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

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Abstract: In this paper, TiO2 nano-films were deposited by RF magnetron sputtering using a TiO2ceramic target of pureTi of 3" diameter and 0.250" thickness with a purity of 99.99%, onto heated glass substrates in a temperature range of200 to 450°C. This study determines the temperature effect on the structural, optical and morphological properties ofTiO2 nano-films. For this, we used X-ray diffraction for structural characterization and optical transmission spectroscopyUV-Visible for optical characterization and atomic force microscopy (AFM) for morphological characterization of thefilms 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 whichimplies a good crystalline structure. Otherwise, the films optical gap variation is proportional to the temperature variationfrom 3,9eV to 3,92 eV for T=200°C and T=450°C, respectively. The surface roughness of TiO2 nano-films range from1,031nm to 4,665nm.

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