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Induced Stress studies of RF Magnetron Sputtered FeCr thin films by surface Brillouin scattering and GIXRD

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Abstract content
   (Max 300 words)

Thin hard films of FeCr are widely used as protective coatings on steel due to their chemical inertness, low wear and tear and high hardness under extreme environments. In this work FeCr thin films on etched (100) Si substrates have been grown by RF sputtering at 0 and - 60V bias to observe stress evolution using a combination of glancing x-ray diffraction and surface Brillouin scattering. RF powers between 100W - 200W in steps of 50W and Ar2 working gas pressure of 1.0 x10-3mbar were used for film synthesis. X-ray Reflectometry has been used to extract the deposition rate, the film thickness and density requisite parameters for simulation of velocity dispersion curves. Surface Brillouin studies on the - 60V biased and pristine samples have shown higher order resonance modes thus indicating a high film quality. The low surface roughness has been determined by X-ray Reflectometry to be less than 0.2nm for all the films. The dispersion curves have shown an increase in sound velocity corresponding to an increase in elastic constants upon biasing. We correlate the elastic constants with stress values measured by glancing angle X-ray diffraction to establish the nature of the stress evolution upon Ar+ bombardment and incorporation.

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