

SENSITIVITY INVESTIGATION TO FORMALDEHYDE OF THE VAPORS OF NANOSTRUCTURED FILMS FROM ZnO SEMICONDUCTOR OXIDES FOR MEDICAL APPLICATION

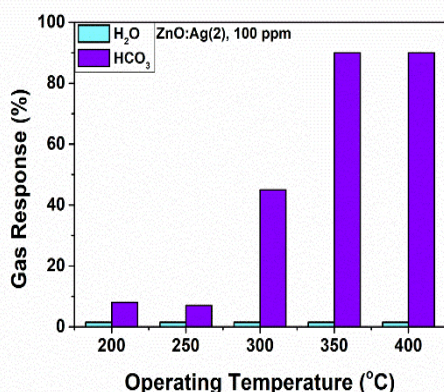
Oleg LUPAN, Ion POCAZNOI, Nicolai ABABII, Vasiliu CRETU, Iuliana SECU

Department of Microelectronics and Biomedical Engineering, Technical University of Moldova,
168 Stefan cel Mare Blvd., MD-2004 Chisinau, Republic of Moldova

*Corresponding author: Oleg Lupan, oleg.lupan@mib.utm.md

Formaldehyde (CH₂O) of 40% is widely used in medicine as a substance applied in processes for sterilization of bone grafts for further use as implants. The efficiency of sterilization depends on the amount of CH₂O remaining in the graft pores [1]. Thus, the purpose of washing grafts with CH₂O being the lack of CH₂O at the end of the sterilization process. The purpose of the investigations is to establish the changes / response of the resistivity of ZnO-type semiconductor oxide films to the action of CH₂O vapors, preventively subjected to rapid thermal treatment regimes. Similar investigations have been carried out on ZnO films doped with Ga and Sn, in which the mechanisms of the sensitization processes are discussed. [2,3].

The researches at different concentrations (5-1000 ppm) of CH₂O vapor allowed to establish the concentration limit, which is obtained at the operating temperature of about 300 °C. Based on the results we propose the mechanism of sensitization to the circle of (CuO-Cu₂O) -ZnO-Ag of the n type which have the sensorial features to vapors of CH₂O.



Of the ZnO: Sn film samples, the ones most sensitive to CH₂O vapors are those subjected to operation at a temperature of 400 °C (Fig.1). For all the measured samples, the sensitization of the CH₂O vapors starts after 22-23 sec.

Fig.1 Response to H₂O and CH₂O vapors of nanostructured films from ZnO-Ag (2), obtained for the purpose of excluding sensitivity to water vapors.

Keywords: nanostructured semiconductors films, gas sensors, formaldehyde sensors

References

1. NACU, V. Grefe tisulare în optimizarea regenerării osoase posttraumatice dereglate. Studiu experimental şi clinic. Chişinău: USMF „N. Testemiţanu”, 1995.
2. NING, H., XIAOFENG, W., DANGWEN, Z., GENLI, S., HAIDI, L., YUNFA C. CdO activated Sn-doped ZnO for highly sensitive, selective and stable formaldehyde sensor. In: *Sensors and Actuators B*, 2011, 152, pp. 324-329.
3. NIGH, H., YAJUN T., XIAOFENG, H., YUNFA, C. Improving humidity selectivity formaldehyde gas sensing by a two-sensor array made of Ga-doped ZnO. In: *Sensors and Actuators B*, 2009, 138, pp.228-235.