KEK-PF and BL08W of SPring-8, respectively. EPMA analysis was made at Center for Material Research by Instrumental Analysis in Gunma University.

The spin and orbital magnetic form factors of $Pd_{3.2}Co_{0.8}$ and $Fe_3Pt$ were measured by the XMD for nearly twenty reciprocal lattice points, and the magnetic Compton profile (MCP) of $Pd_{3.2}Co_{0.8}$ was obtained for three directions along the principal axes [100], [110] and [111].

The observed spin and orbital magnetic form factors were fitted with atomic-model theoretical form factors based on the dipole approximation in order to obtain the spin and orbital magnetic moment of each constituent atom of the alloys. Theoretical form factors for 3d elements of Co and Fe and 4d element of Pd were quoted from the literature [1]. Those for 5d element of Pt were calculated by the authors (K.K. & T.N.) as they were not presented in literatures. The observed MCPs have provided information about the spin moment and directional anisotropy of the momentum distribution of electrons with spin.

The experimental results are as follows. (1) Sum of the spin and orbital moment of $Pd_{3.2}Co_{0.8}$ by the XMD ($2.3\mu_B$ and $0.8\mu_B$, respectively) is $3.1\mu_B$, which is consistent with the magnetic moment $3.16\mu_B$ observed by the magnetization measurement. (2) The estimated spin moment of $Pd_{3.2}Co_{0.8}$ by the MCP is $2.36\mu_B$ which is in agreement with that of the above XMD result. (3) For $Fe_3Pt$ the orbital moment is almost quenched and the spin moment is $6.8\mu_B$ which is corresponding to the value $6.68\mu_B$ by the magnetization measurement. (4) Directional anisotropy is observed for the three MCPs of $Pd_{3.2}Co_{0.8}$. These results are compared with the other experimental results such as polarized neutron diffraction [2] and the MCS. [3,4]

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**Keywords: X-ray_magnetic_diffraction, magnetic_compton_scattering, metallic alloy**

## MS48.P05

*Acta Cryst.* (2011) A**67,** C531

**Perpendicular magnetic anisotropy in Co/Pd multilayer grown by MBE technique**

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Since discovery of high perpendicular magnetic anisotropy (PMA) in Co/Pd multilayer [1], they have attracted much attention for application to high density magnetic recording media. In order to achieve the high density recording, it is important to control the PMA energy in Co/Pd multilayer. It has been reported that the PMA energy in the Co/Pd multilayer depend on Pd layer thickness [2,3]. However the origin of these phenomena is unclear. The interface of the multilayer may affect the PMA energy. In this study we compare the two Co/Pd multilayers with smooth and rough interface.

A Co(1.5nm)/Pd(2.6nm) multilayer was grown on SiN membrane substrate by using effusion-cell of MBE technique. The deposition temperatures of Co and Pd were 1515°C and 1405°C, respectively. Deposition rates of Co and Pd were 0.5nm/min and 2nm/min, respectively. The XRD measurement showed fcc(111) texture and satellite peaks. The satellite peaks confirm the smooth interface.

The Co(1.6nm)/Pd(4.0nm) multilayer was grown by sputter technique previously [4]. The XRD measurement showed fcc(111) texture. Smaller satellite peak intensities suggest rougher interface than multilayer by the MBE.

Magnetization measurement showed that the PMA energy of the Co(1.5nm)/Pd(2.6nm) multilayer was $1.15\times10^6$erg/cc, and the Co(1.6nm)/Pd(4.0nm) multilayer was $1.2\times10^6$erg/cc. Two multilayers have almost the same PMA energy, even if the Co(1.5nm)/Pd(2.6nm) multilayer with the smooth interface has thinner Pd layer thickness.

In order to measure the shape of wave function in the two multilayers, magnetic Compton profiles (MCPs) were measured on BL08W of the SPring-8. Figure 1 shows MCPs for the Co(1.5nm)/Pd(2.6nm) multilayer and Co(1.6nm)/Pd(4.0nm) multilayer. Both the MCPs are almost the same and it is suggested that wave function for the two multilayers are almost the same.

In conclusion we successfully control wave function and adjust the PMA energy by controlling the interface in Co/Pd multilayer.

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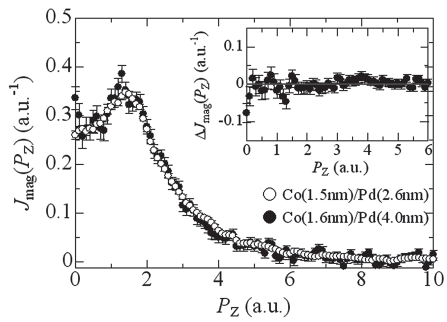


Fig.1 Magnetic Compton profiles (MCPs) of Co(1.5nm)/Pd(2.6nm) (open circles) and Co(1.6nm)/Pd(4.0nm) (solid circles) multilayers. The inset shows difference of the MCPs.

**Keywords: multilayer, magnetic_compton_profile, magnetic_anisotropy**

## MS49.P01

*Acta Cryst.* (2011) A**67,** C531-C532

**Growth and characterization of selectively doped surface modified ZnO nanocrystals**

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ZnO nanocrystals find extensive application potential in modern technology for the fabrication of UV- diode laser and ZnO light emitting structures because of its wide and direct bandgap (3.37 eV) and with a large exciton binding energy (60 meV). ZnO has already been widely used in piezoelectric transducers, gas sensors, optical wave guides, transparent conductive films, varistors, solar cell windows, bulk acoustic wave devices, heterogeneous photocatalyst, etc. There are several methods employed popularly in the synthesis of ZnO nanocrystals. However, the hydrothermal method has been proved to be the most

P.MS.49