

## Uniform Porous Multilayer-Junction Thin Film for Enhanced Gas-Sensing Performance

**Authors :** Ping-Ping Zhang, Hui-Zhang, Xu-Hui Sun

**Abstract :** Highly-uniform In<sub>2</sub>O<sub>3</sub>/CuO bilayer and multilayer porous thin films were successfully fabricated using self-assembled soft template and simple sputtering deposition technique. The sensor based on the In<sub>2</sub>O<sub>3</sub>/CuO bilayer porous thin film shows obviously improved sensing performance to ethanol at the lower working temperature, compared to single layer counterpart sensors. The response of In<sub>2</sub>O<sub>3</sub>/CuO bilayer sensors exhibits nearly 3 and 5 times higher than those of the single layer In<sub>2</sub>O<sub>3</sub> and CuO porous film sensors over the same ethanol concentration, respectively. The sensing mechanism based on p-n hetero-junction, which contributed to the enhanced sensing performance was also experimentally confirmed by a control experiment which the SiO<sub>2</sub> insulation layer was inserted between the In<sub>2</sub>O<sub>3</sub> and CuO layers to break the p-n junction. In addition, the sensing performance can be further enhanced by increasing the number of In<sub>2</sub>O<sub>3</sub>/CuO junction layers. The facile process can be easily extended to the fabrication of other semiconductor oxide gas sensors for practical sensing applications.

**Keywords :** gas sensor, multilayer porous thin films, In<sub>2</sub>O<sub>3</sub>/CuO, p-n junction

**Conference Title :** ICCS 2016 : International Conference on Chemical Sensors

**Conference Location :** San Francisco, United States

**Conference Dates :** June 09-10, 2016