O-09 **Session B, Tuesday, 14.06., 12^{40} - 13^{00}**

Synchrotron radiation studies of ultrathin Pt/Co/Pt trilayers irradiated by nanosecond pulses from EUV plasma

I. Jacyna[1], D. Klinger[1], J. B. Pełka[1], R. Sobierajski[1], A. Bartnik[2], P Dłużewski[1], E. Dynowska[1], M. Jakubowski[1], M. Klepka[1], Z. Kurant[3], R. Minikayev[1], I. Sveklo[3], A. Wawro[1], A. Wolska[1], D. Eichert[4], F. Brigidi[4], I. Makhotkin[5], S. Yakunin[6] and A. Maziewski[3]

[1]*Institute of Physics, Polish Academy of Sciences, 02- 668 Al. Lotników 32/46, Warsaw.*
[2]*Institute of Optoelectronics, Military University of Technology, ul. gen. S. Kaliskiego 2, 00-908 Warsaw, Poland*
[3]*Laboratory of Magnetism, Faculty of Physics, University of Bialystok, K. Ciolkowskiego 1L, 15-245, Bialystok, Poland*
[4]*Elettra-Sincrotrone Trieste, S.S. 14 Km 163.5 in Area Science Park, 34149 Basovizza, Trieste, Italy*
[5]*MESA+ Institute for Nanotechnology, University of Twente, Netherlands*
[6]*NRC Kurchatov Institute, Moscow, Russia*

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*e-mail:yatsyna@ifpan.edu.pl

We have studied structural mechanisms responsible for the magnetic reorientation between out-of-plane and in-plane magnetization in the Pt/Co/Pt trilayer systems modified with short light pulses. Ultrathin film systems containing magnetic component, like Co, sandwiched between nonmagnetic metals, with tunable magnetization direction (in-plane and out-of-plane) are of particular importance for spintronics as well as for technology of magneto-optical memory devices. In case of a Pt/Co/Pt trilayers irradiated with different light impulses [1-3], an out-of-plane to in-plane magnetization reorientation phase transition was evidenced, with an irradiation-driven intermixing and disordering at the Co–Pt interfaces. In comparison with conventional thermal annealing of the sample, the fast laser annealing provides possibility to create structural and magnetic changes at the interfaces while substrate temperature is almost unchanged which is important for technological applications.

In general sample irradiation may lead to such phenomena as blurring of originally sharp interfaces and – as a result of atomic interdiffusion – formation of a PtCo disorderd/ordered alloys and appearance of defects and strains. Such structural modifications change the basic parameters characterizing magnetic properties of multilayer structures – specifically magnetic anisotropy. In particular the interface blurring may reduce the surface anisotropy, while atomic interdiffusion leads to formation of alloys with specific magnetocrystalline anisotropy. In case of lattice deformation – magnetoelastic anisotropy contribution may become significant, as well.

We have investigated Pt(5 nm)/Co(3.5 nm)/Pt(5 nm) trilayers grown by the MBE method on the sapphire (0001) single crystal substrate. We have studied two series of samples – the Pt buffer layer was grown either at 750 °C, or at room temperature. Selected samples were irradiated with ns XUV pulses using laser produced plasma source. The whole sample surface was exposed quazi-uniformly. The irradiation fluences were in the range appropriate to switch the sytem into out-of-plane magnetization state. Magnetic stests were carried out after irradiations by means of magnetooptical Kerr effect (MOKE) based techniques. We have performed structural characterization of Pt/Co/Pt trilayers by means of complementary synchrotron radiation (SR) techniques. X-ray Reflectometry together with Grazing Incidence X-Ray Fluorescence providing information about the layer structure – interfacial roughness, layer thicknesses and about the depth profile of Co and Pt atoms. Polarized XAFS measurements give information about the atomic local structure around the Co atoms in the directions parallel and perpendicular to the layer surface. The structural properties obtained from the techniques based on the SR were correlated with the magnetic features and structural properties determined in other experimental methods (XRD, TEM, MOKE, neutron scattering and microscopic investigation).

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