XAS and XMCD studies of Ga^+ irradiation induced changes of Pt/Co/Pt nanostructure magnetic properties

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9.7 cm

In the our recent paper [J. Jaworowicz et al., APL95 (2009)] we have demonstrated an elegant route to tune the magnetic anisotropy of ultrathin sputter deposited Pt/Co(d=2.6 nm)/Pt films by uniform Ga^+ ions irradiation at 30 keV. We have observed that with increasing irradiation dose the magnetization rotates from the in-plane into out-of-plane orientation and for a higher dose back into the plane. For the purpose of the present work we prepared Al_20_3/Mo/Pt/Co(d=3.3 nm)/Pt samples by molecular beam epitaxy with initial in-plane magnetization. These samples were homogeneously irradiated with Ga^+ ions with an ions dose ranging between $1*10^{14}$ and $1*10^{16}$ ions/cm^2. The irradiated samples were studied using classical magnetooptical Kerr effect, as well as Co K-edge X-ray absorption (XAS) and X-ray Magnetic Circular Dichroism (XMCD) spectroscopy techniques. From the XMCD spectra analysis [Y.S. Lee et al., PRB68 (2008); J. Bartolom et al, PRB77 (2008)] one can deduce the existence of an ordered $L1_0$ CoPt phase for the sample, where Ga^+ irradiation has induced a preferential out-of-plane magnetization.

13.4 cm

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