ESRF	**Experiment title: X-ray topography of a Charge Density Wave system ($NbSe_3$)**	**Experiment number:** 1771
Beamline: ID19	**Date of experiment:** from: 12 juin 2002 to: 14 juin 2002	**Date of report:** 27/08/2002
Shifts: 3	**Local contact(s):** José Baruchel	*Received at ESRF:*

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Report:

In quasi-one-dimensional metals, such as $NbSe_3$, the Peierls instabillity leads to the formation at low temperature of a periodic modulation of the conduction electron density, the so-called charge density wave (CDW), accompanied by a periodic lattice distorsion of same periodicity. Application of an electric field above a finite threshold value unpins the CDW and gives rise to a collective electron transport.

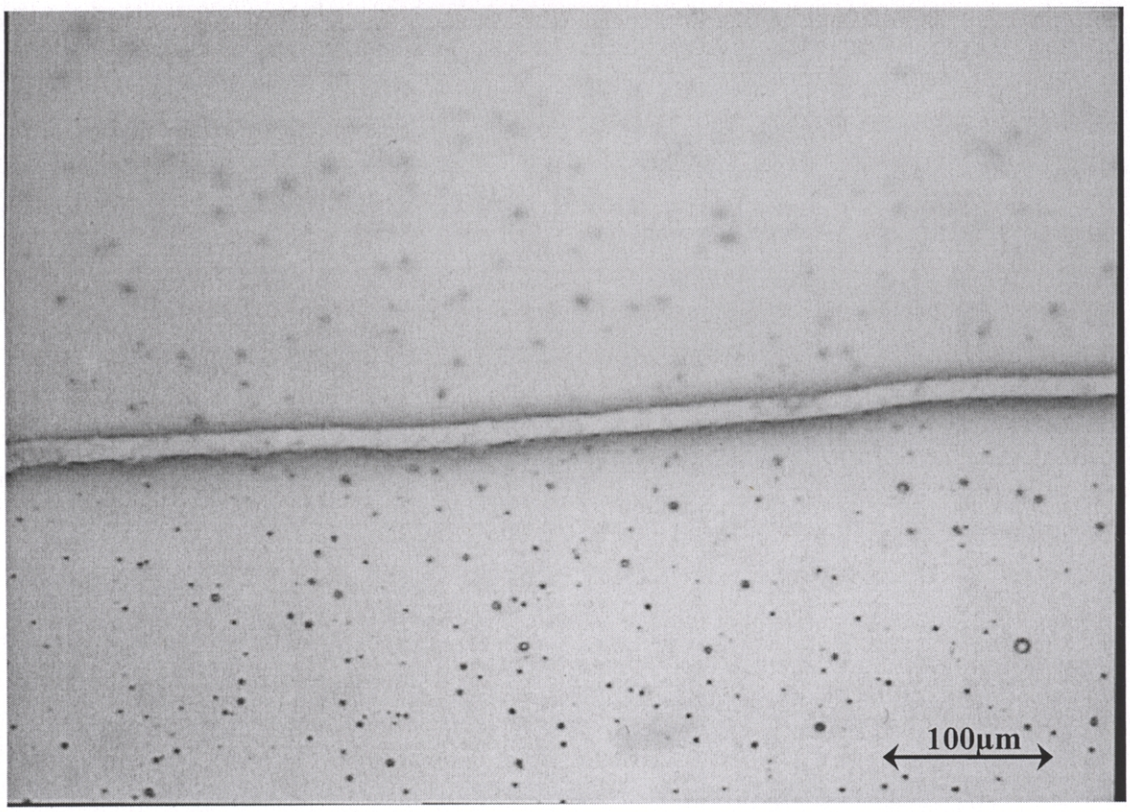
We have used $NbSe_3$, a prototype incommensurate CDW system, which grows as ribbon-shaped whiskers along the b* axis. The purpose of the present measurements was:

To visualize a strong fundamental reflection (0 2 0) of a $NbSe_3$ whisker, by X-ray topography. This test was performed in order to establish the feasability of similar measurements on a CDW satellite peak at low temperature ($T < T_{Peierls}$).

We have used an incident wavelength of 0.59 Å (E = 21 keV) with a extended X-ray beam to illuminate the entire sample (sample dimensions: 30 µm x 3 µm x 4 mm). The sample was mounted on a 60 µm-thick silicon substrate equipped with two buried gold contacts. This technique is used to obtain an electrical contact without step at the substrate surface (in order not to distort the crystal). The sample had been carefully selected by monitoring the (0 2 0) reflection along the sample length, using the rotating anode at Laboratoire Louis Néel/CNRS/Grenoble.

In order to be in the same absorption conditions as in the planned low temperature experiments, we have added a 400 µm-thick aluminium sheet on the X-ray beam path to simulate the absorption of the ID19 orange cryostat X-ray windows. The X-ray film was placed at a distance of 10 cm from the sample. Under these conditions, the time necessary to obtain a good quality X-ray photograph of the (0 2 0) reflection (see figure) was found to be about five seconds.

This first test is encouraging and suggests that similar topographic studies of the CDW satellite peaks at low temperature should be feasible. This should allow to obtain a global picture of the CDW structure and of the CDW deformation induced by its motion under field.



X-ray topograph of a $NbSe_3$ whisker (cross section: 30 µm x 3 µm) taken at room temperature (under the absorption conditions relevant to low temperature measurements) on ID19.