

Studies on H₂S Gas Sensing Performance of Al₂O₃-Doped ZnO Thick Films at Ppb Level

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Abstract : The thick films of undoped and Al₂O₃ doped- ZnO were prepared by screen printing technique. AR grade (99.9 % pure) Zinc Oxide powder were mixed mechanochemically in acetone medium with Aluminium Chloride (AlCl₃) material in various weight percentages such as 0.5, 1, 3 and 5 wt % to obtain Al₂O₃ - ZnO composite. The prepared materials were sintered at 1000°C for 12h in air ambience and ball milled to ensure sufficiently fine particle size. The electrical, structural and morphological properties of the films were investigated. The X-ray diffraction analysis of pure and doped ZnO shows the polycrystalline nature. The surface morphology of the films was studied by SEM. The final composition of each film was determined by EDAX analysis. The gas response of undoped and Al₂O₃- doped ZnO films were studied for different gases such as CO, H₂, NH₃, and H₂S at operating temperature ranging from 50 °C to 450 °C. The pure film shows the response to H₂S gas (500ppm) at 300°C while the film doped with 3 wt.% Al₂O₃ gives the good response to H₂S gas(ppb) at 350°C. The selectivity, response and recovery time of the sensor were measured and presented.

Keywords : thick films, ZnO-Al₂O₃, H₂S gas, sensitivity, selectivity, response and recovery time

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