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 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: The C60/Ge(111)-sqrt(13)xsqrt(13)-R14 reconstruction. A SXRD structural study.	**Experiment number**: SI-604
Beamline: ID03	**Date of experiment**: from: 9-02-2001 to: 19-02-2001	**Date of report**: 31-09-2001
Shifts: 21	**Local contact(s)**: Paul Steadman	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Xavier Torrelles, ICMAB-CSIC (SPAIN)

Jorg Zegenhagen , ESRF

Report:

One subject of intense research is the adsorption of C60 molecules and the growth of C60 thin films on the surfaces of metals [1-3] and semiconductors [4-6]. The interaction of isolated C60 molecules with the Ge(111)-c(2x8) surface [7] causes a perturbation of the adatom arrangement of the c(2x8) structure close to the adsorbed C60 molecules. The typical defect is a shift of a part of a Ge adatom row by one surface lattice constant starting at the C60 molecule. The defective Ge adatom arrangement in the vicinity of the C60 give rise to unsaturated Ge surface atoms with a half-filled dangling bond underneath the C60 molecules and the C60 substrate bond is mediated by a charge transfer from the Ge surface to the C60 molecules. The half-filled dangling bond states paly an important role by providing the needed density of filled surface states within the Ge bulk/surface state band gap.

The Ge(111) samples that were used for this experiment were new ones. The samples were cut and polished at the ESRF and introduced in UHV conditions to be prepared following repeated sputter/annealing cycles already described elsewhere [8]. The roughness of the surface was checked measuring the intensity in antiphase conditions at certain points of the CTR’s.

Due to non-expected problems during the polishing procedure of the Ge(111) samples at the ESRF, we spent five of the seven days of the experiment to clean and characterize the surface sample. The roughness of the surface was visible by looking it at the optical microscopy.

After an intense sample preparation procedure we could check the quality of the surface by measuring some fractional order reflections from the c(8x2) surface reconstruction. Fig. 1 shows the corrected structure factors of four c(8x2) fractional order reflections. The continuous lines are obtained from the simulation using the c(2x8) 3-Dimensional model proposed in references [9-11]. As it can be observed, the differences between experimental and simulated curves are remarkable. This figure seems to indicate that the adatom model proposed by [9-11] could be uncompleted.

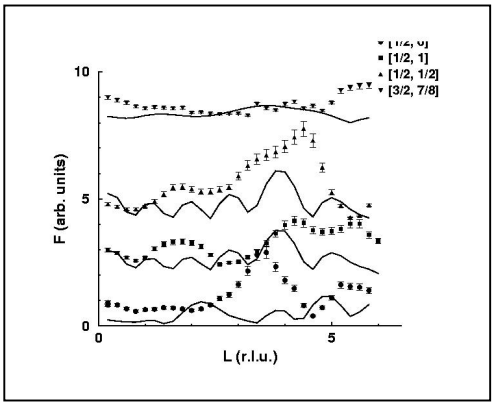

Fig. 1. Experimental and simulated fractional order rods of the Ge(111)-c(2x8) surface reconstruction.

References

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