

Highly sensitive and selective Acetone gas sensors based on Au - surface decorated CuO nanostructures

Nicolai ABABII¹, Victor SONTEA¹, Lee CHOW², Oleg LUPAN¹

¹Department of Microelectronics and Biomedical Engineering, Technical University of Moldova, 168 Stefan cel Mare Blvd., MD-2004 Chisinau, Republic of Moldova

² Department of Physics, University of Central Florida, Orlando, FL 32816-2385, USA

Copper oxide is a *p*-type semiconducting oxide, which in pure form as sensor can detect ethanol vapors [1]. The sensory properties and the selectivity of CuO based materials can be improved by doping with impurities [2]. Another way to improve detection properties is through thermal treatment and its regimes [3]. To raise the gas response and the selectivity tuning, surface functionalization with nanoparticles of noble metals also has been used [4,5].

Recently, our group has demonstrated that by virtue functionalization of CuO nanostructured films with Au nanoparticles, it is possible to detect acetone vapors with very low concentrations of down to 10 ppm with high selectivity when compared with other gases with a response of about 25% [6]. In this context, we can mention that the nanostructures of CuO semiconductor oxide synthesized via a simple synthesis from chemical solutions (SCS) approach [3], functionalized with Au nanoparticles demonstrate promising results as an acetone sensor structure.

This research was supported by STCU within project 6229.

[1] O. Lupan, V.Cretu, V. Postica, O. Polonskyi, N. Ababii, F. Schütt, V. Kaidas, F. Faupel, R. Adelung, Sens. Actuators B, 230 (2016) 832

[2] V. Cretu, V. Postica, N. Ababii, N. Magariu, V. Sontea, F. Schütt, R. Adelung, O. Lupan. IFMBE Proceedings 55 (2016) 349

[3] V. Postica, I. Hölken, V. Schneider, V. Kaidas, O. Polonskyi, V. Cretu, I. Tiginyanu, F. Faupel, R. Adelung, O. Lupan, Mater. Sci. Semic. Proc., 49 (2016) 20

[4] Y.S. Shim, L. Zhang, D. H. Kim, Y. H. Kim, Y. R. Choi, S. H. Nahm, C.Y. Kang, W. Lee, H. W. Jang. Sens. Actuators B, 198 (2014) 294

[5] Y. Feng, I. S. Cho, P. M. Rao, L.Cai, X. Zheng. Nano Lett., 13 (2013) 855

[6] N. Ababii, V. Postica, V. Cretu, E. Lazari, V. Sontea, O. Lupan. 3rd International Conference Health Technology Management, 1 (2016) 78.