

Effect of annealing temperature on the structural, morphological and optical properties of ThO₂ thin films grown by photochemical metal-organic deposition

Arancibia, R.

Huentupil, Y.

Buono-Core, G. E.

Fuentealba, M.

Chornik, B.

Mendoza-Galván, A.

Cabello-Guzmán, G.

© 2019 In this work, we report the influence of annealing temperature on the structural, morphological and optical properties of ThO₂ thin films deposited on fused quartz and (100) silicon substrates by photochemical metal-organic deposition (PMOD) using hinokitolate thorium (IV) complex as the precursor. X-ray photoelectron spectroscopy (XPS) confirmed the deposition of the ThO₂ films. The effect of thermal annealing (from 300 °C to 1100 °C) on the structural properties of the ThO₂ films was evaluated with X-ray diffraction (XRD), UV-Vis transmittance spectroscopy, spectroscopic ellipsometry and atomic force microscopy (AFM). XRD patterns of the films annealed above 300 °C revealed that all diffraction peaks belong to a cubic ThO₂ structure without preferential orientation. The average crystallite size increased from 2.3 nm to 3.7 nm as the annealing temperature increased from 300 °C to 750 °C. Annealing at 1100 °C promoted the formation of huttonite (β -ThSiO₄) in the ThO₂ layer. Film