Investigation of gas sensing properties of copper oxide nanowires using near ambient pressure XPS

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It is known that morphology of sensitive layers seriously affects the sensitivity of a gas sensor. The nanostructured layers exhibit large surface-to-volume ratio with high concentration of active surface sites for chemisorption. Cupric oxide (CuO) has been reported to be a promising material for applications in heterogeneous catalysis and gas sensor applications [1, 2]. In this study, a simple gas sensor prepared by growing a layer of CuO nanowires on a special fused silica substrate using the thermal oxidation method was investigated *in-situ* in oxygen with ethanol atmosphere with different proportions at elevated temperatures by means of Near Ambient Pressure XPS (NAP-XPS). It was possible to follow the resistivity of the nanostructured films simultaneously with NAP-XPS measurements during the gases exposure. The unique combination of thin film resistivity measurement and photoelectron study under higher pressure of investigated gases brings a new insight in gas sensing mechanisms of ethanol with copper oxide nanowires. Scanning electron microscopy (SEM) was also used to characterize the prepared layers. This study throws light on catalytic processes taking place on the surface during catalytic oxidation of ethanol by copper oxide catalyst.

References:

[1] E. Comini et al., *Materials Today*, 2010, 13, 36.

[2] C. Wang et al., *RSC Advances*, 2017, 7, 9567