

Synthesis and Characterization of TiO₂ thin films prepared by non-aqueous sol–gel method

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Abstract : TiO₂ thin films for gas sensing applications are prepared by non-aqueous sol–gel method on glass substrates. The structural evolution of TiO₂ films with thickness is investigated by X-ray diffraction and Raman Spectroscopy. Prepared films are in anatase phase. The grain size calculated from XRD patterns increases with thickness from 14 to 22 nm. Uv–vis transmission spectra show that the absorption edge shifts to longer wavelength as the thickness increases, which is correlated with the change in the optical band gap value. The determination of the refractive index and thickness of TiO₂ thin films by m-lines spectroscopy is presented. Refractive index is found to vary slightly with thickness. Calculation of the film density confirms the behavior of refractive index. The films exhibit one guided TE₀ and TM₀ polarized modes.

Keywords : Sol–gel, TiO₂, anatase, Refractive index, Optical band gap, m-lines.