

Nd isotope initials of Turku Migmatite Complex: Contemporaneous production of contrasting felsic melts

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Within the Turku Migmatite Complex (TMC) in S-Finland two types of in-situ partial melts are observed: akf-quartz-dominated melts and leucosomes comprising 'small-scale granites'. These and the respective restites and precursors have been interpreted in a common genetic model (Johannes *et al.* 2003). In order to test the hypothesis of contemporaneous production of contrasting felsic melts within the same educt, Nd-isotope analyses were performed on garnet separates. U-Pb dating of zircons of the TMC indicate a 1.83 Ga partial melting event. If both types of leucocratic melt were generated at this stage, garnets of both leucosome types and of the respective restites should reveal identical initial Nd isotope compositions.

Clean garnet separates of leucosomes and restites from two different outcrops (R, L) were prepared and analyzed for their Sm-Nd isotope signatures by TIMS. Resulting present-day ϵ_{Nd} values of garnets derived from akf-q-leucosomes are +373 and +288, from restites are +173 and +76 and from small-scale granites are -6 and +76. Recalculation of the Nd isotope composition to the zircon age of 1.832±11 reveal identical ϵ_{Nd} (1.83Ga) of +4.2 for outcrop L and +7.0 for outcrop R for leucosomes and restites, respectively. The observed difference of 3 ϵ -units in the calculated initial Nd isotope compositions is probably due to local heterogeneity within the thick meta-pelite precursor. Considering the peak P-T-conditions in this area with ~800°C and 6 kbar (Johannes *et al.* 2003) it seems obvious that isotopic equilibration had been achieved at each outcrop during mid-crustal partial melting resulting in contemporaneous production of contrasting types of leucosomes. The akf-q-leucosomes and the 'small-scale granite'-leucosomes have different major and trace element composition including highly fractionated REE patterns. Akf-q-leucosomes are interpreted as cumulates formed of in-situ partial melts leaving behind an evolved liquid which crystallized to form the 'small-scale granites'.

Reference

Johannes W., Ehlers, C., Kriegsman L.M., Mengel, K. (2003), *Lithos* **68**,3, 69-90.

High-pressure behaviour of CaIrO₃ perovskite and post-perovskite phases

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CaIrO₃ perovskite and post-perovskite phases might be used as low pressure analogues of the correspondent MgSiO₃ phases in experiments that are currently impossible at conditions of the MgSiO₃ perovskite to post-perovskite transformation, provided that their high-pressure behaviour is well characterised.

Single crystals of CaIrO₃ perovskite and post-perovskite phases were synthesised in a piston-cylinder apparatus at 2.5 GPa and 1525 °C and 1 GPa and 1435 °C, respectively.

Two single-crystals, one with the perovskite and the other with the post-perovskite structure have been loaded together in a diamond anvil cell with ruby chips as pressure calibrant and a methanol:ethanol 4:1 mixture as a pressure transmitting medium. Unit-cell lattice parameters have been measured for both crystals up to 8 GPa. The CaIrO₃ post-perovskite is more compressible than the perovskite structure. The equation of state parameters determined using a second-order Birch-Murnaghan expression are $V_0=229.47(1)$ and $K_0=189.4(6)$ for the perovskite and $V_0=226.38(2)$ and $K_0=176.0(6)$ for the post-perovskite phase. The compressibility of the unit-cell axes of the perovskite structure is anisotropic with $\beta_a > \beta_c > \beta_b$. The smaller compressibility of the **b** axis also has been reported for MgSiO₃, however in the latter compound the compressibility of the **a** and **c** axes is practically the same. In contrast the **b** axis is the most compressible in the post-perovskite structure, whereas the **a** and **c** axes have similar compressibilities and are much stiffer.

Intensity data collections at high-pressure and structural refinements are underway in order to characterise the compression mechanism of these phases.