

Studies on the influence of chromium doping on optical, electrical and magnetic properties of hematite thin films

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Hematite has attracted scientist's attention due to its stability, oxidation, and corrosion resistance. It was established that substitutional doping improves the electronic properties of hematite making it suitable for solar photoelectrochemical (PEC) applications. Based on the literature results on chromium doped hematite thin films and nanoparticles we deposited Cr-doped hematite nanostructured thin films, with chemical formula $\text{Cr}_x\text{Fe}_{2-x}\text{O}_3$, $x=0.00 - 0.08$, on glass substrates, by using a spin coating method.

The influence of chromium on the structure and morphology of thin films was investigated by means of grazing incidence X-ray diffraction, X-ray photoelectron spectroscopy and scanning electron microscopy. To analyse the influence of chromium on optical, electrical and magnetic properties, transmittance, electrical, and magnetic measurements were performed at room temperature and in function of temperature. The changes in bandgap energy, electrical conduction mechanism and hysteresis loops are correlated to the changes in energy and structure of hematite with incorporation of chromium.