EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

ESRF

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office via the User Portal:

https://wwws.esrf.fr/misapps/SMISWebClient/protected/welcome.do

Reports supporting requests for additional beam time

Reports can be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

ESRF	**Experiment title:** Determination of the crystallographic ordering of $Co_{2-x}Fe_{1+x}Si$ Heusler alloy	**Experiment number**: HC-2529
Beamline: BM25B	**Date of experiment**: from: 8.6.2016 to: 12.6.2016	**Date of report**: 1.9.2016
Shifts: 12	**Local contact(s)**: Maria Vila Santos	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

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Report:

As it is written in the proposal, we have perfomed a measurement to obtain energy dependence of specified diffraction on $Co_{2-x}Fe_{1+x}Si$ samples. At last, we measured at three diffractions, namely 202, which is unsensitive to the order-disorder change (described in the proposal) and 111 and 002, which are sensitive.

Procedure was following: after sample alligment we found and set the orientation matrices for the HKL mode on MgO substrate, which has well known parameters. Diffraction indices of the substrate and layer has a specific relation, because of their mutual orientation. Therefore we could find the required diffractions of the layer. Centers of the diffractions were aligned after that with several optimalisation angular scans. Therefore, the final result of our measurement is a set of integral intesities (obtained from measured L-scans) on required diffractions measured at different energies between 7 and 8 keV.

Important task was to obtain good normalisation beacuse of the primary beam intensity. Because primary beam should be focused via two motors manualy within every change of energy, we have decided to fix the motors on specific values and measure intensity of the primary beam with respect to the energy. This measurement has been performed on the photo-diode, which has been put in front of the detector. In this way, intensity of the primary beam decayed quite fast within the require energy interval 7-8 keV, so the measurement on each sample include two calibration measurements of the primary beam intensity. Results of these normalisation measurements are in the Figure 1.

Results of the integrated intensity energy dependence are in the Figure 2. Integrated intensities I^{norm} in Figure 2b, which include normalisation on the primary beam intensity, are computed in the following way:

$$I^{norm} = \frac{I^{int}_{meas}}{\left(\frac{B_{calib}}{Mon_{calib}}\right) Mon_{meas} E}$$

Where I^{int}_{meas} is the integrated intensity obtained from the measured L-scan, B_{calib} is the signal from the photo-diode measured in the calibration measurement - it corresponds to the monitor value Mon_{calib} (at the same time within calibration). Mon_{meas} is the mean value of monitor within the measurement of the L-scan and E is the energy, which is included here because of the linear energy dependence of the primary beam intensity on photo-diod singal.

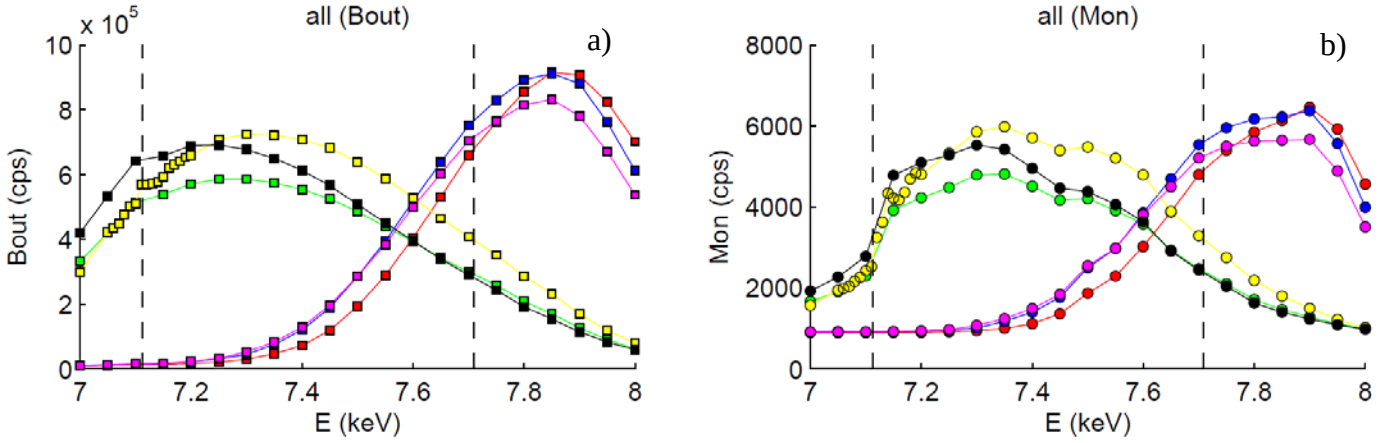

Figure 1: Calibration measurements of the primary beam intensity a) Bout is the signal from the photodiod b) Mon is corresponding monitor value

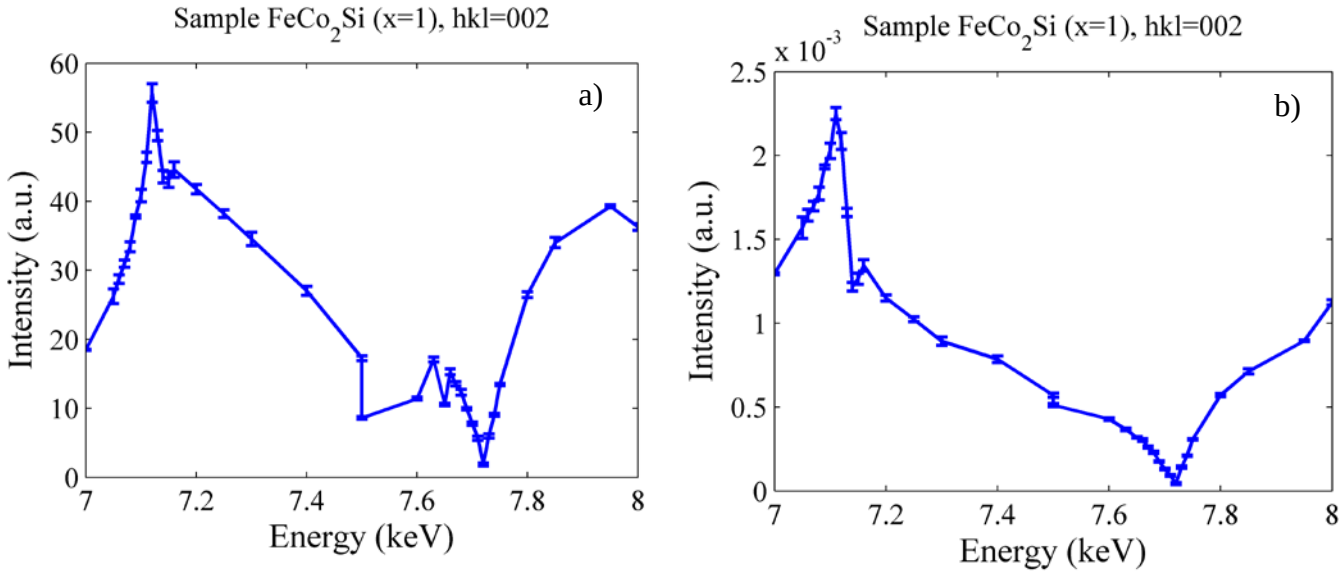

Figure 2: a) dependence of the integrated intensity (diffraction 002, sample $FeCo_2Si$) on energy b) same data as in the Figure 2a, but with renormalistion described in the equation above