STRUCTURAL AND OPTICAL PROPERTIES OF IRIDIUM FILMS ANNEALED IN AIR

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ABSTRACT

Present paper describes the changes in the structural and optical properties of the sputter deposited iridium films annealed in air at 673K-1073K and cooled in the furnace. Glancing Angle X-ray Diffraction (GAXRD) and X-ray Reflectivity (XRR) measurements were used for the structural investigations of the films. GAXRD and X-ray reflectivity measurements shows the growth of ~4nm IrO_2 over-layer by annealing at 873K. Increased annealing temperatures lead to the formation of oxidation of the iridium under-layer, with the film comprising of iridium-oxide (major) and iridium (minor) phases. Increased surface roughness associated with the films annealed at 873K and 1073K is attributed to the growth of crystalline IrO_2 layer. X-ray Photoelectron Spectroscopy was performed on the annealed films for the chemical analysis. The surface layer was etched, using Ar+ ions, in vacuum to carry out the XPS measurements as a function of thickness. Variable angle spectroscopic ellipsometry was carried in the wavelength range 250-1000nm. Measurements were modeled for the estimation of optical constants as a function of wavelength. Results are analyzed in terms of the effect of annealing in air on the structural and optical properties of the films.