

The ethanol sensors made from α -Fe₂O₃ decorated with multiwall carbon nanotubes

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(Received February 10, 2015, Revised March 17, 2015, Accepted March 24, 2015)

Abstract. Thin film ethanol sensors made from α -Fe₂O₃ decorated with multiwall carbon nanotubes (MWCNTs) were manufactured by the electron beam deposition method. The morphology of the decorated α -Fe₂O₃/MWCNTs (25:1 weight ratios) nanocomposite powder was investigated using the scanning electron microscopy and X-ray diffraction techniques. The thickness of thin films has been determined from ellipsometric measurements. The response of manufactured sensors was investigated at different temperatures of the sensor work body and concentration of gas vapors. Good response of prepared sensors to ethanol vapors already at work body temperature of 150°C was shown.

Keywords: gas sensor; Fe₂O₃; carbon nanotubes; response; ethanol

1. Introduction

An interest to application of portable alcohol sensors is caused by possibilities of their use in modern technics medicine, biotechnology etc. In particular, sensors can be used also for control of different chemical processes and food quality, determining of a level of alcohol in wines and a degree of human intoxication. It is very important to detect the gas vapors and measure its concentration, toxicological and psychological effects in the atmosphere and different environments (Vrnata *et al.* 2000, Ling *et al.* 2006, Xu *et al.* 2008, Zhang *et al.* 2008, Prajapati *et al.* 2011, Beckers *et al.* 2013).

As usually, all of the most important parameters of the semiconducting resistive gas sensors depend on the correct choice of its sensing material. Different metal oxides are mainly used as sensitive materials. It is known that metal oxides are very sensitive to a composition of

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