MOKE, AFM and RHEED study of cobalt ultrathin films covered with different metals

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It is well known that surface magnetic anisotropy of ultrathin Co films in sandwich structures is influenced by interface morphology due to: roughness, surface strains, and electronic states hybridization. Numerous underlayers influence substantially magnetic properties (Mo, W, V, Au, Ag, Pt) whereas others as Pb, do not disturb the magnetic anisotropy [1]. Correlation between interface morphology and magnetic anisotropy was observed in Co/Cu(001) [2]. And in one of more recent work in this field it was shown that the crystallographic structure, growth mode, and morphology of Co films grown on Pd/Cu(001) and on Pd(001) are mainly due to actual interface strain [3].

The main purpose of the current work is to define the correlations between magnetic domain structure in ultrathin Co films and the surface morphology of Mo (V) overlayers. The samples grown by molecular beam epitaxy technique on sapphire (11–20) single-crystal substrate had the following sequence: (i) Mo (20nm); (ii) Au (20 nm); (iii) flat or wedged Co film; (iv) flat or wedged X layer (where X= V or Mo) with the X-wedge gradient perpendicular to the Co one; (v) Au coverage. The crystalline structure and purity of constituent layers were monitored in-situ by RHEED and Auger spectroscopy, respectively. Sample surfaces with and without Au coverage were studied *ex-situ* by AFM . Magnetic properties of ultrathin cobalt films were measured by MOKE. The domain structures were investigated by both MFM and an optical polarizing microscope using the immersion technique in order to increase the spatial resolution. It was found that magnetic properties of Co layer are much stronger affected by V than Mo. Mo coverage induces easy in-plane magnetic anisotropy axis.

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[1] J. Camarero, J. J. de Miguel, and R. Miranda, Phys Rev B, V **64** (2001)125406.
[2] Moroni, D. Sekiba, F. Buatier de Mongeot, G. Gonella, C. Boragno, L. Mattera, and U.Valbusa, Phys. Rev. Lett. **91**, (2003) 167207.
[3] Y.F. Lu, M. Przybylski, M. Nevlt, A. Winkelmann, L. Yan, Y. Shi, J. Barthel, and J. Kirschner, Phys Rev B **73** (2006) 035429.

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