

Trace elements of rutile in eclogites from Sulu UHPM terrane, China

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Eclogites from Sulu ultrahigh pressure metamorphic (UHPM) terrane in east China are rich in rutile, which formed a large to super-large eclogite-type rutile deposit in China. Rutile-bearing eclogites have at least three different occurrences in outcrops: (1) xenoliths in ultra-mafic rocks, e.g. in Xugou (XG-Ec); (2) lenses in marbles, e.g. in Yanmachang (YMC-Ec); (3) lenses in gneiss, e.g. in Xiaojiao (XJ-Ec). Rutile-bearing eclogites from the main hole of the Chinese Continental Scientific Drilling (CCSD), which is located in the southern part of the Sulu UHPM terrane, can be divided into four types by their accessory minerals' content: normal eclogite (N-Ec), quartz eclogite (Q-Ec), phengite eclogite (P-Ec) and kyanite eclogite (K-Ec).

Rutile has long been concerned by its ability of contain a wide range of highly charged and HFS trace elements up to the percent level. Here we report new trace elements data for rutile from Sulu UHPM terrane (18 samples from outcrops of different occurrences and 18 samples from CCSD of different types) and its implication on eclogite and eclogite-type rutile deposit's genesis. A JXA8800R electron probe microanalyser was used to measure the trace elements of rutile with high voltage and current (20kV, 100nA), and long counting time (120-300s). Detection limit of 20~50 ppm were obtained for elements Nb, Cr, Fe, V, Al and Zr.

Different trace element contents were found in rutile in eclogites of different occurrences and different types. In eclogites from outcrops, XG-Ec have the highest content of Cr, V and Zr, XJ-Ec have the highest Fe, YMC-Ec have the highest Nb; In eclogites from CCSD, N-Ec have the highest Fe, V and Zr, and K-Ec have the highest Nb, Cr and Al. In Nb-Cr diagram[1], most eclogites were plotted in rutile from mafic rocks, only YMC-Ec were plotted in rutile from metapelitic rocks. These trace element characters of rutile were well correlated with their host rocks' petrochemistry and their possible protolith. Temperatures calculated from Zr-in-Rutile geothermometer[2] for eclogites were 534~772°C, a little lower than that calculated from Grt-Omp geothermometer, which may be interpreted that rutile were formed prior to the peak metamorphism. This investigation showed that trace elements of rutile have great potential in the study of UHPM eclogites and eclogite-type rutile deposit.

References

- [1] Zack T, von Eynatten H, Kronz A. (2004) *Sediment Geol.* **171**, 37-58.
- [2] Zack, T, Moraes, R, Kronz, A. (2004) *Contr. Min. Petrol.*, **148**, 471-488.