

Materials Science in Semiconductor Processing

The hierarchical nanostructured Co-doped WO₃/carbon and their improved acetone sensing performance

Saasa, Valentine R
Council for Scientific and Industrial Research
Pretoria, 0001, South Africa
Email: VSaasa@csir.co.za

Abstract

Hierarchical nanostructured Co-doped WO₃ with carbon as template has been successfully synthesised through facile sol-gel method. The synthesised Co-doped WO₃ was characterized by X-ray diffraction, Scanning electron microscopy, Transmission electron microscopy, Energy dispersive X-ray spectrometry, and Brunauer-Emmett-Teller and X-ray photoelectron spectroscopy. The gas sensing properties of WO₃ doped with Co from 0 to 0.8 wt % were also investigated on various VOCs. The fabricated sensor based on 0.6 wt% Co-doped WO₃ with carbon as a template showed good sensitivity, selectivity, fast response and recovery time towards 1.5 ppm of acetone at 50 °C under 90% relative humidity. The excellent gas sensing properties could be attributed to high surface area, small crystallite size, defect of WO₃ and Co catalysis effect which promotes gas adsorption and most importantly the stabilized monoclinic phase of WO₃, which accounts for the good selectivity.