XMaS the UK-CRG	**Experiment title:** Measurement of stacking faults in CoPtCrTa thin film recording media	**Experiment number**: 28-01-10
Beamline: **BM 28**	**Date of experiment**: from: 7/10/98 to: 11/10/98	**Date of report**: 18/10/98
Shifts: 12 (or 4 days)	**Local contact(s)**: Dr. Simon Brown	*Received at XMaS:*

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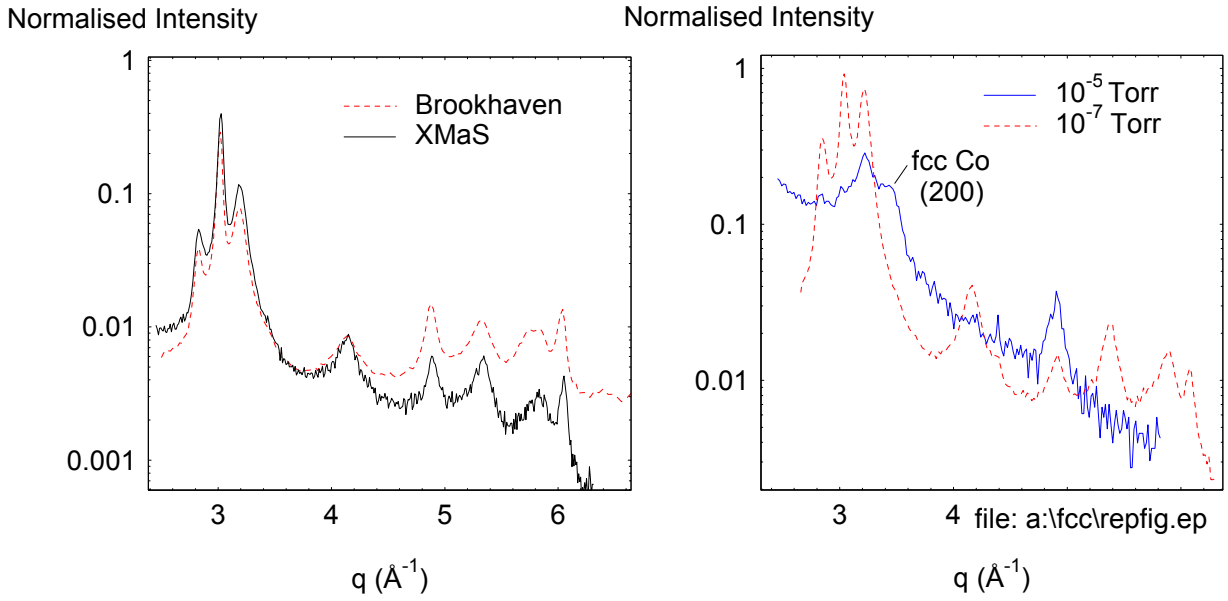
Report: (Preliminary report)

At present there is much interest in the effects of crystallographic defects in thin film magnetic recording media (hard disk drive media) and their role in determining media noise and thermal loss of signal. Stacking faults are common in thin film media, which can contain as much as 10% of Co in the non-ideal hcp phase. Accurate quantification of the percentage of stacking faults in thin film media is not trivial and usually synchrotron radiation is employed with a grazing incidence geometry (GIXS) to eliminate the large background scatter from the underlayers and amorphous substrate. We have already found a correlation between magnetic viscosity and the percentage of stacking faults in a collaboration with IBM in which the stacking fault density in two samples grown on different underlayers was measured by workers at IBM using the National Synchrotron Light Source [1].

We began our recent experiment at XMaS by making similar measurements on one of these IBM samples and we have been able to confirm that the results can be reproduced satisfactorily (see fig. 1). Of course a lower noise base would have been achieved by repeating this preliminary scan over longer counting times.

We then began a similar experiment to characterise stacking faults in a set of 5 samples provided by Seagate Magnetics which had been produced at different sputtering pressures. Earlier qualitative High Resolution TEM measurements had already provided evidence of increasing stacking fault density with increasing sputtering pressure [2]. We obtained data on 2 out of the set of 5 samples. Preliminary analysis of the horizontal 2(scans has confirmed a significant increase in fcc-like stacking faults, evident by the increased intensity at the position of the fcc (002) Co reflection (see fig. 2). Additionally data collected at varying angles of vertical 2(suggests that the degree to which the c-axis of the hcp Co grains is oriented in the plane of the film is decreasing with increasing sputtering pressure. At present we are in the process of analysing this data and hope to obtain a quantitative measure of the stacking fault density by fitting the data. Our overall aim is to correlate the results of existing magnetic measurements [2] with the percentage of stacking faults (and addtionally the c-axis mis-orientation) as determined by these GIXS measurements.



Figs. 1 and 2

References

[1] P. Dova et. al, submitted to J.Appl.Phys. 1998.
[2] C. Gao et al, IEEE Trans.Mag. 34,4,1576 (1998).