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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 using the **Electronic Report Submission Application:**

http://193.49.43.2:8080/smis/servlet/UserUtils?start

Reports supporting requests for additional beam time

Reports can now 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:** Topographic study of mosaic copper crystals for neutron monochromators.	**Experiment number**: MI-492
Beamline: ID15 A	**Date of experiment**: from: 28/3/2001 to: 31/3/2001	**Date of report**: 29 / 08 / 2001
Shifts: 9	**Local contact(s)**: Jose Manuel Merino Alvarez	*Received at ESRF:*

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Report:

We have succeeded in recording X-ray topographs and rocking curves of a single copper mosaic crystal at the photon energies of 96 and 136 keV. From these experimental results some conclusion can be drawn:

1. The rocking curves present a much lower reflectivity than that predicted by theoretical models using the Darwin equations [1], [2] (Fig. 1). This result is consistent with neutron measurements performed at ILL [3]. Moreover, in some cases the measured peak reflectivity at 136 keV is higher than at 96 keV, contrary to the theoretical calculations.
2. Rocking curves registered using a small beam (0.025mm x 4mm) impinging on the crystal surface at different positions are similar, thus showing a relative good *averaged* uniformity in terms of mosaicity across the crystal.
3. Some X-ray topographs clearly show that different crystal regions diffract in very different ways. This is probably due to the fact that the crystal consists of different blocks sligtly misaligned one respect to others (Fig. 2).

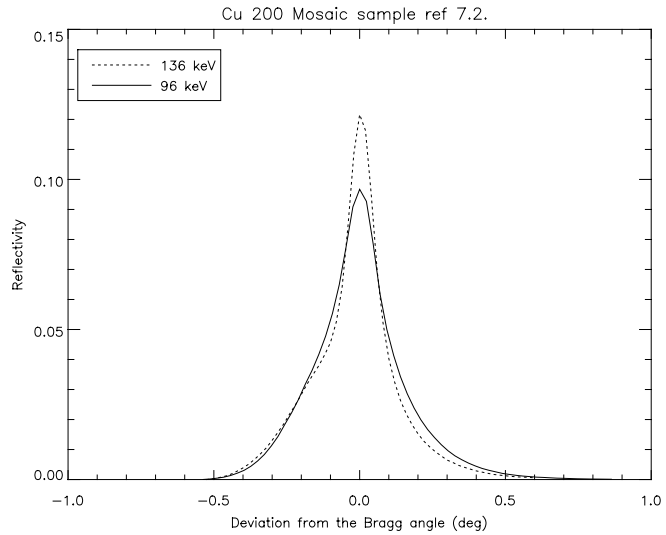
We have to thank the ID15 staff for their effort to make this experiment successful. However, some technical problems and an underestimation of the number of requested shifts made it impossible to obtain concluding quantitative results that could lead into a publication. We are submitting a new proposal for the continuation of this project. We will measure other copper crystals samples and also mosaic germanium, as well as Ge crystals with graded d-spacing.

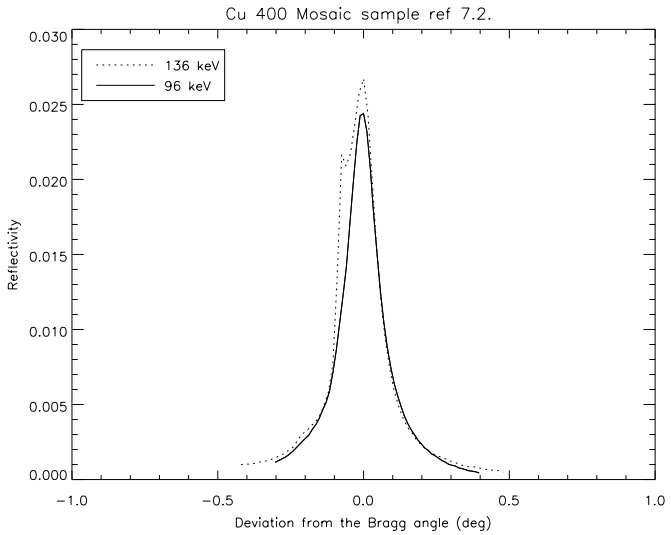
References:

[1] W. H. Zachariasen (1996) “Theory of X-ray diffraction in crystals” *Dover*, New York.

[2] V.F. Sears (1997) *Acta Cryst.* **A53**, 35.

[3] L. Alianelli, M. Sanchez del Rio and R. Felici (2001), *SPIE proceedings* 4509. To be published.





