NANOSENSORS BASED ON INDIVIDUAL HIBRID STRUCTURES AND THEIR APPLICATION IN GAS SENSING AT ROOM TEMPERATURE

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Extended Abstract

During the last decades, the progress of bottom-up technologies has emerged in fabrication of high-performance nanodevices based on individual nano- and microstructures [1-3]. A special attention has been paid for metal oxide structures due to their unique structural, chemical and electrical properties [4]. Due to high surface-to-volume ratio of individual nanostructures, the charge transport through the conduction channel is highly influenced by surface phenomena, such as adsorption/desorption of gaseous and biological species [3-5]. This makes them ideal candidates for chemical and biological sensors, even at room temperature [3,5]. Different individual metal oxide nanostructures such as ZnO and CuO were integrated into devices for application in gas sensing using bottom-up technology developed by Lupan *et al.*, which is based on focused ion beam/scanning electron microscopy (FIB/SEM) [3-5]. The further improvement in gas sensing performances of such devices, namely based on ZnO was performed by integration of three-dimensional individual hybrid structures such as Fe_2O_3/ZnO, $ZnAl_2O_4$/ZnO, carbon nanotubes (CNT)/ZnO and Buckminster fullerene (C_{60})/ZnO. Herein are summarized the gas sensing properties of the mentioned above individual hybrid structures, showing the possibility of rational change in selectivity from hydrogen gas to volatile organic compounds and ammonia by surface functionalization of ZnO structures using materials with excellent catalytic properties and carbon based nanomaterials with high room temperature selectivity to ammonia.

Keywords: *hybrid materials, nanosensors, gas sensor, ZnO, room temperature.*

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