FOCUSED ION BEAM STUDY ON MELT AND FLUID INCLUSIONS FROM KERIMASI VOLCANO, TANZANIA

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In this study we demonstrate applicability of focused ion beam-scanning electron microscopic (FIB-SEM) technique in melt and fluid inclusion research (BERKESI *et al.,* 2012; GUZMICS *et al.,* 2012). The samples studied are calciocarbonatite and pyroxene-nephelinite (afrikandite) from Kerimasi volcano, Tanzania. The rock-forming phases are abundant in primary melt and fluid inclusions. Our stepwise exposure technique (Fig. 1) allowed us to calculate the actual volume proportions of daughter phases in both melt and fluid phases inside the inclusions. This can uniquely help in determination of composition of bulk fluid system coexisted with the melts by combining our FIB-SEM results with that from Raman analyses.

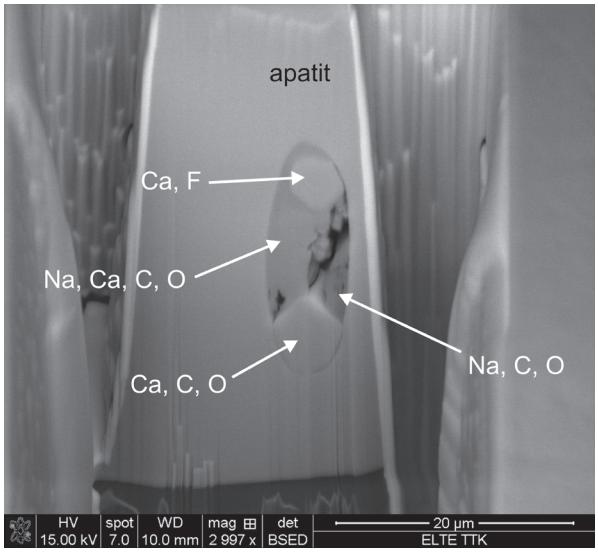

Fig. 1. *Focused-ion-beam-exposed carbonate melt inclusion in apatite from Kerimasi calciocarbonatite. Backscattered electron image.*

The FIB-SEM study shows presence of daughter phases in the carbonate melt and coexisted fluid inclusions, such as $(Ba,Sr)SO_4$, $NaHCO_3$, CaF_2, $(Na_2,Ca)(CO_3)$, Na_2SO_4 and NaCl. This suggests that the fluid, coexisted with the melt(s), was mainly consisting of components of Na, Cl, C, O, S and H. In contrast to previous fluid inclusion studies (e.g., BÜHN *et al.* 2003), our work suggests that fluids, derived from carbonate-rich igneous systems, are not capable in carrying rare earth and high field strength elements in a comparison with melts, but play important role in precipitation of late stage alkaline-rich phases, such as nahcolite, alkaline carbonates and alkali sulphates. Our study additionally demonstrates that FIB-SEM technique is powerful in studying daughter phases that are highly sensitive (e.g. use conventional polishing) and/or easily can alter due to humidity of air.

References

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