

Abstract

Pd-F:SnO₂ thin films have been prepared by spray pyrolysis technique using an alcoholic precursor solution consisting of stannic chloride (SnCl₄·5H₂O), ammonium fluoride (NH₄F) and palladium chloride (PdCl₂). Optimization on the deposition parameters has been done in order to obtain high quality thin films. The effect of varying the fluorine content on the optical properties of Pd-F:SnO₂ thin films were studied. Data for transmittance and reflectance in the wavelength range from 300nm – 2500nm was measured using the solid spec 3700DUV spectrophotometer. The calculated optical band gap of the as prepared thin films has been found to range from 3.8eV to 4.11eV. Fluorine incorporation for Pd-F:SnO₂ has been found to have a narrowing effect on the band gap, but at its higher concentration the band gap has been seen to increase. The band gap narrowing is due to the incorporation of F⁻ ions in the crystal lattice therefore giving rise to donor levels in the SnO₂ band gap which is an essential characteristic for the gas sensor applications. Both annealing and passivation have been found to have very insignificant change in optical band gap of Pd-F:SnO₂.