ESRF	Experiment title: XMCD Study of Mn/Pt Multilayered Thin-Films and MnPt3 Intermetallics	Experiment number: HE-125
Beamline: ID-12A	Date of Experiment: from: 3 May, 1997 to: 12 May, 1997	Date of Report:
Shifts: 24	Local contact(s): Jose GOllLON and Andrei ROGALEV	*Received at ESRF :* L 1 SEP. 1997

Names and affiliations of applicants (*indicates experimentalists):

Hiroshi MARUYAMA and Naomi KAWAMURA

Department of Physics. Faculty of Science Okayama University.

3-1-1 Tsushima-Naka, Okayama 700, Japan.

Kebir HLIL-EL and Denis RAOIJX

Laboratoire de Cristallographie, C.N.R.S,

B.P. 166,38042 Grenoble Cedex. France.

Report:

$MnPt_3$ thin-films have recently attracted considerable interest in the magneto-optical property and magneto-anisotropy because of application to high-density recording medium [I]. In the thin-films spin-orbit interaction of Pt atoms has been regarded as an important factor to the characteristic properties [2]. For $MnPt_3$ bulk sample. however, X-ray magnetic circular dichroism (MCD) of Pt L-edge has demonstrated that Pt 5*d*-magnetic states have a vanishing orbital component and are dominated by spin character. This contradiction about orbital contribution should be understood in connection with the characteristic properties in thin-films. To clarify this difference between the thin-film and bulk samples, MCD is a unique probe because of applicability for separating Pt 5*d*-moments into spin and orbital components using the magneto- optical sum rules [3].

Thin-film of $MnPt_3$ (I 500Å) or CoPt (I 000Å in thickness) alloy was prepared onto fused quartz or MgO(111) substrate by MBE method [l], and the relevant bulk samples were attained by Ar arc-melting and then the suitable thermal treatment. Pt L-edge MCD measurements were made in the fluorescent mode on ID-12A of ESRF, and MCD was defined as a difference spectrum between antiparallel and parallel configurations of magnetic field under the fixed condition of circularly polarized X-rays.

To make a comparison between the thin-film and bulk samples, figures I(a) and l(b) show the MCD spectrum at the Pt L_3 and L_2-edges in $MnPt_3$ and CoPt, respectively. Absorption edge energy E_0 was determined at the first inflection point of XANES spectrum. For all of the samples used in this study, the Pt L_3-(L_2-)edge MCD shows a negative (positive) sign, which indicates that Pt 5*d*-moments are ferromagnetically coupled with Mn or Co 3d-moments. The spectra in CoPt can be well described by a Lorentzian line-shape, whereas the spectra in $MnPt_3$ show an asymmetrical profile and narrowing of FWHM in both thin-film and bulk. These features are related to an increase of white-line area in XANES with substituting Mn for Co, and probably ascribed to an increase of exchange splitting and charge-transfer from Pt to Mn site. Spin and orbital components of Pt 5*d*-moments were evaluated using the standard procedure on the basis of the magneto-optical sum rules [3]. The preliminary analysis showed that the orbital component in $MnPt_3$ is almost quenched in both thin-film and bulk whereas CoPt alloy has a relatively large orbital moment; however, that the ratio of orbital to spin component ($\langle L_z \rangle / \langle S_z \rangle$) indicates no significant difference between thin-film and bulk. The analysis is in progress.

[l] T.Kato et al., J.Mag.Mag.Mater., 140-144, 713 (1995).

[2] P.M.Oppeneer *et* al., Solid State Commun. 94,255 (1995).

[3] P.Carra ***et al.,*** Phys.Rev.Lett., 70,694 (1993).

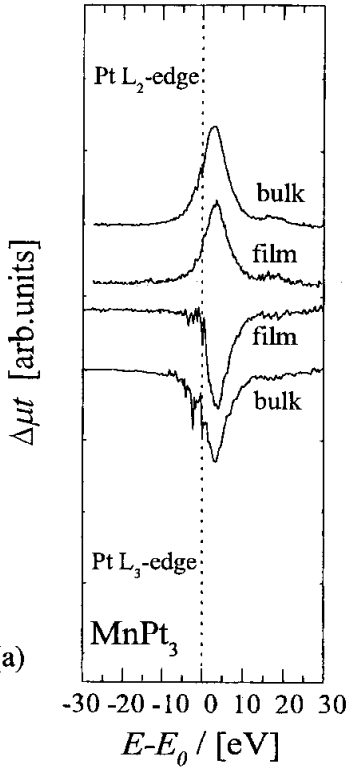

Fig. 1(a)

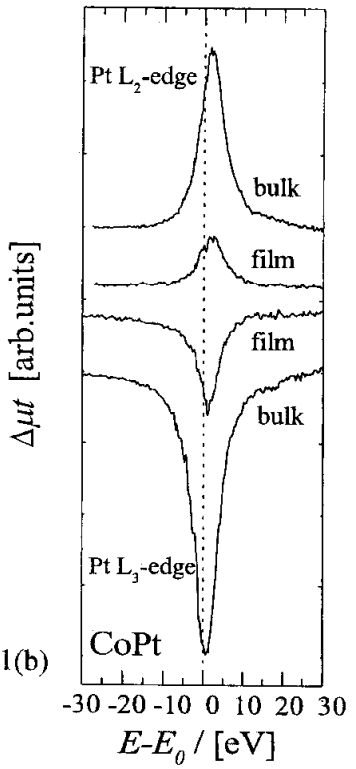

Fig. 1(b)