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Synthesis, Characterization and Gas Sensing Properties of SnO_2-$x Fe_2O_3$(x = 0 to 1) Thin Films[1] G. SETZLER, C. SUDAKAR, M.B. SAHANA, Wayne State Univ, Detroit, MI 48201, P.P. VAISHNAVA, Kettering Univ., Flint, MI 48504, RON BAIRD, G.W. AUNER, G. LAWES, R. NAIK, Wayne State Univ, Detroit, MI 48201, V.M. NAIK, Univ. of Michigan-Dearborn, MI 48128 — Due to special properties and enhanced performance, nanocrystalline composites are being explored for use in potential applications in gas sensors, solar energy conversion and photocatalysis. We report the properties of SnO_2 – $x Fe_2O_3$ (x = 0 to 1) nanocrystalline composite thin films grown by the spin-on metal-organic decomposition method using Fe and Sn ethyl hexanoate on sapphire substrates. The films, on annealing at 600^{o}C, are comprised of SnO_2 and Fe_2O_3 nanoparticles, as evidenced by X.ray diffraction and Raman spectra. Ultraviolet-visible spectra indicate a decreasing band gap of this composite from ∼3.9 to 2.25eV with increasing Fe_2O_3 concentration. These samples were also tested for response to CO gas in a nitrogen environment. Parameters such as annealing temperature, operating temperature and CO concentration were varied, showing an increase in sensitivity with operating temperature, and a decreasing sensitivity with increasing Fe_2O_3concentration.

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