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 original report should be sent, together with 5 reduced (A4) copies, to the User Office.

In addition, please send a copy of your file as an e-mail attachment to reports@esrf.fr**,** using the number of your experiment to name your file. This will enable us to process your report for the ESRF Annual Report.

Reports accompanying requests for additional beam time

If your report is to support **a new proposal**, the orginal report form should be sent with the new proposal form, and a copy of your report should be attached to each copy of your proposal. 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.
- bear in mind that the report will be reduced to 71% of its original size. A type-face such as "Times", 14 points, with a 1.5 line spacing between lines for the text, produces a report which can be read easily.

Postal address: User Office, ESRF, B.P. 220, F-38043 GRENOBLE Cedex, France
Street address: 6 rue Jules Horowitz, F-38043 GRENOBLE Cedex
Telephone: +33 (0)4 7688 2552; Fax: +33 (0)4 7688 2020; e-mail: useroff@esrf.fr

ESRF	**Experiment title:** Epitaxial Growth of Anthraquinone on NaCl (100)	**Experiment number**: SI-778
Beamline: ID-32	**Date of experiment**: from: 26-feb-02 to: 05-mar-02	**Date of report**: 22. 08. 2002
Shifts: 21	**Local contact(s)**: Samantha Warren	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

J. Arsic* ,D. Kaminski*, W. S. Graswinckel*, H. M. Cuppen* and E. Vlieg*

Department of Solid State Chemistry, University of Nijmegen, The Netherlands

Report:

If a simple organic molecule, anthraquinone ($C_{14}O_2H_8$), is deposited from the vapor on the sodium chloride (100) surface, needle-shaped anthraquinone crystals are formed in two different directional domains, as observed with optical microscopy, atomic force microscopy (AFM) and scanning electron microscopy (SEM). These growth domains suggest that there is strong interaction between NaCl and anthraquinone, but the growth mode of anthraquinone can not easily be derived from microscopy measurements.

Two growth modes of anthraquinon on NaCl are possible: first a monolayer (or few layers) are formed and subsequently 3D nuclei (Stranski- Krastanov), or 3D nuclei are formed immediately (Frank-van der Merwe). The other question is whether the NaCl surface undergoes changes due to epitaxial growth of anthraquinone?

Here we repport the results of recent SXRD experiments of anthraquinone epitaxially grown on NaCl (100) surface.

Sodim-cloride crystals were freshly cleaved along [100] direction and mounted on sample holder in the growth chamber [1]. Anthraquinone was placed in a special container in the cap of the growth chamber and the vapor flow was controlled by a valve and the temperature. The experiments were done at energy of 10 keV.

We were able to measure in total 181 reflection consisting of (20), (11)and specular reflectivity rods, with an agreement factor of 15% when averaged over all measured conditions. All reflections were measured under two different circumstances. A small amount of anthraquinon was deposited on the clean surface of NaCl (no bulk bragg peak of anthraquinon was visible) and a large amount of anthraquinon was deposited so the very intense bulk bragg peak of anthraquinon was present. In this way we could check our deposition procedure. We do not have a complete growth model yet, but the differences between the clean NaCl (100) surface and the surface covered with aproximatelly a monolayer of anthraquinone are very clear, as shown in fig 1.
Our working hypothesis is that anthraquinon starts to grow epitaxially on the NaCl (100) but as soon as the bulk anthraquinon is starting to form, the monolayer is "eaten-up" by the 3D structure.

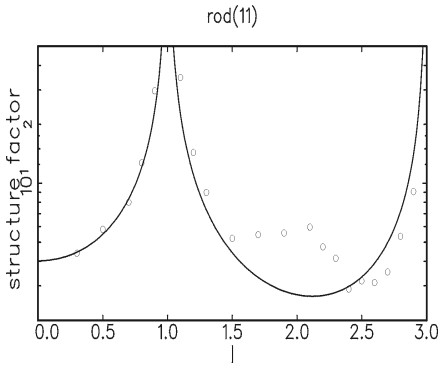

Fig. 1 *Structure factor amplitude along the (11)rod of NaCl (100) with a monolayer of antraquinone deposited. Open circles represent data and the line represents a model calculation for the clean NaCl (100) surface.*

Analyses is still in the progress.

References:

[1] M. F. Reedijk, J. Arsic, F. F. A. Hollander, et al., submitted Science.