

SEMINARIUM RENTGENOWSKIE

Dnia 06.02.2018 r. o godz. 10.30, w sali D Instytutu Fizyki PAN, odbędzie się seminarium rtg., na którym **mgr Iwanna Jacyna** z IF PAN, wygłosi referat na temat:

"Investigations of ultrathin Pt/Co/Pt trilayers irradiated by nanosecond pulses generated by EUV plasma sources"

Streszczenie:

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, an out-of-plane to in-plane magnetization reorientation phase transition (RPT) was evidenced, with an irradiation-driven intermixing and disordering at the Co–Pt interfaces. In comparison with conventional thermal annealing of the sample, the ultrafast 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 disorder/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 single crystal substrate. We have studied two series of samples - the Pt buffer layer was grown either at 750C, or at room temperature. Selected samples were irradiated with ns XUV pulses using laser produced plasma source. The whole sample surface was exposed quasi-uniformly. The irradiation fluences were in the range appropriate to switch the system into out-of-plane magnetization state. Magnetic tests were carried out after irradiations by means of magneto-optical techniques exploiting Kerr effect – p-MOKE. We have performed structural characterization of Pt/Co/Pt trilayers by means of complementary 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 synchrotron radiation were correlated with the magnetic features and structural properties determined in other experimental methods (XRD, TEM, MOKE, neutron scattering and microscopic investigation).

Prof. dr hab. Krystyna Jabłońska