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

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Abstract : Highly-uniform In2O3/CuO bilayer and multilayer porous thin films were successfully fabricated using selfassembled soft template and simple sputtering deposition technique. The sensor based on the In2O3/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 In2O3/CuO bilayer sensors exhibits nearly 3 and 5 times higher than those of the single layer In2O3 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 SiO2 insulation layer was inserted between the In2O3 and CuO layers to break the p-n junction. In addition, the sensing performance can be further enhanced by increasing the number of In2O3/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, In2O3/CuO, p-n junction

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