



SYNTHESIS OF SrTiO₃ NANOPOWDER BY SOL-GEL-HYDROTHERMAL METHOD FOR GAS SENSING APPLICATION

D. D. Kajale¹, G. E. Patil¹, V. B. Gaikwad², S. D. Shinde², D. N. Chavan³, N. K. Pawar⁴, S. R. Shirsath¹ G. H. Jain^{1*}

¹Materials Research Lab., Arts, Commerce and Science College, Nandgaon 423 106, India.

²Materials Research Lab., K.T.H.M. College, Nashik 422 005, India.

³Department of Chemistry, Arts, Commerce and Science College, Lasalgaon 422 306, India.

⁴Department of Physics, Arts, Commerce and Science College, Satana 423 105, India.

Emails: gotanjain@rediffmail.com

Submitted: Apr. 1, 2012

Accepted: May 10, 2012

Published: June 1, 2012

Abstract- Strontium titanate (SrTiO₃) nanopowder has been synthesized through a sol-gel-hydrothermal method. The X-ray diffraction studies of SrTiO₃ nanopowder have shown that the as-prepared powder was single phase, crystalline, and has a cubic perovskite structure (ABO₃) with a lattice constant $a = 3.903 \text{ \AA}$. The particle size calculated from FWHM was $\sim 22 \text{ nm}$. SrTiO₃ nanopowder was examined using thermo gravimetric analysis; differential thermal analysis and UV-visible absorption spectroscopy. The transmission electron microscopic investigations have shown that the particle size of the as-prepared powder has a mean size of 34 nm. Then highly sensitive and selective sensors to H₂S based on glass substrate were fabricated successfully by screen-printing technique. Sensitivity, selectivity, response time, and recovery time of the sensors were systematically investigated as a function of operating temperature, using H₂S, CO, CO₂, H₂,

Cl₂, LPG, C₂H₅OH, O₂, NH₃ and NO₂ as test gases. The sensitivity was found to lie below and around the ppm level for H₂S gas at 150°C.

Index terms: SrTiO₃, sol-gel-hydrothermal, nanocrystalline, thick film, gas response, H₂S gas sensor.