Optical and Magnetic Properties of Ferromagnetic Co-Ni Co-Doped TiO2 Thin Films

Authors : Rabah Bensaha, Badreddine Toubal

Abstract : We investigate the structural, optical and magnetic properties of TiO2, Co-doped TiO2, Ni-doped TiO2 and Co-Ni codoped TiO2 thin films prepared by the sol-gel dip coating method. Fully anatase phase was obtained by adding metal ions without any detectable impurity phase or oxide formed. AFM and SEM micrographs clearly confirm that the addition of Co-Ni affects the shape of anatase nanoparticles. The crystallite sizes and surface roughness of TiO2 films increase with Co-doping, Ni-doping and Co-Ni co-doping, respectively. The refractive index, thickness and optical band gap values of the films were obtained by means of optical transmittance spectra measurements. The band gap of TiO2 sample was decreased by Co-doping, Ni-doping and Co-Ni co-doping TiO2 films. Both undoped and Co-Ni co-doped films were found to be ferromagnetic at room temperature may due to the presence of oxygen vacancy defect and the probable formation of metal clusters Co-Ni.

Keywords : Co-Ni co-doped, anatase TiO2, ferromagnetic, sol-gel method, thin films

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