9.7 cm

OPTICAL AND MAGNETO-OPTICAL STUDIES OF Co/Cr MULTILAYERS

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The optical and magneto-optical (MO) properties of the Co/Cr multilayers (MLS) have been studied experimentally by spectroscopic ellipsometry and magneto-optical Kerr effect over the spectral range 0.8-5.8 eV and compared with the results of *ab initio* calculations performed with the use of LMTO method. From the hysteresis loops measured in both the polar and longitudinal Kerr geometry it was inferred that for all the Co/Cr MLS, prepared with constant Co sublayer thickness equal to 2 nm and the Cr thickness changing in the range of 0.4-3 nm, the magnetization lies in the sample plane. The MLS structures studied were modeled using supercell approach including both the perfect and diffused Co/Cr interface region. The influence of the Cr-sublayer thickness and the interface spatial extent on the optical and MO response of the MLS was investigated. Considerable reduction of the Co magnetic moment due to the substitutional disorder at the interfaces was found and strong sensitivity of the magnetic structure spatial profiles on the interface thickness and composition has been observed. It was found that the interface imperfectness is a main factor that affects both the shape and amplitude of the MO spectra. Excellent agreement between the theoretical and experimental optical and MO spectra has been obtained.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

Presentation mode :
poster

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