Na-K INTERDIFFUSION IN ALKALI FELDSPAR – COMPOSITION DEPENDENCE, ANISOTROPY AND CHEMICALLY INDUCED STRESS

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Cation exchange experiments have been conducted using crystallographically oriented plates of gem quality sanidine.
The geometry of the observed diffusion fronts can be explained by a composition dependent interdiffusion coefficient $D(X_{Or})$. Using the Boltzmann transformation we extracted the composition dependence of D from our measured data in the composition range $0.5 < X_{Or} < 1$ in the directions normal to (001) and (010). At 850 °C the interdiffusion coefficient is nearly constant for the composition range $0.50 < X_{Or} < 0.96$ for both directions before rising steeply at higher X_{Or}. Interdiffusion normal to (001) is faster by a factor of about ten than normal to (010).
Comparison of our data with theoretically calculated interdiffusion coefficients derived from literature data (FOLAND, 1974; KASPER, 1975) using the Manning relation showed that while interdiffusion normal to (001) shows a rough fit the slower interdiffusion normal to (010) deviates significantly from what would be expected.
The strong direction dependence of the diffusion profiles indicates that interdiffusion might be influenced by chemically induced coherency stress across the diffusion front. A new method cross correlating shifts in EBSD Kikuchi patterns has been employed to estimate stress and lattice distortion.

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