

Effect of the flow rate of nitrogen sputter gas on the properties of thin zirconium oxynitride films

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Zirconium oxynitride films were obtained by r.f. reactive magnetron sputtering of a zirconium target with nitrogen flow rate ranging from 0 to 60 sccm. The phases present in the films were determined by X-ray diffraction (XRD). Measurements of the oxidation state $ZrON_x$ films were investigated by X-ray photoelectron spectroscopy (XPS) and Auger electron spectroscopy (AES). Thickness of these samples was estimated by spectroscopic ellipsometry (SE) and scanning electron microscopy (SEM). We found that the surface morphology of $ZrON_x$ films measured by atomic force microscopy (AFM) was also depended on the nitrogen gas flow.