	Experiment title: Structure of keratin crystals grown from water solution	**Experiment number**: SC-1894
Beamline: ID13	**Date of experiment**: from: 17/9/05 to: 19/9/05	**Date of report**: 30/9/05
Shifts: 6	**Local contact(s)**: C. Riekel	*Received at ESRF:*

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Report:

Micron sized crystals of chicken feather keratin were grown on a carbon coated Cu grid. A micrograph of the grown crystals between cross polars is shown in Fig. 1. A square in the Cu grid having crystals is selected and scanned across (as in a mesh-scan) in steps of 2 μm using a beamsize of 1x1 μm^2 and an energy of 12.6 keV. A mesh scan of the selected square having crystals is shown in Fig. 2. This figure shows a compilation of diffraction patterns with a light and dark region, providing impression of the selected region. The edges of the selected region in the Cu grid is identified by the presence of Cu diffraction rings.

To visualise the crystalline region in the selected square, a region of interest (ROI) in the diffraction pattern is defined. This ROI can then be compiled into the corresponding mesh scan as shown in Figure 3. Profile of the ROI provides impression of a crystalline domain present in the selected square of the grid.

The diffraction pattern showed both arcs and or spot as is shown in Fig. 4a and 4b, respectively. For comparison, a typical diffraction pattern of a small piece of a chicken feather is shown in Fig 5. This diffraction pattern shows sharp arcs along the vertical axis and broad

arcs/rings in the horizontal axis. Orientation of the crystal-axes and long/short range order can be deduced.

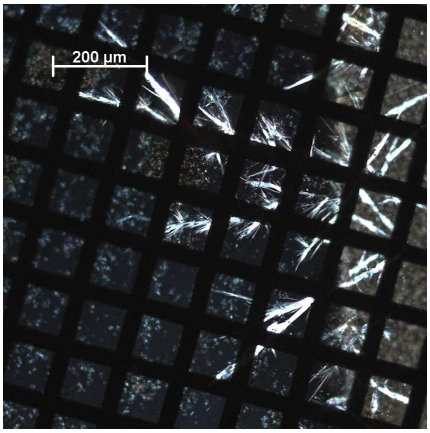


Figure 1: Micrograph of chicken feather keratin on carbon coated Cu grid.

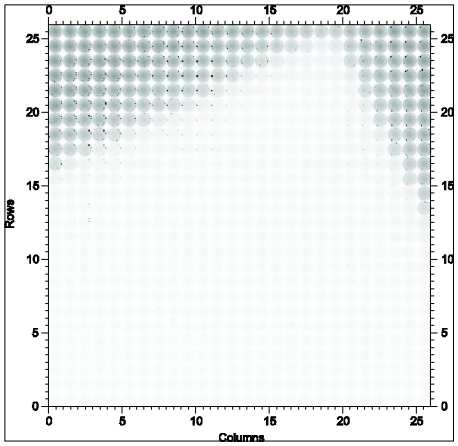


Figure 2: Compilation of series of diffraction patterns scanned acros a box of the grid.

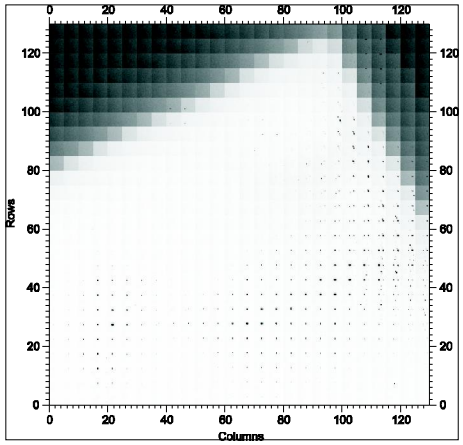
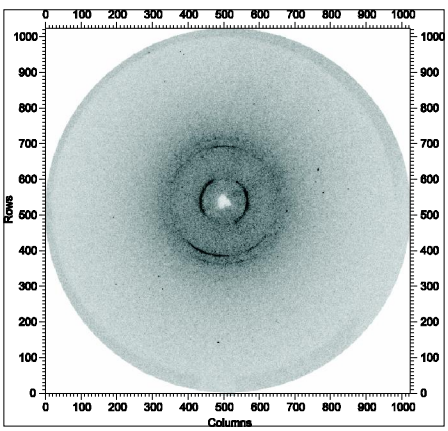
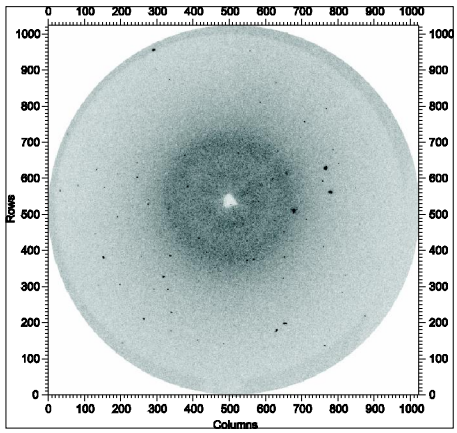


