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EFFECT OF ANNEALING TEMPERATURE ON CERIUM OXIDE THIN FILMS GROWN BY DC SPUTTERING METHOD

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ABSTRACT- The cerium thin films were deposited on n-type Si (100) substrate by direct current (DC) sputtering followed by post-annealing at different temperature (400°C and 600°C, 800°C, 1000°C) in an oxygen ambient. In this study, the effect of annealing temperature on the crystallized CeO₂ thin films was characterized by using grazing incidence X-ray diffraction (GIXRD). The surface topology and surface morphology of the CeO₂ were analyzed by using atomic force microscopy (AFM) and field emission scanning electron microscope (FESEM). The energy bandgap was calculated from the ultraviolet-visible spectroscopy (UV-Vis) measurement. GIXRD result shows (111) plane has the highest peak intensity, therefore (111) plane was selected as the preferred orientation for CeO₂ thin films. AFM results reveal the root-mean-square (RMS) roughness of the CeO₂ thin films decreased as annealing temperature increased from 400°C to 1000°C.

Keywords: CeO₂ thin film, DC sputtering, Temperature, Oxygen, Grazing incidence X-ray diffraction.