

## **Mobility of HFSE - insights to the complexation in aqueous fluids at high P-T conditions**

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Igneous rocks occurring along convergent plate margins are significantly depleted in high field strength elements (HFSE). The geochemical signature of these rocks is thought to result from complex melt formation processes involving aqueous solutions, which stem from dehydration of the subducted slab. In these processes, HFSE retention may be controlled by the presence of accessory phases such as zircon and rutile, which can strongly fractionate HFSE (e.g. Brenan et al. 1994). However, the effective mobility of the HFSE is also dependent on the stability of these phases in the P-T-X space. Recently, we presented new data on the solubility of rutile in aqueous fluids acquired at in-situ conditions using diamond anvil cells and synchrotron radiation micro-XRF. The rutile solubility in Na-Al-Si bearing fluids is considerably enhanced in comparison to water and increased with the Na/Al ratio of the fluids, reaching more than 4000 ppm Ti in a fluid containing 30 wt% Na<sub>2</sub>Si<sub>3</sub>O<sub>7</sub> (Manning et al. accepted). These data suggest enhancement of solubility by complexation of Ti with the Na-Al-Si components in these fluids. Here, we present new results on the solubility of zircon and Zr complexation in Na-Al-Si bearing fluids measured by in-situ SR-micro-XRF and XANES. Experiments were performed at the ESRF beamline ID 24. As with Ti, the Zr content in the Na-Si bearing fluid is ca. 200 times higher than in the Na-Al-Si bearing fluid. In order to study the complexation mechanism directly, XANES measurements at in-situ conditions were performed. Our first spectra acquired on Na-Si bearing fluids reveal a considerable difference in the short-range structural environment in comparison to Zr in HCl or nitrate solutions (Farges & Rossano 2000). The spectra show qualitative similarities to spectra taken on Zr in sodium-silicate glass, suggesting a complexation environment for Zr in these fluids, that is similar to the short-range environment in silicate glass. These data imply, that Zr can readily be scavenged by the silicate components dissolved in the fluid and that the Zr (HFSE) mobility may be closely linked to the prevalence of these components in the fluid.

### References

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