Sensors for detecting different types of gases: VOCs and battery

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Abstract. In the given work is presented the fabrication of sensors based on AlO_x on columnar zinc oxide structures utilizing cost-effective methods for gas sensor development.

To obtain the sensors based on AlO_x on columnar zinc oxide structures, the chemical synthesis from solution (SCS) method was used to obtain the nanostructured columnar ZnO film and atomic layer deposition (ALD) was used to deposit different thicknesses of AlO_x.

In the same way, AlOx can be deposited over CuO nanostructured films [1].

Different types of heat treatments were used to improve the morphological, structural, chemical and sensory properties.

After studying the sensory properties, it was observed that the AlO_x/ZnO based structures are selective and stable over time to different types of gases. It was demonstrated that the use of 19 nm thickness of AlO_x on columnar zinc oxide was obtained a sensor for the detection of n-Butanol vapors. Thus, a sensor with a high response to n-Butanol reaching the value of ~ 300 % was obtained (Fig.1). The use of smaller thicknesses of AlO_x allowed to obtain stable sensors for the detection of 2-Propanol molecules [2].

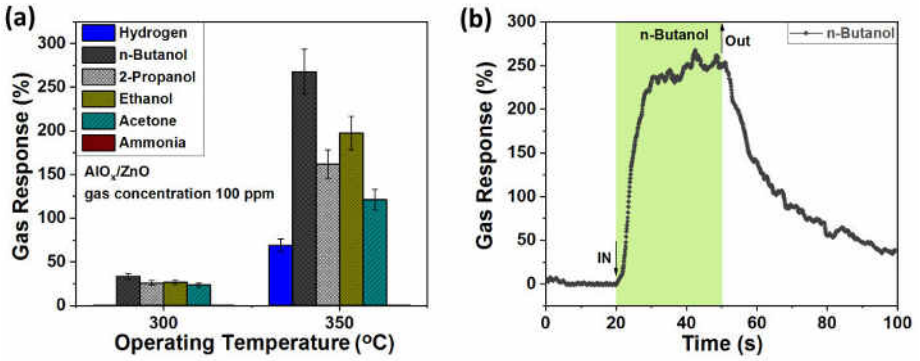

Fig.1. (a) The response of oxide structures to different gases. (b) The dynamic response to n-Butanol molecules.

At the same time, the AlO_x structures were also tested with the vapors that are part of the electric batteries. Thus, it was demonstrated that the use of the thickness of 10 nm allowed inding a sensor for $C_3H_6O_2$ sensing. It has been demonstrated that the given sensor can detect small concentrations of $C_3H_6O_2$ [3].

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