CHARACTERIZATION OF SURFACE PROPERTIES OF ZnO Nanolayers for POTENTIAL TOXIC GAS SENSOR APPLICATION

Anna Kuliś-Kapuścińska 1\*, Monika Kwoka 1, Michał A. Borysiewicz 2, Jacek Szuber 1

1 Department of Cybernetics, Nanotechnology and Data Processing, Faculty of Automatic Control, Electronics and Computer Science, Silesian University of Technology, 44-100 Gliwice, Poland

2 Łukasiewicz Research Network – Institute of Microelectronics and Photonics, 02-668 Warsaw, Poland

\*autor korespondencyjny: anna.kulis-kapuscinska@polsl.pl

The main scientific goal of this work will be to determine the selected surface properties of the low dimensional zinc oxide (ZnO) nanostructures in the form of nanolayers deposited on the silicon Si substrate using the direct current magnetron sputtering method, in terms of their potential applications in microelectronics, especially in toxic gas sensors. As part of the planned research, their surface chemical properties, including the level of their non-stoichiometry and the concentration of pollutants (contaminations) of the residual gases from surrounding atmosphere, as well as their surface morphological properties will be determined.

In the planned investigation the X-ray photoelectron spectroscopy (XPS) method will be used, in combination with the thermal desorption spectroscopy (TDS) method, as well as the microscopic methods like scanning electron microscopy (SEM) method and the atomic force microscopy (AFM). The obtained information are crucial for the interpretation of the sensor characteristics of the tested ZnO nanolayers in the atmosphere of selected toxic gases using the own, original gas sensor system based on the surface photovoltage effect (SPV).

On the basis of the achieved experimental information, an attempt will be made to determine the correlation between the above-mentioned selected surface properties and the sensor properties of ZnO nanolayers in terms of their use in detection of selected toxic gas sensors.

**Acknowledgement**

This work was realized within the Statutory Funding of the Department of Cybernetics, Nanotechnology and Data Processing, Silesian University of Technology, Gliwice, Poland, and partially financed by the research grant of National Science Centre, Poland - OPUS 11, No. 2016/21/B/ST7/02244.