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:** In situ investigation of the microstructures of “rubrene-like” β-MT-thienoacenes during thin-film growth	**Experiment number**: SC 5068
Beamline: ID10	**Date of experiment**: from: 27 Jan 2021 to: 02 Feb 2021	**Date of report**:
Shifts: 18	**Local contact(s)**: Oleg KONOVALOV, Maciej JANKOWSKI	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

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Report:

1. Abstract

Due to the COVID-19, this beamtime was done by remote access. We prepared thin-film samples in our lab, and sent them to ESRF. The support by the local contacts was excellent. Through the data we analysed the in-plane and out-of-plane structure of our thin films, to correlate the solid-state structures and the optoelectronic properties of our materials.

2. Experimental Results

We grew thin films based on various organic small molecules, i.e. anthradithiophene (ADT), ADT derivatives. The growth condition was varied by using different growth time, using templating layer before thin-film growth and using additives during growth. We determined the molecular orientation from XRR data (Fig. 1a). The coherent island size, corresponding to the height of the highest islands were calculated from the full width at half maximum of the Bragg reflections. We analyzed the in-plane microstructure of the thin films from GIXD data (Fig. 1c-d), and we clearly observed the improvement of thin-film crystalinity by utilizing a molecular monolayer as templating layer. The coherent island size, corresponding to the lateral domain size of the crystalline islands, were calculated from the GIXD line scan measurement (Fig. 1b). For reciprocal space maps we utilized a 300k PILATUS detector, and the quality of the data is good enough to determine the unit cell of all the thin films.

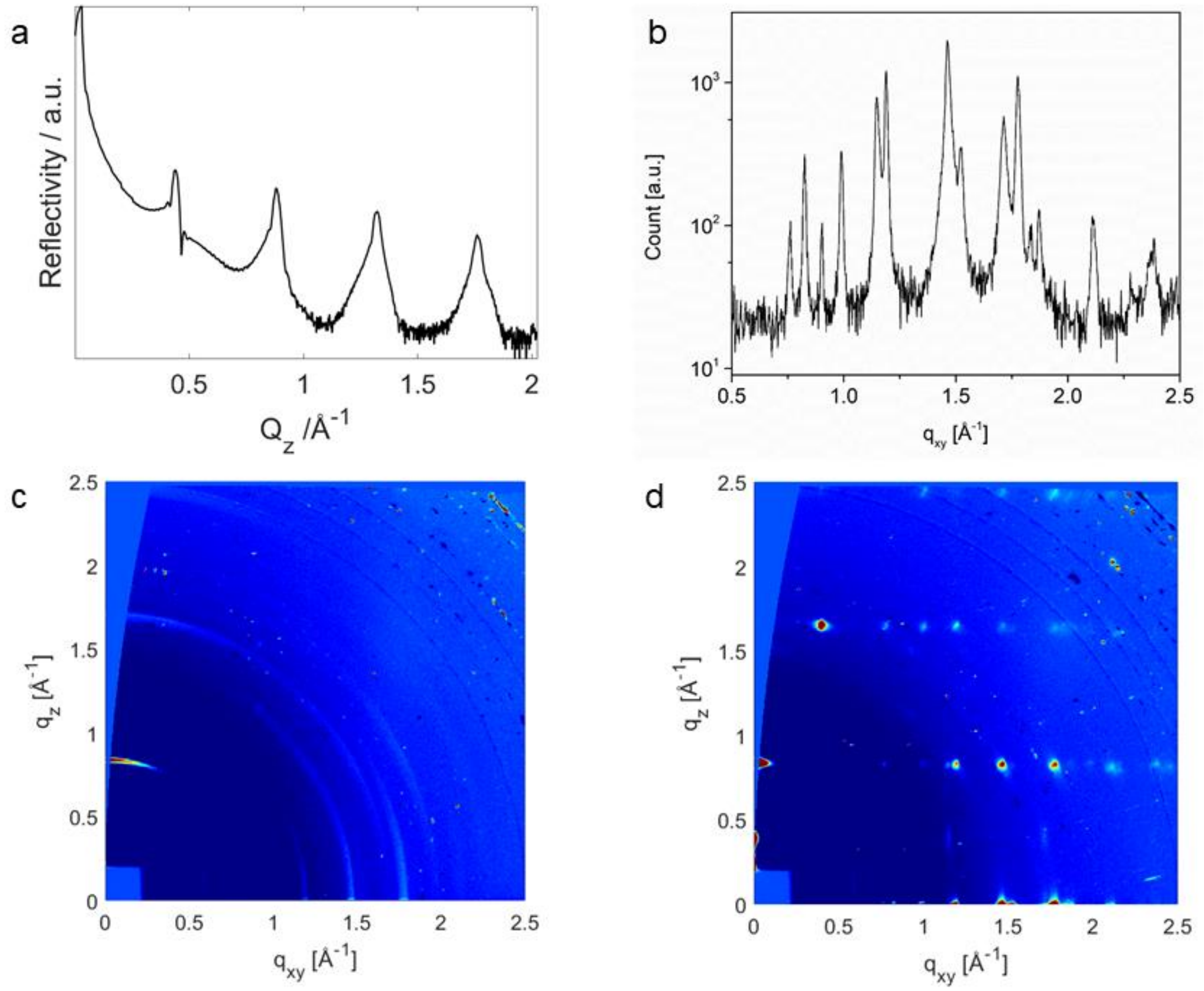

***Figure* 1a** Postgrowth XRR scan for a small-molecule organic thin film, **1b** GIXD line scan of a small-molecule organic thin film with templating layer, GIXD scans of the small-molecule organic thin films without (**1c**) and with (**1d**) templating layer, the reciprocal space maps clearly indicate the improvement of crystalinity of the thin films.

3. Remarks on quality of measurements

We found the ID10 beamline was very suitable for our weakly scattering organic materials. We used a PILATUS 300K to obtain excellent results in the framework of our study. In particular we would like to mention the excellent beam stability during the whole beamtime. Even though due to the COVID-19 we were not able to carry out the experiments by ourselves, with the help of local contacts, through the remote experiments we had obtained excellent results

4. Status and progress of data evaluation

We aim to include these data in a wider publication concerning the solid state structure-optical property relationship of a series of organic semiconducting materials, once the dataset is fully analysed.

We thank Oleg Konovalov and Maciej Jankowski for the excellent support as local contacts during the beamtime.