

Magnetic properties and local structural investigation of MgO/Co/MgO trilayer in presence of oxygen migrated interface

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We investigate the MgO/Co/MgO trilayer structure interface mixing mechanism for different thickness of Co upon annealing at 500 °C for 1 hour. To resolve magnetic and structural properties after annealing, we used Magneto-optical Kerr effect (MOKE) microscope and near edge X-ray absorption spectra (XANES), X-ray absorption fine structure (XAFS) spectroscopy techniques. Upon annealing it has been observed an increase in coercivity and reduction in two-fold uniaxial magnetic anisotropy (UMA) for all the Co layer thickness using MOKE measurement. The MOKE images shows distortion of domain walls along easy axis and labyrinth domains along hard axis upon annealing. The O K-edge XANES spectra shows drastic change in hybridization of Co 3d orbitals with neighbouring O 2p orbitals upon annealing whereas Co L3 and K-edges XANES and XAFS revealed increase in CoO formation upon annealing. A model of diffused interface has been drawn to describe the interaction of Co layer with MgO layer at MgO/Co/MgO trilayer structure after an annealing at 500 °C for 1 hour, which may help to design high-performance spintronic devices.