

Synthesis and Characterization of SnO₂: Ti Thin Films Spray-Deposited on Optical Glass

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Abstract : In this study, we have newly developed titanium-tin oxide (TiSnO) thin films as the transparent conducting oxides materials by the spray pyrolysis technique. Tin oxide thin films doped with different Ti content were successfully grown by spray pyrolysis and they were characterized as a function of Ti content. The effect of Ti contents on the crystalline structure and optical properties of the as-deposited SnO₂:Ti films was systematically investigated by X-ray diffraction (XRD), scanning electronic microscopy (SEM), atomic force microscopy (AFM), UV-vis spectrometer and photoluminescence spectrophotometer. The X-ray diffraction patterns taken at room temperature showed that the films are polycrystalline. The preferred directions of crystal growth appeared in the diffractogram of SnO₂: Ti (TiTO) films were correspond to the reflections from the (110), (200), (211) and (301) planes. The grain size varies from 21.8 to 27.8 nm for (110) preferred plane. SEM and AFM study reveals the surface of TiTO to be made of nanocrystalline particles. The highest visible transmittance (570 nm) of the deposited films is 80 % for 20 wt % titanium doped tin oxide films. The obtained results revealed that the structures and optical properties of the films were greatly affected by doping levels. These films are useful as conducting layers in electro chromic and photovoltaic devices.

Keywords : transparent conducting oxide, gas sensors, SnO₂, Ti, optoelectronic, spray pyrolysis

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