

Topic: Tracer diffusion in alkali feldspar

Alkali feldspar is a binary mixed phase between albite ($\text{NaAlSi}_3\text{O}_8$) and potassium feldspar (KAlSi_3O_8) and is one of the most common mineral groups in the earth's crust. At high temperatures, alkali feldspar shows complete miscibility. Intermediate alkali feldspar separates and forms an intergrowth of Na-rich and K-rich lamellae (perthite) during the cooling from super-solvus temperatures. After formation, the lamellae start to coarsen and chemical segregation enhances. Both processes are time- and temperature-dependent and have to be calibrated for geological time scale determinations. So far, the accuracy of the reconstruction of the thermal history from perthite microstructure and chemistry is limited, because the calibration is mainly based on segregation experiments, which integrate all underlying processes including Na-K diffusion, the formation of new phase boundaries and the development of coherence stress. For an improved quantification of the segregation, each of these processes must be calibrated in independent experiments and their mutual interactions must be understood. The main goal is the determination of the Na and K tracer diffusion coefficients including their temperature, composition, direction and deformation dependence by the radiotracer technique.