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Unmixed glass inclusions in clinopyroxenes: A unique occurrence from the SCLM xenoliths of Deccan Traps, India

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End-cretaceous alkali basalts from the north-western margin of the Deccan Volcanic Province (DVP) carry Sub-Continental Lithospheric Mantle (SCLM) xenoliths [1]. Preliminary studies on these SCLM xenoliths have revealed there metasomatized nature [1]. Here we report occurrence of unmixed silicate glass inclusions within diopside grains (Fig. 1). The studied xenoliths are mainly dunites with minor harzburgites and lherzolites and the whole suite can be divided into two groups- Group 1 and 2, based on the occurrences of metasomatic features. Group 2 contain three different groups of diopsides with different chemistry and texture (Fig. 2). Melt inclusion bearing diopsides have variable Mg# (87-92), Al_2O_3 (1.3-4.6 wt%), high Cr_2O_3 (1.2-1.5 wt%) and Ti (avg. 3800 ppm). They possess high Y (~11-23 ppm) and low Sr (~40-140 ppm) and are LREE enriched. They are observed replacing primary diopsides and adjacent to reaction rims which replace primary orthopyroxene. The glass within most of these inclusions exhibit spectacular separation into two visibly distinct phases (Fig. 1). The lighter coloured glass has high SiO_2 (63-67 wt%), alkali (10-15 wt%), Al_2O_3 (13-19 wt%) with low FeO, MgO. The darker glass has high MgO (20-32 wt%), low SiO_2 (40-45 wt%) with very low alkali (0.2-0.35 wt%). Silicate-silicate immiscibility of similar type has been reported for lamprophyres [2] and interestingly, the REE patterns of the modelled melt in equilibrium with the host diopsides matches exactly with lamprophyres of DVP. Another important clue is that similar glasses are found within the reaction rims around primary orthopyroxene. This suggests the possibility that the DVP SCLM experienced metasomatism by a lamprophyre-like melt which crystallized the diopsides and reacted with primary orthopyroxenes. This melt may have become trapped within diopsides and later suffered immiscible separation by decompression during ascent.

[1] Mantle-derived mafic-ultramafic xenoliths and the nature of Indian sub-continental lithosphere, Karmalkar, N. R., Duraiswami, R. A., Rao, N. V. C. & Paul, D. K. (2009), *J. Geol. Soc. India* 73, 657–679.

[2] Minor and trace element partitioning between immiscible ocelli-matrix pairs from lamprophyre dikes and sills, Monteregian Hills petrographic province, Quebec, Eby, G. N. (1981), *Contrib. to Mineral. Petrol.* 75, 269–278.

Fig. 1

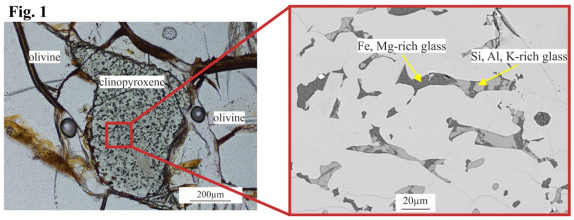

Figure 2