Abstract

Nanocrystalline n type ZnO thin films were deposited on SiO2-coated (0.4 µm) p-Si substrates (10-20Ω-cm, 400 µm) by a low cost chemical deposition technique to fabricate ZnO-based resistive sensors for methane detection. The nanocrystalline ZnO needle like structures were grown on RCA cleaned p-Si substrates by successive immersion (100-200 times) into a Sodium
Zincate bath (0.125M) kept at room temperature and DI water maintained at 90oC. The Sodium Zincate was prepared by reacting Zinc Sulphate and excess Sodium Hydroxide in aqueous solution. The film thickness of 0.5-1 µm (approx.) for 100 dippings was obtained. The dipping time is 1-2 seconds. Air annealing was done at a lower temperature of 150oC for 30 minutes. Structural characteristics were studied by FESEM and EDS to indicate the formation of ZnO. The hexagonal needle like structures of 0.3-0.5µm diameter and 0.5-1µm length were formed. The resistance of the ZnO films in ambient air (zero level for gas sensing) was found to be stable and reproducible after several thermal cyclings. Two types of planar contacts (Au and Pd-Ag) were deposited by vacuum evaporation technique and the device was then tested for its methane sensing property at different operating temperatures (150 to 350oC) and at 5 different methane concentrations (0.01,0.05,0.1,0.5,1%) taking N2 as a carrier gas. The response magnitude, response time and recovery time were studied in detail. Pd is a far better oxygen dissociation catalyst. A high sensitivity to methane even at low temperature (150oC) was observed with Pd-Ag (70%) contact comparable to those obtained by pure Au contact.

**Reference**


**Index Terms**
Effect of Catalytic contact on Methane Sensitivity using Chemically deposited Zinc Oxide thin Film

Key words

Chemical deposition
Nanocrystalline zinc oxide
Methane sensor
Pd-Ag (70%) contact
High sensitivity