

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

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Abstract : We investigate the structural, optical and magnetic properties of TiO₂, Co-doped TiO₂, Ni-doped TiO₂ and Co-Ni co-doped 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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