



Experiment title: Small and Wide Angle X-ray Scattering characterization of a oligopeptidic tubular fiber.

Experiment number:
SC802

Beamline: ID2A	Date of experiment: from: 20.06.2001 to: 23.01.2001	Date of report: 07.2001
Shifts: 6	Local contact(s): T. NARAYANAN	<i>Received at ESRF:</i>
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The wavelength energy was 12.0keV, the beam was not focussed with a size of $200 \times 200 \mu\text{m}^2$ on sample and on detector. Attenuation was only due to the beam definition slits. Two kind of detections were used, the CCD and the Image Plate.

In the case of the CCD detector, the sample/detector distances were 0.9m, 1.5m, 6.5m. In this condition, the accessible scale was $q=0.005-0.7 \text{ \AA}^{-1}$, and the resolution is due to the detector pixel resolution (300/400 μm). A few image plates of the best samples were measured at 0.75m and 6m a very large $q_{\text{max}}/q_{\text{min}} = 100$ and a resolution due to the beam size.

The 8 shifts, 64 hours, were used in order to obtain a maximum of results and testing some configurations that could be used in the future for this subject. The beamtime was separated as described in the following :

- beamline alignment, setup installation and tests.
- sample stability tests. Under these conditions, samples are stable a few secondes, and a degradation is observed after 1 minutes.
- temperature scans studies with 20 samples measured at each temperature. As expected in these conditions, it was possible to collect a large number of scan, 40 temperatures for 20 samples in a few hours.
- selected oriented samples were studied with the Image Plate, yielding very good resolutions.
- New project were tested : actin/lipid complexes and polymorphism studies of Solid Lipid Nanoparticles. Results are promising.

OLIGOPEPTIDE RESULTS : The samples are prepared by water addition on the oligopeptide powder. The SAXS indicate that the molecules are self-organized in large tubes of 120 \AA radius and whose the membrane thickness is 20 \AA (fig.1). This membrane should exhibit an organization comparable with the tubular viruses or bacteriophages since the WAXS are quite similar to the electronic diffraction. First interpretation of the WAXS pattern agrees with a 2D pseudo-hexagonal monoclinic.

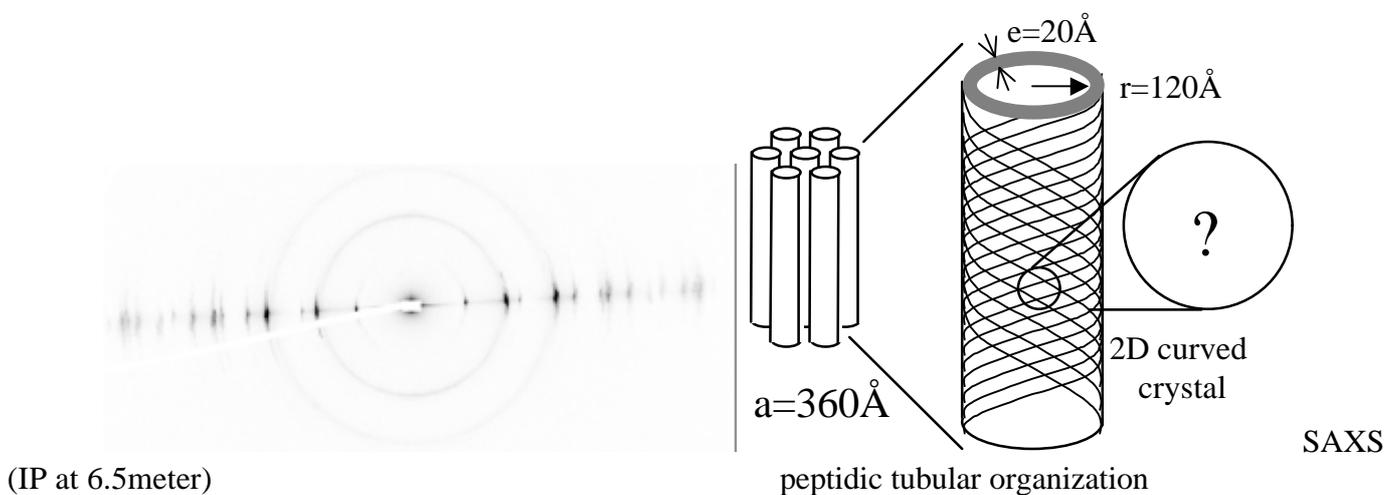
Large structural evolution of the tube with the water content are observed : solution, tubes, chochelates.

Analysis of the temperature scan demonstrated a negative dilation coefficient of the hexagonal lattice parameter without tube diameter evolution.

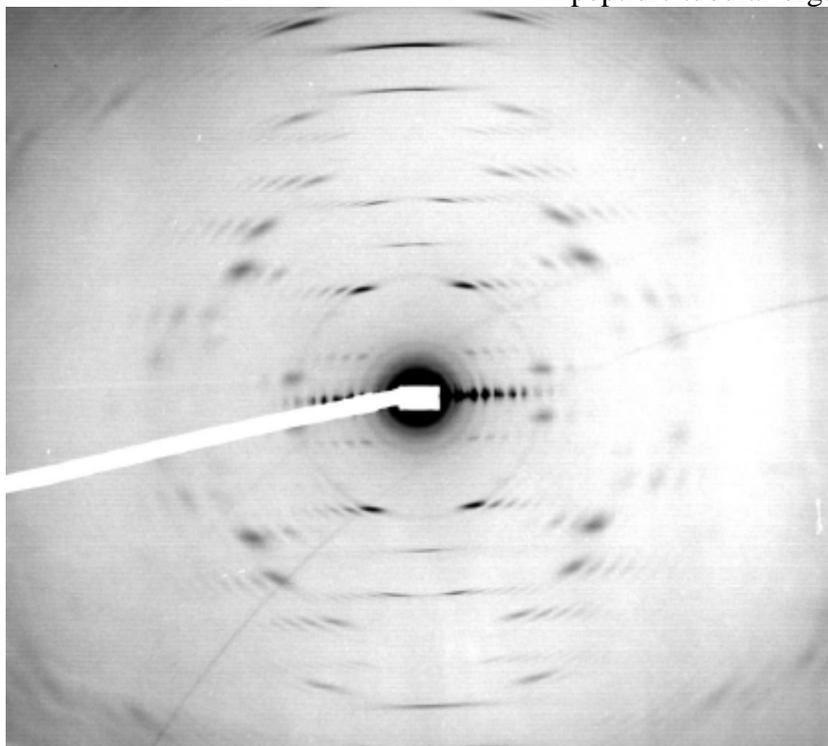
The large studies in water concentration and temperature let us find two well oriented samples. The SAXS and the corresponding WAXS are shown bellow. The WAXS are in agreement with the previous interpretation. The data collection at 6\AA , is limited on the meridian by the smallest sample-detector distance available on ID2.

Two analogos were studied. We hope so, that it will be then possible to find the phase of the diffuse scattering and to solve the molecular structure.

Moreover, the high quality of WAXS pattern reveal some systematic diffuse scattering which can not be indexed. First analysis seems to indicate that it should be due to the disorder of the tubular 2D lattice.



(IP at 6.5meter)



WAXS (IP at 75cm)