

Study of Optical and Morphological TiO₂ Nano-Films Properties Deposited by Magnetron Sputtering on Glass Substrate

K. Bedoud, H. MERABET, L. Alimi

Abstract: In this paper, TiO₂ nano-films were deposited by RF magnetron sputtering using a TiO₂ ceramic target of pure Ti of 3" diameter and 0.250" thickness with a purity of 99.99%, onto heated glass substrates in a temperature range of 200 to 450°C. This study determines the temperature effect on the structural, optical and morphological properties of TiO₂ nano-films. For this, we used X-ray diffraction for structural characterization and optical transmission spectroscopy UV-Visible for optical characterization and atomic force microscopy (AFM) for morphological characterization of the films produced. The (101), (400), (112), (200), (105), (211), (213), (204) peaks of the anatase structure and the (210), (102), (-112) (710) peaks of the monoclinic structure are observed. In addition, the peaks are sharp and intense which implies a good crystalline structure. Otherwise, the films optical gap variation is proportional to the temperature variation from 3.9 eV to 3.92 eV for T=200°C and T=450°C, respectively. The surface roughness of TiO₂ nano-films range from 1.031 nm to 4.665 nm.

Keywords : Thin films, sputtering, semiconductor, TiO₂ nano-films, gas sensors, nano-films, RF magnetron sputtering, DRX, UV-Vis, AFM.