World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:10, No:6, 2016

# Preparation and Characterization of Transparent and Conductive SnO2 Thin Films by Spray Pyrolysis

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**Abstract :** Thin films of undoped and As-doped tin oxide (As:SnO2) were obtained on silicon and glass substrates at 450°-480°C by spray pyrolysis technique. Tin chloride (SnCl4.5H2O) and As oxide (3As2O5.5H2O) were used as a source for Sn and As respectively. The As2O5 concentration was varied from 0 to 10 mol% in the starting water-alcoholic solution. The characterization of the films was provided with XRD, CEM, AFM and UV-VIS spectroscopy. The influence of the synthesis parameters (the temperature of the substrate, solution concentration, gas and solution flow rates, deposition time, nozzle-to substrate distance) on the optical, electrical and structural properties of the films was investigated. The substrate temperature influences on the surface topography, structure and resistivity of the films. Films grown at low temperatures (<300°C) are amorphous whereas this deposited at higher temperatures have certain degree of polycrystallinity. Thin oxide films deposited at 450°C are generally polycrystalline with tetragonal rutile structure. The resistivity decreases with dopant concentration. The minimum resistivity was achieved at dopant concentration about 2.5 mol% As2O5 in the solution. The transmittance greater than 80% and resistivity smaller than 7.5.10-4Ω.cm were achieved in the films deposited at 480°C. The As doped films (SnO2: As) deposited on silicon substrates was used for preparation of a large area position sensitive photodetector (PSD), acting on the base of a lateral photovoltaic effect. The position characteristic of PSD is symmetric to the zero and linear in the 80% of the active area. The SnO2 films are extremely stable under typical environmental conditions and extremely resistant to chemical etching.

**Keywords :** metal oxide film, SnO2 film, position sensitive photodetectors (PSD), lateral photovoltaic effect
**Conference Title :** ICTFTA 2016 : International Conference on Thin Film Technology and Applications
**Conference Location :** Copenhagen, Denmark
**Conference Dates :** June 27-28, 2016