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Magnetic Easy Axis and Domain Structure of Ion-Irradiated Co/Pt Multilayered Film

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Recently, magnetic anisotropy in ferromagnetic thin films has attracteda lot of attention due to its importance in realizing ultrahigh storage density in magnetic recording media. In common longitudinal recording technology, the manipulation of magnetic anisotropy is one of the key issue on getting higher density than that of recent media. In this research, we intended to control the direction of magnetic easy axis in a ferromagnetic thin film. For that purpose, Co/Pt multilayered films are ion-irradiated with 80 keV Ar+ ions at various dosages in an external magnetic field. CoPt alloy film with chromium has been widely used as a main constituent of magnetic storage media due to their large magnetic anisotropy energy, high coercivity, and high corrosion resistance. In addition, ion irradiation has an advantage to change film structure so as to get metastable alloy or amorphous film. In this experiment, magnetic field is applied to the sample in order to support the easy axis change process during ion irradiation. The easy axis direction is confirmed by measuring the magnetic hysteresis loop of the film with magneto-optical Kerr spectrometer, and the valence-electronic structure of the magnetic material is studied by using x-ray emission spectroscopy with synchrotron radiation. As a result, the easy axis is formed along the external field direction and the electronic structure along the easy axis direction shows different feature from that along the hard axis.