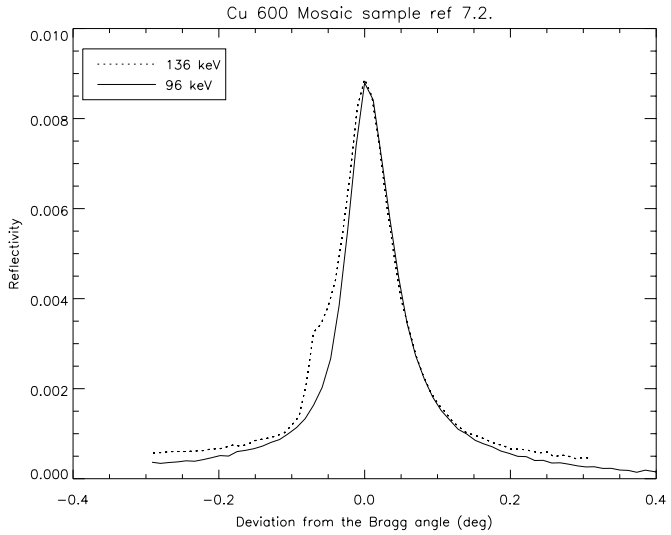
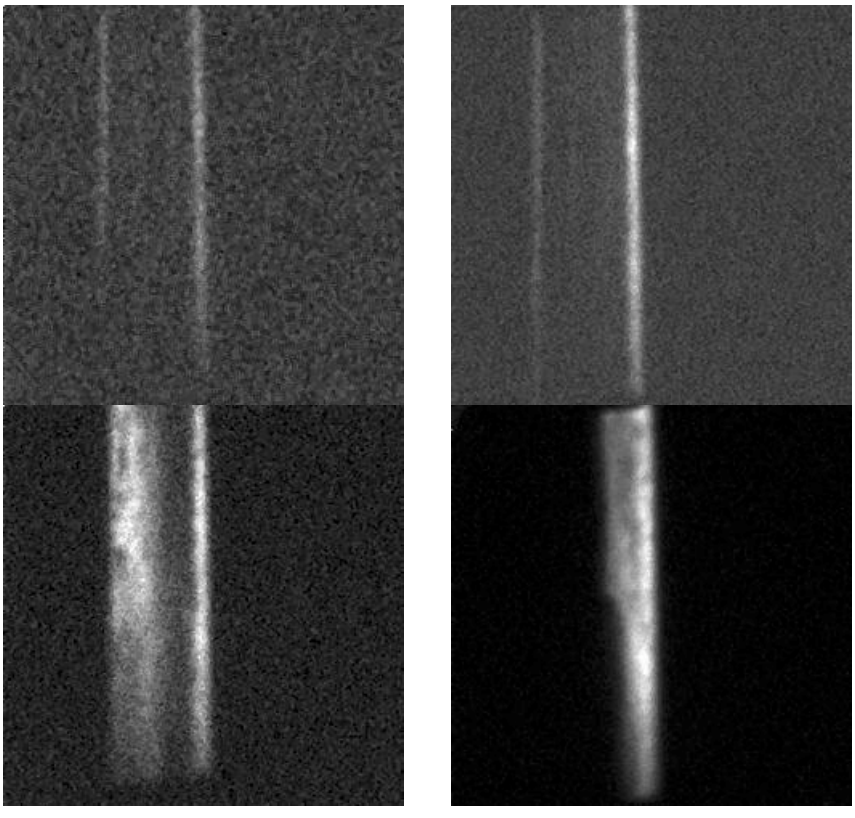


Figure 1. *Reflectivity of mosaic copper at 96 and 136 keV for the <200>, <400>, and <600> reflections in Bragg geometry. The peak reflectivity is, on average, 30% of the calculated value.*



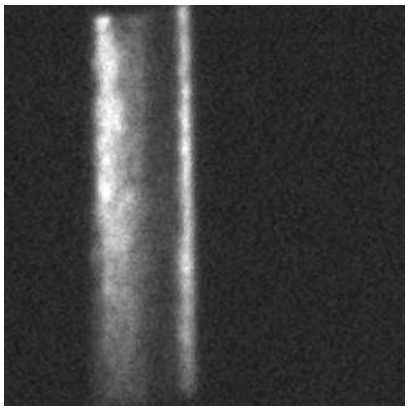


Figure 2. *Topographs recorded along the rocking curve for the <400> reflection at 136 keV. The deviation from the Bragg position is (left to right): -0.2, -0.13, -0.07, -0.06, 0 degrees. The sample is the same as in Fig. 1.*