

LOCAL PHENOMENA IN METAMICT MINERALS

Ulli Bismayer¹, Carsten Paulmann²

^{1,2} Mineralogisch-Petrographisches Institut, Universität Hamburg, Grindelallee 48, 20146 Hamburg, Germany

The modification of minerals with MO_x -polyhedra ($M = \text{Si}, \text{Al}, \text{Ti}\dots$) due to metamictization phenomena is complex. Radioactivity occurs in natural minerals and recoil processes due to alpha radiation change over geological time scales the originally periodically structured material into a quasi-amorphous state with persisting short-range order but destroyed long-range order. The local polyhedra topology in metamict samples can be very different from classical arrangements in the crystalline state and hence, local as well as macroscopic physical properties are drastically modified in the irradiated material. Thermal annealing leads via various steps to a re-established long-range order and to other phenomena like dehydration. Local, mesoscopic and macroscopic behaviour of different mineral-examples, with and without additional structural transformation behaviour will be discussed. Fig 1. displays typical the lattice reconstruction of metamict titanite on annealing.

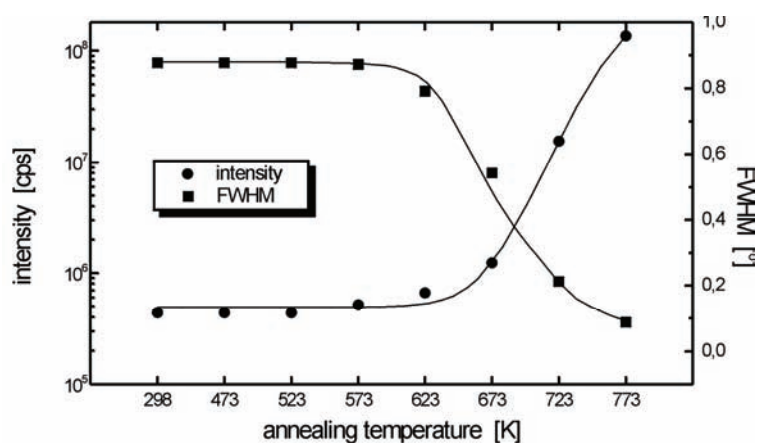


Fig. 1. Intensity and width of the 080-Bragg reflexion in metamict titanite as a function of temperature and annealing time (15 min per temperature step) (Paulmann et al. 2000).

References

- [1] Paulmann, C., U. Bismayer and L.A. Groat. Thermal annealing of metamict titanite: A synchrotron radiation and optical birefringence study. *Z. Kristallographie* **215**, 678-682, 2000