

Distinguishing trace element redistribution during mineral reactions from fluid-induced trace element mobility in blueschists

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Exhumed high pressure metamorphic rocks, having experienced conditions of downgoing oceanic crust in subduction zones, offer a rich microchemical and microtextural archive for fluid behavior under such conditions. A particularly large and well-exposed high pressure complex is found in the Western Alpine Sesia-Lanzo Zone (SLZ). Here, clear evidence for widespread fluid infiltration at blueschist-facies conditions can be observed. Chemical modification along grain boundaries and fractures of glaucophane and phengite is visible in high contrast back scattered electron images. Glaucophane core-to-rim zonations show an step-like increase in Fe²⁺ associated with a Mg-decrease, while phengites show a characteristic change towards more celadonic compositions. Thermodynamic forward models show that the observed compositional trends in glaucophane and phengite are the result of the influx of a hydrous fluid phase at around 40 km during the exhumation of the SLZ.

The trace element zoning patterns differ between metapelitic and metabasic samples. In the metapelites phengite rims have lower concentrations of B, Pb, Sr, Li and Be with respect to the cores. Amphiboles show lower B and Sr, but higher Li and Be concentrations in the rims compared to the cores. In the metabasites phengites show the same trend as in the metapelites, but amphibole have decreasing Sr, Pb and Li from core to rim associated with constant or increasing B concentrations. Trace element mass balance calculations coupled with the thermodynamic forward modelling show that epidote formation during the fluid influx leads to significant redistribution of Sr and Pb within the metapelitic and metabasic samples (closed system) and therefore masks any contribution from the infiltrating fluid (open system). On the other hand, zoning trends of Li, Be and B can not be explained by closed-system element redistribution and must therefore be related to the infiltrating fluid. Comparing trends from different lithologies, it is possible to make inference about the trace element composition of these fluid.

Study of mullite-precursor structure changes type I along with temperature rising

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Mullite (3Al₂O₃.2SiO₂) is an important material in the field advanced ceramics. For the preparation of pure and ultrafine precursors powders, the sol-gel route is a convenient method [1]. The 100°C-dried powders were heat-treated in 100°C and 50°C steps in the range from 950 to 1650°C.

Lattice parameter changes study in this heated range indicates chemical compound changing from Al-rich mullite 2:1 to Al-poor 3:2 mullite.

[1] Fischer, Schneider & Voll (1996) *J. Eur. Ceram. Soc.* **16**, 109-113.