s5.m3.o5 **TEM investigations on microcrystalline SiO_2.**

C. Wahl, G. Miehe, H. Fuess. *Institute of Material Science, Darmstadt University of Technology, Petersenstr. 23, D-64287 Darmstadt.*

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Microcrystalline quartz contains a large amount of planar defects. As Heaney and Post [1] revealed, most fine grained quartz contains between 10% to 80% of moganite, a SiO_2-modifikation with a special structure type containing 4-rings of tetrahedra [2]. Moganite was first found on Gran Canaria in the 70s.

The present investigation focuses on the quartz-moganite system: Often completely ordered moganite domains are intergrown with so called "disordered" quartz which coexists with "ordered" quartz. Different micro-crystalline fabric varieties are investigated, one of them being chalcedony. The investigations are mainly performed by means of HRTEM. Due to the high beam sensitivity of the material, the images are recorded on video. Contrast simulations are necessary for the interpretation of the images.

A second method – the so called **D**efocused **D**ark-**F**ield method (**DDF**) – is used to get more information about the phenomenon of the wrinkle banding ("Runzelbänderung"), a rhythmic extinction banding that only occur in chalcedony. The method offers the possibility to visualise orientational relations in the fabric. In practice the centre of a powder ring segment in the selected area diffraction mode is tilted to the optical axis. When the dark-field image is defocused, the bright areas move corresponding to the position of the associated diffraction spots with respect to the optical axis. A pair of images taken in over- and under-focus, respectively, and viewed as a stereo pair shows the orientation as the third spatial dimension. The application of this method shows that the "fractal" character [3] (selfsimilarity in dimensions 1cm - 0,1 mm - 1000nm) of some features in the fabric of micro-crystalline quartz is extended to smaller dimensions: in chalcedony crystallites with dimension of 1000 nm are built up of mosaic blocks with 10 nm size.

Notes

[1] P.J. Heaney, J.E. Post, Science 255 (1992) 441-443.
[2] G. Miehe, H. Graetsch, Eur. J. Minral. 4 (1992) 693-706
[3] P.J. Heaney, A.M. Davis, Science 269 (1995) 1562-1565