

ESRF

Experiment title:

Single crystal diffraction experiments on kaolinite

Experiment

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Local contact(s):A. Brain

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Report:

ABSTRACT

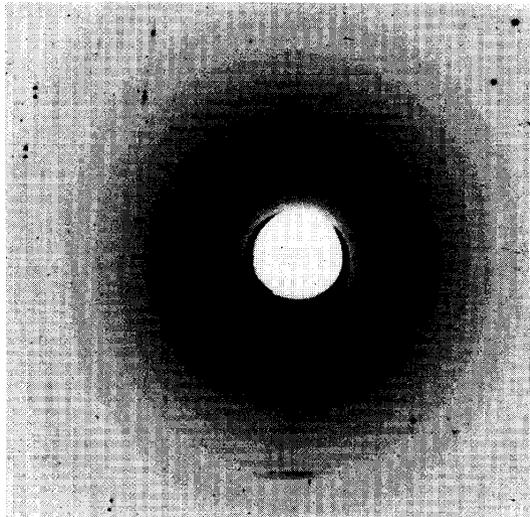
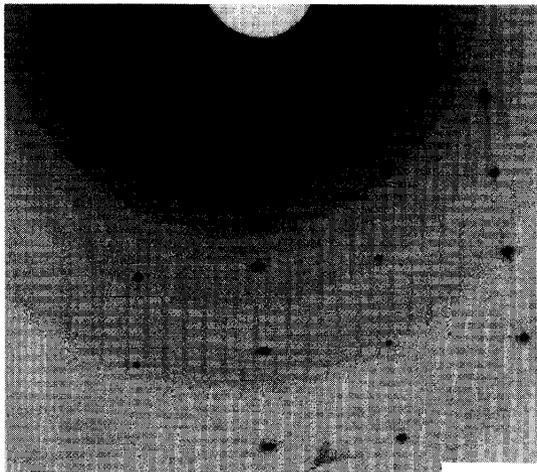
For the first time single crystal diffraction experiments on individually mounted kaolinite crystals with volumes of 8 to 0.4 μm^3 are reported. The diffraction patterns prove that no reflections violating the C-centering exist, confirming the space group C 1 for kaolinite. Preliminary refinements confirm the structural model of kaolinite in C 1. Non-hydrogen atoms could be refined anisotropically and the hydrogen positions could be refined as well. The diffraction patterns show diffuse scattering in streaks along 001 through hkl reflections with hk not equal zero, which is caused by stacking faults. The diffraction pattern of the smallest (0.4 μm^3) sample also reveals micro twinning and diffuse scattering. This sample consists of domains of left and right handed kaolinite

Neder, R. B., Burghammer, M., Grasl, Th., Schulz, H., Brain, A., Fiedler, S. & Riekell, C.
(1996)

Single crystal diffraction experiments by submicrometer sized kaolinite; observation of
Bragg reflections and diffuse scattering.

Z. Kristallogr. in press.

Diffraction pattern of the $8\mu\text{m}^3$ kaolinite. The oscillation range was 8° , exposure time 350 s. The orientation of this oscillation is approximately normal to the h00 direction. The three strong reflections in the bottom center of the diffraction pattern are 004, 005 and 006. The reflection at the top left is 021, at the top right 042. Note the diffuse scattering parallel 001 through the 021 and 041 reflections that is not observed between the 001 reflections.



Diffraction pattern of the $0.4\mu\text{m}^3$ kaolinite crystal. The 001 direction is approximately vertical in the diffraction pattern. Oscillation range 8° , exposure time 600 s. The 002 and 004 reflections are not split while the other reflections are split due to micro twinning. Note that the separation between corresponding reflections in a pair increases with increasing distance to 001.