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# Study of structural and optical properties of $TiO_2$:Tb thin films prepared by high energy reactive magnetron sputtering method

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Keywords

$TiO_2$, magnetron sputtering, Tb, structural properties, optical properties

Abstract

This work is focused on structural and optical properties of $TiO_2$ thin films doped with different amount of terbium. The thin films have been prepared by high energy reactive magnetron sputtering (HE RMS) and by low pressure hot target reactive magnetron sputtering (LP HTRS) processes. Thin films were deposited from mosaic, metallic Ti-Tb target sputtered under oxygen plasma (without argon) at a pressure below $10^{-1}$ Pa. Structural examinations show nanocrystalline nature of prepared thin films with either anatase or rutile phases depending on concentration of Tb 0.4 at.% and 2.6 at.%, respectively. The phase transformation from the anatase to the rutile has not been observed after additional post-deposition annealing even at the temperature up to 1000 K. Based on investigations performed with the help of atomic force microscope high nanocrystalline, close-packed structure has been found. Studies of refraction index revealed higher value for the thin films prepared by the HE RMS than by the LP HTRS methods.