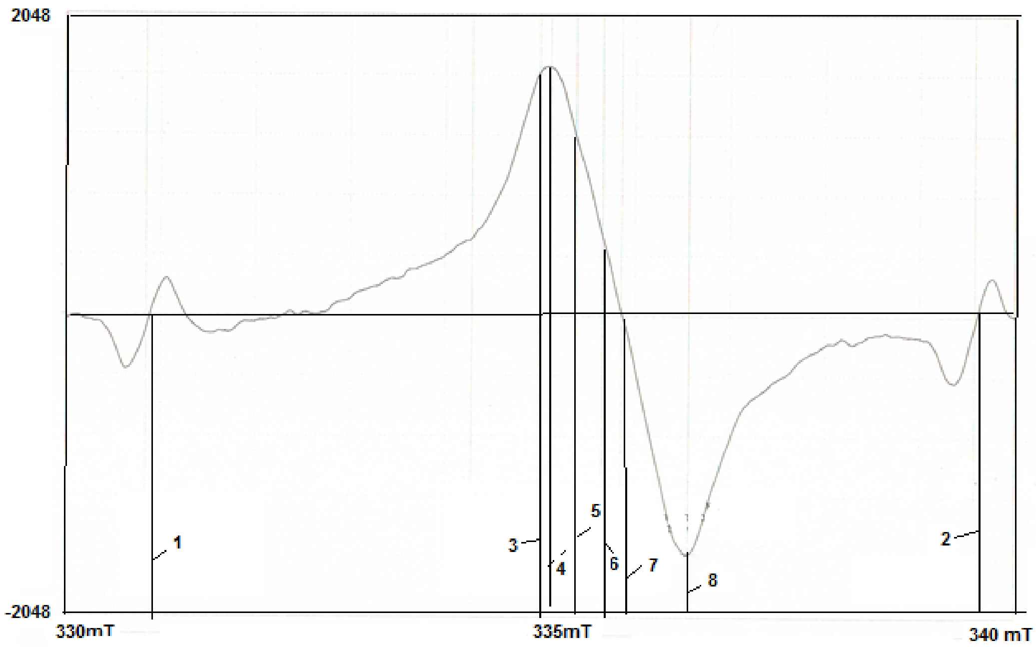

Fig.1 The EPR spectrum of graphen structures obtaining by under the influence of an ultrasonic field on graphite with aromatic hydrocarbons (toluene) at treatment of 30 minute

The third component of the carbon structure has a g-factor equal to 2.00118 ÷ 2.00164 depending on the angle of rotation of the sample in a magnetic field. This indicates the presence of carbon maretial consisting of various forms of graphite with some degree of crystallinity.

The investigation of the EPR spectra of the samples was found that they mainly consist of one rather intense line with a g-factor equal to g = 2.00414 ÷ 2.00416. Such a value of the g-factor of the EPR spectrum is characteristic of graphene.

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