



Subarea POB3:

Title of the presentation: Carbon materials as sensor's layers in detection of selected gases

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Abstract:

Carbon is one of the most abundant elements on Earth. It can be found in various allotropic forms (e.g. graphite, carbon nanotubes or graphene); some of which have been known since antiquity, while the others have only been discovered recently. The last one mentioned, graphene, deserves special attention. Many methods of its production are known. The Department of Optoelectronics at the Silesian University of Technology has intensively investigated the materials obtained by chemical methods.

Graphene samples obtained by chemical methods (with using reduced graphene oxide) are characterized by greater amount of defects and lower chemical purity than graphene obtained, for example, by the CVD method. However, thanks to chemical admixtures and inhomogeneities, it is possible to use this material in the sensors (especially in gas sensor).

The Department of Optoelectronics successfully designs, produces and tests structures with carbon materials (initially undoped graphene and palladium-doped graphene, later graphite oxides and reduced graphene oxides obtained by various methods) as sensing layers. There were attempts to detect, among others, hydrogen and nitrogen dioxide. Measurements were performed at various humidities of the carrier gas (synthetic air or nitrogen). The sensor structures were maintained at room temperature and also at higher temperature.

All sensor's materials are characterized using various measurement techniques, including AFM and SEM microscopy and Raman spectroscopy. Graphite and graphene oxides are also characterized using among others XRD, XPS or FT-IR (to get more detailed information about the samples).

Currently, research is focused on hybrid materials such as graphene / zinc oxide (with various concentrations), and in the near future it is planned to perform tests of sensor's structures with the above-mentioned materials in various gaseous atmospheres.