ESRF	**Correlation between magneto-crystalline anisotropy and growth-induced chemical anisotropy in expitaxial $CoPt_3$ thin film alloy.**	**Experiment number: HE-220**
Beamline: ID12A (B)	**Date of experiment:** from: 3/09/97 to: 7/09/97	**Date of report:** 26/02/97
Shifts: 9(9)	**Local contact(s):** N. Brookes, A. Rogalev	*Received at ESRF:* 02 MAR. 1998

Names and affiliations of applicants (* indicates experimentalists):

W. Grange*, IPCMS-GEMME, Strasbourg.
J.P. Kappler*, IPCMS-GEMME
M. Maret*, IPCMS-GEMME
J. Vogel*, Laboratoire Louis Néel, Grenoble.
A. Fontaine*, Laboratoire Louis Néel, Grenoble.
F. Pétroff*, Unité mixte CNRS-Thomson, Orsay.

ORIGINAL

Magnetocrystalline anisotropy in (111) $CoPt_3$ thin films probed by X-ray magnetic circular dichroism

Abstract

Angle-dependent X-ray magnetic circular dichroism experiments have been performed at both the Co and Pt $L_{2,3}$ edges in two epitaxial (111) $CoPt_3$ thin films grown at 690 and 800K. The analysis of the angular variations of the 3d orbital magnetic moment shows two different magnetic behaviors: a strong perpendicular magnetocrystalline anisotropy (PMA) for the film grown at 690K and an almost isotropic behavior for the film grown at higher temperature. The same analysis at the Pt $L_{2,3}$ edges suggests that the $5d$ atoms play an important role in the PMA. Our results correlate the appearance of PMA with the existence of anisotropic structural effects induced during the co-deposition process.

Submitted to Phys. Rev. B

PACS numbers: 75.30.Gw, 75.70.-i,75.25.+z, 78.70.Dm

Figure 4: ***3d*** orbital magnetic moment (in units of μ_B /atom), measured in the (111) $CoPt_3$ thin film grown 690K, as a function of the photon incidence angle γ (H=4T, T=300K). The solid curve is a fit assuming that the ***3d*** orbital magnetic moment varies as $m_{orb}^{\perp} - (m_{orb}^{//} - m_{orb}^{\perp}) sin^2\gamma$, where $m_{orb}^{\perp}$ and $m_{orb}^{//}$ denote respectively the orbital moment measured along and perpendicular to the [111] direction.

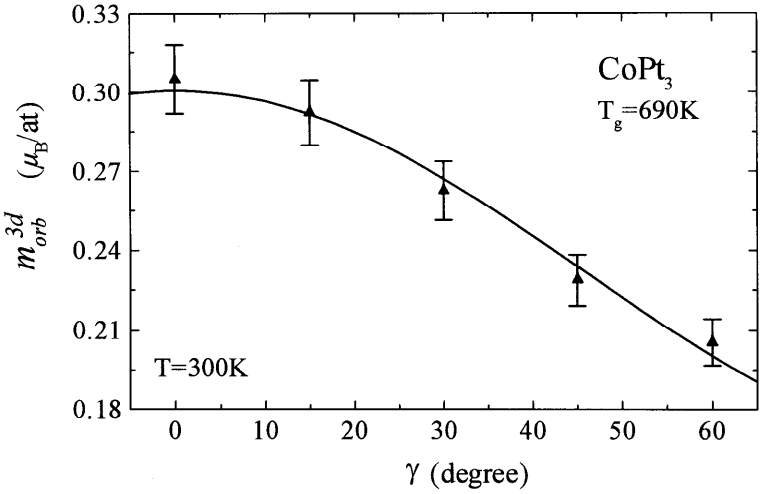

Figure 6: The angular dependence of m_{orb}/m_{Spin} ratio of Pt atoms for two (111) $CoPt_3$ thin films grown at 690K (left panel) and 800K (right panel). We assume that the contribution of magnetic dipole term to the effective spin magnetic moment is negligible. The solid lines are guides for the eyes.