

Oral Presentation

The Optical Band and Optical Constants of Non-Crystalline WO₃ Thin Films Doped with Ti Deposited by Dip Coating in Sol-Gel

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Abstract

The optical constants and optical band gaps of the non-crystalline tungsten oxide (WO₃) thin films doped with Ti deposited by dip coating method onto glass substrates with different atomic concentrations of Ti have been investigated by optical characterization method. The amorphous crystal structure of the films when heated to 160 °C was revealed by XRD. The optical data of WO₃ thin film have revealed a direct allowed transition band gap of 3.1 eV, which increases slightly up to 3.6 eV by increasing Ti concentration due to the traces of TiO₂ phase that may be introduced within the amorphous structure. The effect of Ti concentration on the film thickness and optical constants (refractive index, absorption coefficient and dielectric constants) of these films has also been investigated. The thickness of films increases with doping concentration increase from 0.373 to 0.757 μm, but above 20% Ti it begins to decrease due to the liquid vapor surface tension and density increase, as expected. The room temperature refractive index, which was calculated from the reflectance and transmittance data, allowed the identification of the dispersion and oscillator energies, static dielectric constant and static refractive index of these films.