ROBL-CRG	**Experiment title:** Pole figure measurements on coarse grained black tourmaline	**Experiment number**: 20_02_633
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Report:

Black tourmaline (schörl) (ditrigonal-pyramidal) is a characteristic mineral formed during the pneumatolytic state of the consolidation of granitic intrusions into the Earth's crust. It may be concentrated like planar, mostly spotlike distributed occurrences on joint planes within granitic bodies, but never reaches concentrations in nature required for diffraction experiments using neutron radiation. Therefore, textural information on tourmaline may be of interest analysing the latest states of granitic magma consolidation or even states of its earliest deformation.

Tourmaline occurs in several modifications depending on its contents on iron, sodium and others. The tourmaline under investigation was proved to be the iron-rich mineral *schörl*.

With a powder sample it was verified that (0 5 $\bar{5}$ 1), (2 2 $\bar{4}$ 0), (0 1 $\bar{1}$ 2), (1 3 $\bar{4}$ 1), (1 2 $\bar{3}$ 2) and (2 1 $\bar{3}$ 1) were the strongest reflections. The measurement of polefigures of these lattice planes with a 5°x5°-grid, where the azimuthal angle varies from 0° till 355° and the polar angle from 0° till 70°. Because the sample is coarse-grained a special sample oscillator (Huber 511.301) was used. The oscillation range was 10 mm and achieved by the movement of an excenter. In Fig. 1 is shown the sample oscillator.

Thus increasing the number of crystallites which should be detected it was estimated to obtain smooth polefigures. The analysis of data showed that the effect of the coarse grains remained. All ODF-programms we tried have refused working.

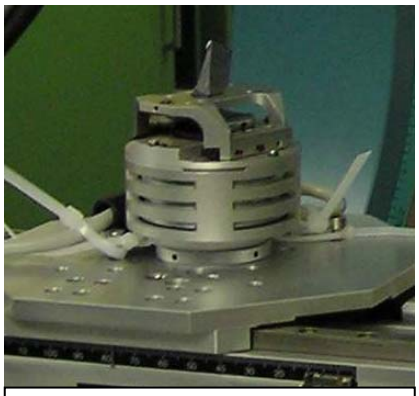

Fig. 1: Sample oscillator

We tried some correction strategies:

- smoothing with binominals
- smoothing with fast Fourier analysis
- smoothing with cubic splines

All these correction work one-dimensional, i.e. for the same tilt (polar) angle for varying azimuthal angles. In the pole figures is this to be seen as "elongations" on circular traces. In Fig. 2 is shown a section of the (012)-pole figure for the polar angle $\psi = 5°$. Besides the background corrected experimental measured values there are shown 5-fold binominal smoothed data and data after fast Fourier smoothing.

Another correction concept was to develop the circles of the pole figures in Gaussians. Gaussians with halfwidth below 2° were regarded as "grains" and removed, i.e. replaced by the mean value of the neighbours. Removing a certain number of the strongest "grains" the remaing pole figure should be smoother and processable. But alas, this procedure was changing only the scale of the effect. The remaining pole figure show still coarse grains.

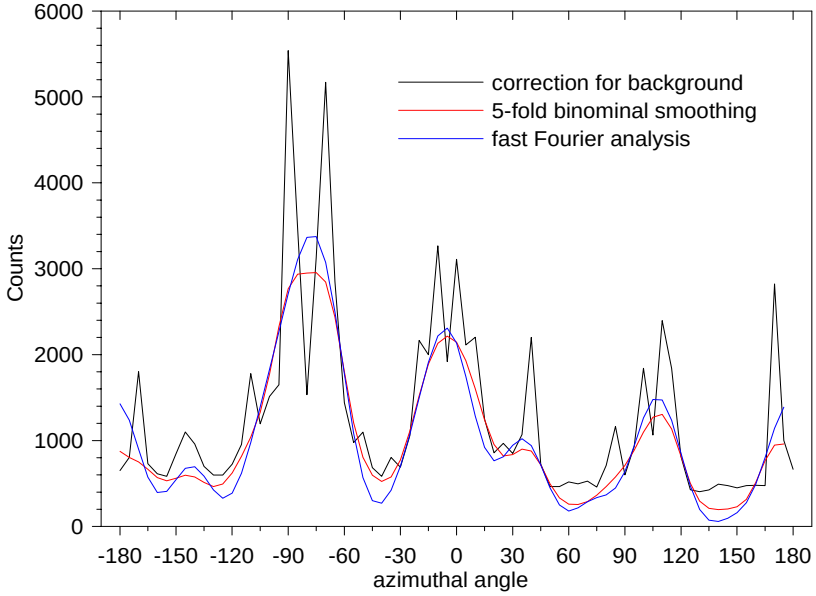

Fig. 2: Smoothing of polefigures. The black curve represents the background corrected original data, in red is shown the effect of binominal smoothing,, blue curve shows fast Fourier smoothing.

Further investigations are under their way to fix this problem with newly developed algorithms for sharp textures.