

TiO₂ doped with nickel thin films Properties

Heider Dehdouh^{a,b,*}, Mohamed Cherif Benachour^{a,b}, Rabah Bensaha^b, Mourad Zergoug^a

^a Research Center in Industrial Technologies CRTI, P.O.Box 64, Cheraga 16014, Algiers / Thin Films development and Applications Unit (UDCMA), Sétif- Algeria.

^b Ceramics laboratory, Frères mentouri-Constantine-1 University, Road Ain El-Bey (25000) Constantine, Algeria

*Corresponding author. Email: h.dehdouh@crti.dz

Abstract

Thin films of un-doped and Ni-doped TiO₂ were synthesized by the sol-gel dip-coating technique and deposited on glass substrates, for different annealing temperatures (from 400 °C to 500 °C). The X-rays diffraction and Raman show the formation of anatase phase, we also notice that doping with Ni influence the intensity of anatase peaks and decreases of grain sizes (from 24.3 to 15.23 nm). The nanostructure Ni-doped TiO₂ thin films was observed AFM, which shows that the elaborated films are smooth and dense with Rms values of about 3 nm. The calculate values of refractive index of thin films increases from 2.22 to 2.38, and reduction in transmittance and band gap with the increase in the nickel concentration. Vibrating sample magnetometer results of un-doped TiO₂ thin films reveal a ferromagnetic behavior at room temperature with $M_s = 0.67 \cdot 10^{-4}$ emu and low content of nickel doping leads to an enhancement of the saturated magnetic moment $M_s = 1.11 \cdot 10^{-3}$ emu.