

Morel, J., Zahid, M., den Brok, S.W.J. (2000) Time-dependent cataclastic deformation of very soluble elastic/brittle salts. Geoscience 2000 Meeting 17-20 April 2000 in Manchester.

Time dependent cataclastic deformation of very soluble elastic/brittle salts

Jacques Morel¹, Mohsine Zahid¹ and Bas den Brok²

1. Institut für Geowissenschaften, Mainz, Germany.
2. Geologisches Institut ETH Zürich. Switzerland.

Two types of experiments were carried out at room temperature on very soluble elastic/brittle salts used in our laboratory as a rock analogue material for in-situ microscopy study of dissolution/precipitation deformation processes ("pressure" solution, cataclastic solution creep):

1) The effect of elastic strain on the microstructure (micro topography) of free surfaces of K-alum ($\text{KAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$) and NaClO_3 -single crystals (typically 4 x 4 x 12 mm in size) was studied while the crystals dissolved in an undersaturated solution. Regular arrays of dissolution etch grooves (typically 20 μm deep, 40 μm wide) developed in an orientation approximately perpendicular to the maximum compressive stress, and following crystallographic low index directions. Because of localisation of the stress, grooves can develop into a fracture network and time-dependent cataclastic deformation of the rim of the stressed crystals.

2) Wet NaClO_3 synthetic polycrystals (grain size XXX μm) were stressed and microscopically studied "in-situ". Irregularly distributed etch grooves developed on grain boundaries under relatively low surface normal stress, i.e. parallel to the maximum compressive stress. These etch grooves also developed into fractures leading to time-dependent cataclastic deformation of the grains. On removing the stress the fractures healed and grooves disappeared.

Similar observations have been made in deformation experiments on quartz.