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:** **Real-time observation of molecular reorientations**	**Experiment number**: SC-1562
Beamline:	**Date of experiment**: from: 03/11/2004 to: 09/11/2004	**Date of report**: 31/08/2005
Shifts: 18	**Local contact(s)**: Dr. Leide Cavalcanti	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

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Report:

As outlined in the proposal, this experiment has focused on an in-situ and real time x-ray study of a model system (Diindenoperylene DIP) for organic molecular beam deposition (OMBD) [1]. The goal of this study was to follow in real time the degree of phase coexistence of the disordered, standing up and lying down phase in the film.
The experiment went well, and the collaboration with the beamline staff was excellent.

We will give a short summary of results from the beamtime. A detailed analysis of the data is still in progress, but we can already say that a publication will emerge from these data, which are of high quality.

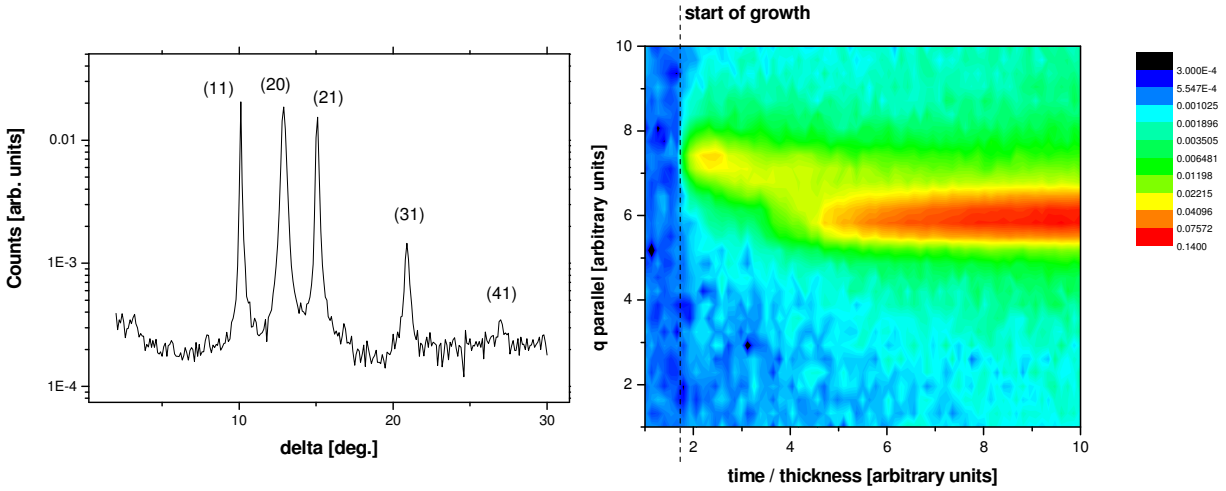
1. Using a PSD detector we could acquire GID scans for our thin films, including the rod in the q_z direction. This helps to establish a detailed picture of the molecular arrangement in the 2-d in-plane unit cell [2].

2. Using depth dependent GID measurements, we could establish the depth profile of lying down and standing up molecular structures in the film (see Fig. 1a for a typical GID scan).

3. Measurements at different temperatures establish that the fractions of lying down and standing up structures change. At high temperatures (that is 130 ºC substrate temperature) only standing up molecules can be seen.

4. Real-time measurements of the Bragg reflection of DIP, show that the position of the reflection, and therefore the lattice spacing, is changing during growth

5. Real-time GID measurements (Fig. 1b) show that the (11) reflection moves during growth. Therefore the in-plane unit cell changes during growth, in agreement with the out of plane (specular) data.



a) **b)**

Figure 1 a) Typical GID scan of a DIP film on silicon grown at 35 degrees substrate temperature. **b)** Evolution of the (11) reflection from a) with time, that is thickness. After start of the film growth the (11) reflection gets stronger, but soon starts to move to lower q values.

[1] A. C. Dürr, F. Schreiber, K. A. Ritley, V. Kruppa, J. Krug, H. Dosch, and B. Struth Phys. Rev. Lett. **90** (2003) 016104
[2] A. C. Dürr, N. Koch, M. Kelsch, A. Rühm, J. Ghijsen, R. L. Johnson, J.-J. Pireaux, J. Schwartz, F. Schreiber, H. Dosch, and A. Kahn, Physical Review B 68, 115428/1 (2003).