

Nanocrystalline SnO₂-Pt thick film gas sensor for air pollution applications.

Abstract

A series of xSnO₂(1-x)Pt nanopowder (x = 1, 0.995, 0.99, 0.985, 0.98) was calcinated at 950 °C, mixed with an organic vehicle, printed on premade silver electrodes, and fired at 650 °C. Microstructural, morphological, and elemental properties of the mixed powders and films were determined by using XRD, TEM, SEM, and EDX. Samples were exposed to ethyl alcohol, xylene, methanol, isopropanol, acetone, isobutane, and truck exhaust fumes, at wide range of operating temperature, and sensitivity as well as response time of the samples were measured and compared with Taguchi Gas Sensors of TGS2602 (air contaminants), TGS3870 (CO), and TGS4160 (CO₂). It was discovered that crystallite sizes of SnO₂ powder and response times of samples are decreased with increasing Pt contents, whilst sensitivity is increased. Measurements are shown that 1 wt.% Pt loaded sensor, operating at 300 °C, can detect exhaust gas with high differentiating between the applied gases.

Keyword: Gas sensor; Thick film; Tin dioxide; Platinum; Exhaust fumes.