

Deposition and structural characterization of Ag films

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The Ag films with ~500nm thickness were deposited on Cr-and Ti-coated Si substrates and Al₂O₃ substrates in a high vacuum electron beam evaporation chamber interfaced with a thin film deposition controller. The structural and surface morphology of Ag films were characterized by X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), high resolution scanning electron microscopy (HRSEM). Various XRD measurement techniques, including 3D pole figure, glazing incident scattering, out-of-pane and in-plane scattering were used to characterize the film structural properties in details. It was revealed that all Ag films possess a FCC structure with a refined lattice parameter $a=4.0934\pm 0.0002$ Å. Detailed texture information was obtained from 3D pole figure analysis that indicated all Ag films have a similar strong fiber textured (111) orientation along surface normal. The presence of pure metallic Ag was confirmed by XPS analysis and X-ray energy dispersive spectroscopy (EDS).