ESRF	Experiment title: On-line ODF Microtexture Analysis of Polycristalline Materials	Experiment number: HC 415 HC 420
BeamIine: ID13/BLl	Date of experiment: from: 19.6.1996 to: 23.6.1996	**Date of report:** 1.9.1996
Shifts: 15	**Local contact(s):** F. Heidelbach	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

* H.-R. Wenk, Department of Geology and Geophysics, University of California, Berkeley, CA 94720, U.S.A.
*M. Pernet, Laboratoire de Cristallographie, CNRS, 38043 Grenoble, France
D. Chateigner, Laboratoire de Cristallographie, CNRS, 38043 Grenoble, France
P. Germi, Laboratoire de Cristallographie, CNRS, 38043 Grenoble, France
* C. Riekel, ESRF, 38043 Grenoble, France

Report:

The preliminary results of the two experiments HC415 and HC420 are reported here together because the goals of the two experiments were almost identical; the establishment of a procedure for microtexture measurements with a small X-ray beam (30μm) at the Microfocus beamline of ESRF. In the course of the experiment various samples (Al and Fe wires, High Tc superconductors, bone material and diamond thin films) were measured in transmission as well as in reflection; the analysis of these data is still ongoing and due to the limited space we will present here the complete procedure and the results only for one experiment, the texture analysis of thin Al wires (98, 150 and 200 μm thick).

Experimental setup: The monochromatic (λ=.6883Å, Zr absorption edge) and focussed beam was collimated with a 30μm collimator and then aligned with the crossing point of the rotation axes of the Kappa goniometer available at BL1. The sample wires were then also optically aligned on a goniometer head and centered at the same crossing point. The experiment was carried out in transmission so that the 2D CCD detector was positioned stationary at 2Θ=0° and a distance of 57.5 mm, recording the complete Debye powder rings of {111}, {200}, {220} and {311} of the f.c.c. structure. The sample was rotated

in 10° steps around the wire axis (parallel to ϕ of the Kappa geometry).

Analysis procedure: The intensity variation along Debye ring was extracted from the 2D image by integration and the transferred into pole figure angles. The axially symmetrized pole figures are displayed here with the wire axis in the center (Figure l). The blind areas with no areas in the center of the pole figures are due to the measurement geometry and correspond to the Θ-angle for each {hcI }. The pole figures were then used as input for the calculation of the complete orientation distribution function (ODF) with the WIMV algorithm [1]. In this case of an axially symmetric texture the inverse pole figure of the wire axis represents the complete texture information (Figure 2). Note that due to the measurement geometry the intensity distribution in the direction of the wire axis could not be directly measured but could only be derived from the ODF calculation. The wire shows a strong {111} fiber texture with a small component of {100} oriented material, which is consistent with textures found in thick wires.

Conclusions: The consistency and reliability of the texture data gained in this study is very encouraging and we plan to expand the microtexture experiments on the rnicrofocus beamlime.

Figure 1: Pole figures of Aluminum wire of 98µm thickness.

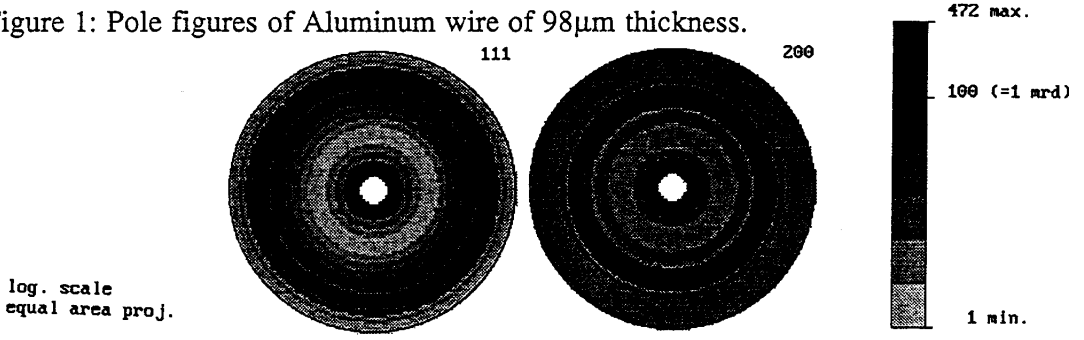
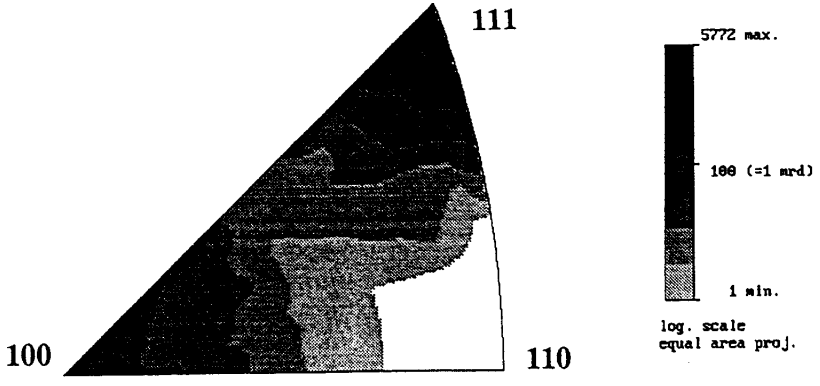


Figure 2: Inverse pole figure of wire axis of the same sample as in Figure 1.



[1] Matthies, S. (1979), *Physics Status Solidi*, **B92**, *135-138.*