Influence of a Non-Magnetic Underlayer on the Magnetic Anisotropy of Ultra-Thin Co and Fe Films

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We have used in situ polar Kerr effect measurements (pMOKE) and Auger electron spectroscopy (AES) to study the growth and magnetic anisotropy of MBE-grown layered structures containing ultra-thin Co and Fe films grown on non-magnetic underlayers. The structures investigated included Si(111)/Cu/Au(x)/Co/Au, Si(100)/Cu/Au(x)/Co/Au, Si(100)/Cu/Pd/Au(x)/Co/Au, and Si(100)/Cu/Pd/Ag(x)/Fe. These structures were deposited using a stepped-wedge technique which provided multiple underlayer thicknesses on one sample. For the case of Si(111)/Cu/Au(x)/Co/Au, we find a sharp minimum in the perpendicular anisotropy at ~1 atomic layer thickness for the Au underlayer. In great contrast, for the cases of Si(100)/Cu/Au(x)/Co/Au and Si(100)/Cu/Pd/Au(x)/Co/Au we find the Co to be magnetically dead for Au underlayer thicknesses greater than zero. Further investigation is required to interpret the results for the structures containing Fe.

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