ESRF	**Experiment title:** Anchoring of the n-CB serie on MoS_2 monocrystal: Bulk layering as a function of thickness and temperature	**Experiment number:** SC553
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Report:

The aim of the proposed experiment was to study how the highly organized interfacial structure of 8CB adsorbed on MoS_2 substrates aligns the smectic bulk phases. Optical microscopy studies have revealed ordered defects appearing as sets of straight parallel lines, the spacing if which depends on the LC thickness. For thin films ($1\mu<e<20\ \mu$), they were locked at fixed angles with respect to the substrate, displaying the same hexagonal symmetry.

We have worked in a standard grazing incidence X-ray diffraction (GIXD) at an energy of 8.2 KeV (MoS_2, critical angle θ_C= 6 mrad) with a vertically mounted sample to gain access to the whole reciprocical space of interest. The full beam spot of 0.3x0.7 mm^2 was delimited close to the sample by a pair of slits to a typical size of 0.05x.0.5 mm^2 (horizontal x vertical gaps). The diffracted beam was detected by a Braun PSD detector (1x50mm^2 slits at 700 mm of the sample).

We have aligned three different substrates of MoS_2 coming from natural single crystals that were freshly cleaved and on which we have deposited 8CB LC molecules. The LC film deposited on the first substrate revealed to be too thick and the only resulting smectic planes that we found starting perpendicular to the substrate were locked at 30° from a [100] direction. The two follwing samples were checked optically under the TROIKA microsocope and revealed the right patterns and textures of ordered defects. We thus found that the perpendicular smectic planes ($S_\perp$) were locked at 17.5° of the [100] directions of the MoS_2 and started to bend away (fig.1) to accomodate the homeotropic anchoring at the LC/air interface. We measured a very good mosaicity of these bent smectic planes after several thermal treatments (fig.2) and scanned the sample surface to evaluate the coherence lengths of the defect domains. The experimental results are presently under data reduction.

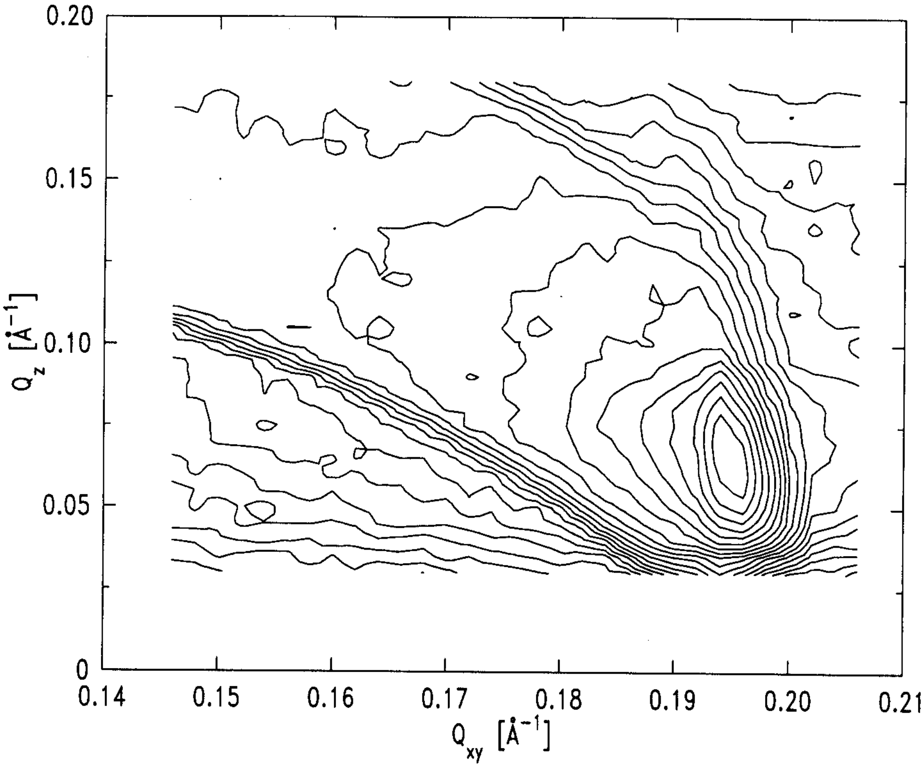

Fig 1: Diffraction map of bent smectic planes measured in GIXD at the smectic Q-vector, Q_S =0.2 Å^{-1}
The logarithmic contour plots go from 250cnts/10s to 6000cnts/10s and show the enhanced GIXD peak and a broad circular ridge. The measured intensity is averaged over the lower half of the PSD detector, i.e. over a total angle of 1.5°.

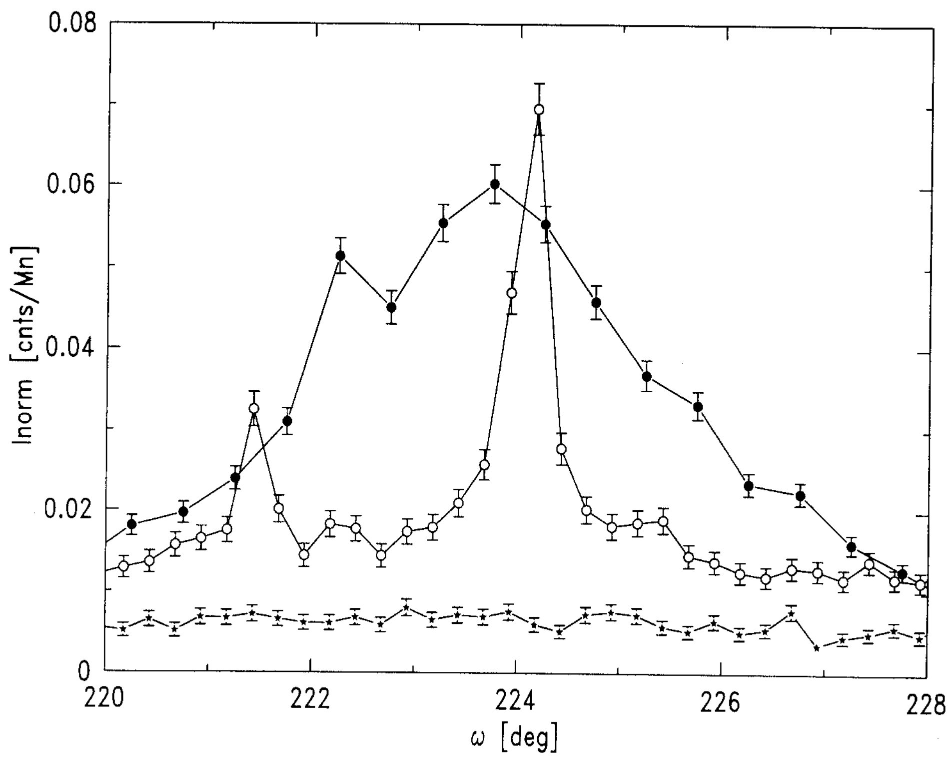

Fig 1: Mosaicity of bent smectic planes measured on the ridge at the nominal Q-vector, Q_S =0.2 Å^{-1}
The upper curve (close circle) displays the broad mosaic ($\Delta\omega \approx 5°$) of the normally prepared sample. The sharp peak correponds to the much better mosaic ($\Delta\omega \approx 1°$) of the same sample after thermal cycle through the S-N transition . The lower curve is the background signal obtained in the nematic phase. The bent smectic planes are locked at 17.5° from the [100] substrate direction (reference at 240°).