

From microcrystals to nanocrystals

Reinhard B. Neder, Manfred Burghammer, Thomas Grasl, and Heinz Schulz
*Institut für Kristallographie, Ludwig Maximilians Universität, Theresienstr. 41, München 80333,
Germany*

Stefan Fiedler, Andreas Bram, and Christian Riekel
European Synchrotron Radiation Facility, BP 220, 38043 Grenoble, France

The high brilliance of the microfocus beamline ID13, ESRF, allows one to push the limits of single crystal diffraction to the nanometer range. Samples, for which no single crystal data had been available due to their limited size, can now be studied by single crystal diffraction.

The resolution of optical microscopes is insufficient to mount nanometer-sized single crystals. We developed a novel micromanipulator for use within a scanning electron microscope. The micromanipulator uses a combination of stepper-motor-controlled microtranslation units with piezo drivers and is capable of nanometer resolution. Samples as little as 300 nanometers in diameter can routinely be mounted to small glass rods. These glass fibers are pulled from massive glass rods to achieve a diameter of some 500 nanometers.

As a first example, we report on the results of diffraction experiments with single crystal samples of natural kaolinite. The sample volume is estimated to be about one tenth of a cubic micron. An important part of the experiment is the background reduction. Nanometer-sized sample supports and the vacuum option of beamline ID13 are essential.