

Fracture Sealing Experiments in Transmitted Light Microscopy

AU: Hilgers, C

EM: c.hilgers@ged.rwth-aachen.de

AF: Geologie-Endogene Dynamik RWTH Aachen, Lochnerstr. 4-20, Aachen, 52056 Germany

AU: * Urai, J L

EM: j.urai@ged.rwth-aachen.de

AF: Geologie-Endogene Dynamik RWTH Aachen, Lochnerstr. 4-20, Aachen, 52056 Germany

AB: Fracture sealing is an important process in structural geology, hydrocarbon industry, groundwater modelling and nuclear waste repositories. In all cases the precipitation of minerals from advecting solute significantly changes the flow pattern in the rock. Studies of this problem most commonly consider the dissolution of a solid from fracture surfaces in bulk experiments. Precipitation experiments are more complicated as the exact location of precipitation and sealing is difficult to control. We developed a transparent reaction cell for direct observations of the sealing process at a grain scale, which also allows to re-open the sealed fracture. Movies will be presented of the fracture sealing processes caused by epitaxial overgrowth from advecting solute. Solute is pumped at constant fluid flux rate along an artificial fracture surface. The fracture is about 3 mm wide and 15 mm long. We used alum as analogue material, which produces microstructures observed in many natural rock samples and has similar growth kinetics. Experiments show the complexity of polycrystal growth from supersaturated solution. The variation of fluid flux rate and supersaturation controls the final sealing pattern in the fracture. Additionally, the orientation of the seed crystal facets and secondary recrystallisation have an important effect on the final vein microstructure. In all cases the fr