Structural characterization of Ir/Au/Cr multilayer films

Qiyin Lin

Irvine Materials Research Institute
University of California, Irvine, Irvine, CA, 92697, USA
qiyinl@uci.edu

A series of Ir/Au/Cr multilayer thin films with thicknesses ranging from 30nm-90nm were deposited on Si substrates in a vacuum chamber interfaced with a thin film deposition controller. The structural and surface morphology of multilayers were characterized by X-ray diffraction (XRD), high resolution scanning electron microscopy (HRSEM) and Atomic Force Microscope (AFM). 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 Ir layers in the films possess a FCC structure with a refined lattice parameter a=3.854±0.008Å and Au layers possess a FCC structure with a refined lattice parameter a=4.053±0.006Å. Texture information was obtained from 3D pole figure analysis that indicated both Ir and Au layers in the films have a preferred (111) orientation along surface normal. The presence of pure metallic Ir and Au was confirmed with X-ray energy dispersive spectroscopy (EDS).