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Sensing Mechanism and Modeling of PbO Doped tin Oxide Thick Film for Detection of Toxic Gas †

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Abstract: The present work studied PbO doped tin oxide (SnO_2) based thick films using a screen printing technique. The pure SnO_2 thick film doped 1wt% PbO at firing temperatures of 800˚C and 900˚C. Undoped and PbO doped paste are printed on alumina substrate to be used as a sensor. The sensing properties such as sensitivity and selectivity of fabricated thick films were investigated at operating temperature 200˚C upon exposure LPG, acetone, and ethanol concentration in the range 0-5000 ppm. It observed that the maximum response of ethanol at operating temperature 200˚C (5000 ppm) for PbO-SnO_2 was 88% and 80% for firing temperatures 900˚C and 800˚C, respectively. The response of ethanol is ~3 times more sensitive to LPG and ~2 time-sensitive to acetone for PbO-SnO_2 (900˚C firing temperature). Therefore the fabricated PbO-SnO_2 sensor may use for selective detection of ethanol over LPG and acetone.

Keywords: PbO-SnO_2; ethanol; sensitivity; selectivity; sensor.

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Conflicts of Interest

The authors declare no conflict of interest.