Humidity sensing properties of CuO structures

P. W. Santos[1], S. M. Zanetti[1,2], D. P. Volanti[1], E. Longo[1], J. A. Varela[1]

[1]*Universidade Estadual Paulista, Instituto de Química, Araraquara, SP, Brazil*
[2]*SENCER Ind. e Com. de Sensores Cerâmicos Ltda ME, São Carlos, SP, Brazil*
e-mail: zanetti@iq.unesp.br

Metal oxide semiconductor (MOS) based sensors have attracted significant attention due to its simplicity, low cost, small size and possibility of integration in electronic devices for application in different areas - industry, environment, health, biomedical, automotive, security, etc.[1-2] The research on growth of nanoscale materials such as nanoparticles, nanobelts, etc., has favored the development of sensors with high sensitivity and selectivity combined with low energy consumption.[3] In previous work, gas sensor measurements, performed simultaneously on multiple samples, show that morphology can have a substantial influence on gas sensor performance.[4] In this work, we have studied the influence of morphology (urchins-like, fibers-like and nanorods) in the humidity sensing response (resistance vs. relative humidity) of nanostructured copper (II) oxide materials. In addition, these materials were previously characterized by structural (X-ray diffraction) and morphological (field emission scanning electron microscopy) techniques. Humidity sensing tests were performed using interdigital substrates at room temperature. Such measurements showed that all morphologies respond as humidity sensor, however, sensitivity and response time are directly related to the kind of morphology.

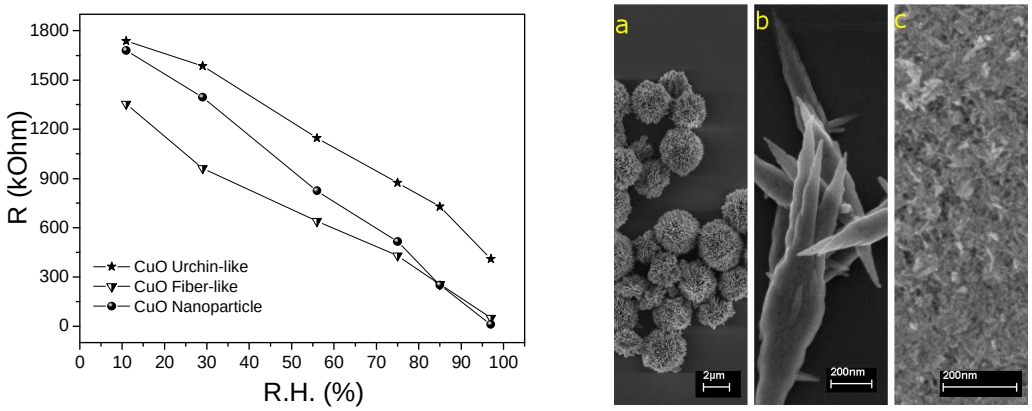

Figure 1: Film resistance as a function of the relative (left); FEG-SEM images of the CuO synthesized structures: (a) urchin-like, (b) fibers, (c) nanoparticles (right).

Acknowledgments: This work was supported by CNPq, CAPES and FAPESP.

References:

[1] Jimenez-Cadena, G.; Riu, J.; Rius, F. X., *Analyst* **2007**, *132*, 1083-1099. [2] Comini, E., *Anal. Chim. Acta* **2006**, *568*, 28-40. [3] Kim, I.-D.; Rothschild, A.; Tuller, H. L., *Acta Mater.* **2013**, *61*, 974-1000. [4] Volanti, D. P.; Felix, A. A.; Orlandi, M. O.; Whitfield, G.; Yang, D.-J.; Longo, E.; Tuller, H. L.; Varela, J. A., *Adv. Funct. Mater.* **2013**, *23*, 1759-1766.