Figure 3: Compilation of series of diffraction pattern where a particular keratin reflection is selected.

Integration of each diffraction pattern and plotting them in a 3D, as in Figure 6, reveals that not all of the diffractograms have the same peaks. This implies that the square in the grid contains not one single crystal but a multitude of crystals with different crystallograpic domains.



a



b

Figure 4: Diffraction patterns of chicken feather keratin crystals showing: a) diffraction arcs and b) diffraction spots.

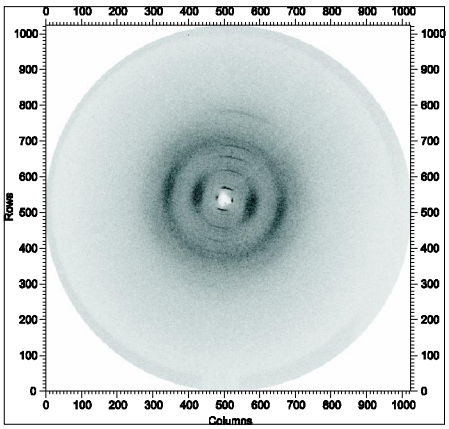


Figure 5: Diffraction pattern of chicken feather.

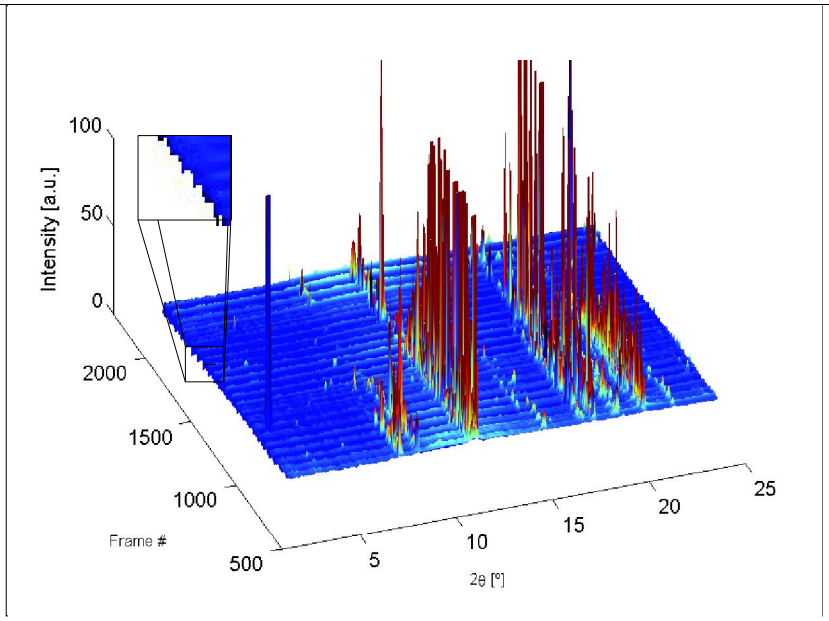


Figure 6: Representation of diffraction spots/arcs of the mesh scan as calculated by integrated diffraction patterns. Note that the ondulation of the scan width of the mesh scan can be seen in the insert.