Surface morphology of sputtered Bi thin films on glass substrates from *in-situ* heating X-ray reflectivity

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Abstract

Bismuth thin films have been deposited on glass substrate using RF magnetron sputter deposition under vacuum condition of 10^{-6} torr with different deposition time. The films were examined using atomic force microscope(AFM), X-ray diffraction (XRD) and X-ray reflectivity(XRR). XRR method was used to measure the surface roughness of a thin film during growth, We found that the thin film surface roughness increased as the film growth thicker. A growth exponent approximately $\beta = 0.5$ was obtained which correspond to random deposition model.Moreover, *In-situ* heating XRR was conducted in vacuum at 250 ^{0}C to reveal that transformation of surface morphology. Due to evaporation will reduce the surface thickness and we can unfold that also the roughness and density change.With evaporation time different ,the surface morphology will distinctive.

Keywords: bismuth thin films, magnetron sputtering, X-ray reflectivity, surface roughness.