Study of Substrate Temperatures effects on Optical TiO2 Nano-films Properties deposited by RF Magnetron Sputtering for Gas Sensor application

Khouloud BEDOUD, R. Graine, H. MERABET, I. Rahmani, D. ZELMATI, N. Sehab, L. Alimi.

Abstract : Titanium dioxide (TiO2) is a non-toxic material and chemically stable. It hase a high optical transmittance, electrical conductivity and high refractive index. It is widely used in many fields such as photo catalysis, electro catalysis. It can be used serves as self-cleaning coatings. Similarly, TiO2 can be used as bio-sensor coatings, biomedical materials, antibacterial applications. Furthermore, it can be used in water purification, solar cells and gas sensors. This work deals with deposition of TiO2 onto heated glass substrates in a temperature range of 200 to 450 ° C via radio frequency (RF) reactive magnetron sputtering. We used a metal target of pure Ti of 3" diameter and 0.250" thickness with a purity of 99.99%. Optical properties of TiO2 are substrate temperature dependent. Those are investigated in the UV–Visible range of the specter. Transmission characterization confirmed the transparent character of the films. The highest transparency was achieved for deposition temperature of 300 °C. The yielded gaps varied in the range 3.75–3.92 eV.

Keywords : Thin films, sputtering, semiconductor, TiO2films, gas sensors, carbon dioxide, Optical properties.