

# Effects of Cd doping on structural and optical properties of TiO<sub>2</sub> thin films prepared by sol-gel dip coating method

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## **Abstract**

Undoped TiO<sub>2</sub>, 3 and 5 at.% Cd-TiO<sub>2</sub> thin films are prepared on glass substrate by sol-gel dip-coating technique. The structural, morphological and optical properties of the films have been investigated by X-ray diffraction (XRD), Raman spectroscopy, Atomic force microscopy (AFM) and UV-Vis spectroscopy. XRD and Raman analyzes show that the crystalline phase of TiO<sub>2</sub> and the Cd-TiO<sub>2</sub> thin films comprised only the anatase phases, no additional peak corresponding to cadmium or any other phase was observed. Atomic force microscopy images show compact and granular morphology of grains. The crystallite sizes and surface roughness of TiO<sub>2</sub> films increase with Cd doping. The obtained films are transparent in the visible range. Due to the doping of Cd the value of transmittance increases from 80 % to 86 %. The refractive index, thickness and optical band gap values of the films were calculated from the measured transmittance spectra. As Cd concentration increased the optical band gap was also found to be decrease from 3.53 to 3.44 eV.

**Keywords:** Thin films; Cd:TiO<sub>2</sub>; Sol-gel; Optical properties; Structural properties.