ORIGIN OF GLASS IN A SPINEL PERIDOTITE XENOLITH FROM SZENTBÉKÁLLA, PANNONIAN BASIN, HUNGARY - TRACE ELEMENT EVIDENCE

G. DOBOSI[1], A. EMBEY-ISZTIN[2] and G. A. JENNER[3]

[1.] *Laboratory for Geochemical Research , Research Centre for Earth Sciences, Hungarian Academy of Sciences, H-1112 Budapest, Budaörsi út 45, Hungary.* dobosi@geochem.hu

[2.] *Department of Mineralogy and Petrology, Hungarian Natural History Museum, Ludovika tér 2, H-1431 Budapest, Hungary*

[3.] *Department of Earth Sciences, Memorial University of Newfoundland, St. John's, NF, A1B 3X5, Canada*

Silica-, alumina- and alkali-rich glasses found in upper mantle spinel peridotite xenoliths as pockets and veins are commonly interpreted as low degree melting in the mantle, breakdown of amphibole, or they may represent metasomatic melt infiltration into the lithospheric mantle.

Such melt pockets and glass veins occur in the peridotite xenoliths from Pliocene alkali basalts of the region of Lake Balaton (Hungary) and they have been investigated by Embey-Isztin and Scharbert (2001) and by Bali et al. (2002); however, these investigations are based mainly on electron-microprobe analysis, and the trace element content of the glasses have not been studied so far. Using laser ablation ICP-MS method (at the Memorial Unversity of Newfoundland) we present the first, preliminary data on the glasses from a spinel peridotite xenolith from Szentbékálla (region of Lake Balaton).

The xenolith (Szt1130) has equigranular texture with a slight foliation and composed of olivine, orthopyroxene, clinopyroxene and spinel. No amphibole can be observed in the xenolith. The glassy patches (up to 1 mm across) contain secondary cpx, ol and sp and rounded blebs of carbonate (calcite with a few % of $MgCO_3$). Glass with carbonate blebs also occur as thin veinlets along grain boundaries of primary phases; contrary to the glassy patchets, secondary crystals are missing from the veinlets in this sample. The variation in glass composition is relatively small in the thin section; the glass has silica saturated composition with Al_2O_3 about 20 wt% and Mg# about 0.62. The Na_2O content of the glass is 4 wt% but it has unusually low (0.1 wt%) K_2O.

The glass has a concave upward chondrite normalised REE pattern peaking at Pr and Ce with negative anomaly of Zr and Hf relative to the adjacent REE (Fig.1.). The REE and Zr-Hf pattern of the glass is practically identical to that of the primary clinopyroxene of the xenolith, however, the clinopyroxene has lower abundances of Ti, Sr, Nb, Ta, Ba and Rb than the glass. Since there is no any trace of resorption of the primary clinopyroxene,

the glass cannot be originated as melting of clinopyroxene. However, amphibole may have approximately the same REE, Th, U, Zr and Hf but significantly higher Rb, Ba, Nb, Ta and Ti abundances as the coexisting clinopyroxene, which may suggest that the glass is the product of amphibole melting. To test this hypothesis, we plotted the $D_{glass/clinopyroxene}$ (contentration of a trace element in glass divided by the concentration of the same trace element in the clinopyroxene) together with some amphibole/clinopyroxene partition coefficients ($D_{amph/cpx}$) from the literature (Fig. 2). The agreement of the partition coefficients confirms the previous suggestion that the glass is the breakdown product of a former amphibole in the xenolith Szt1130, and this amphibole was in equilibrium with the clinopyroxene.

This conclusion is in agreement with several observation in upper mantle xenoliths (Eggins et al. 1998; Yaxley and Kamenetsky 1999). However, amphibole melting alone does not explain the presence of the carbonate blebs and the difference of the major element composition of the glass and amphibole. According to Bali et al. (2002) this discrepancy indicate that carbonate-rich external melt could have been added to the in situ melt formed by breakdown of amphibole. However, the trace element composition of the glass does not indicate the addition of an exotic silicate melt.

Key words: glass, spinel peridotit, xenolith, Pannonian Basin

References

Bali E., Szabó C., Vaselli O. and Török K. (2002): Significance of silicate melt pockets in upper mantle xenoliths from the Bakony–Balaton Highland Volcanic Field, Western Hungary. Lithos 61, 79-102.

Eggins S.M., Rudnick R.L. and W. F. McDonough W.F. (1998): The composition of peridotites and their minerals: a laser-ablation ICP¯MS study. Earth Planet. Sci. Lett. 154, 53-71

Embey-Isztin A. and Scharbert H. (2001): Glasses in peridotite xenoliths from the western Pannonian Basin. Periodico di Mineralogia 70, 359-376

Yaxley G.M. and Vadim Kamenetsky V. (1999): In situ origin for glass in mantle xenoliths from southeastern Australia: insights from trace element compositions of glasses and metasomatic phases. Earth Planet Sci. Lett. 172, 97-109.

Zack T., Foley S. and Jenner G.A. (1997): A consistent partition coefficient set for clinopyroxene, amphibole and garnet pyroxenites from Kakanui, New Zealand. N. Jb. Mineral. Abh., 172, 23-41.

Fig. 1. Trace element composition of glass and primary clinopyroxene from Szt1130 spinel peridotite xenolith

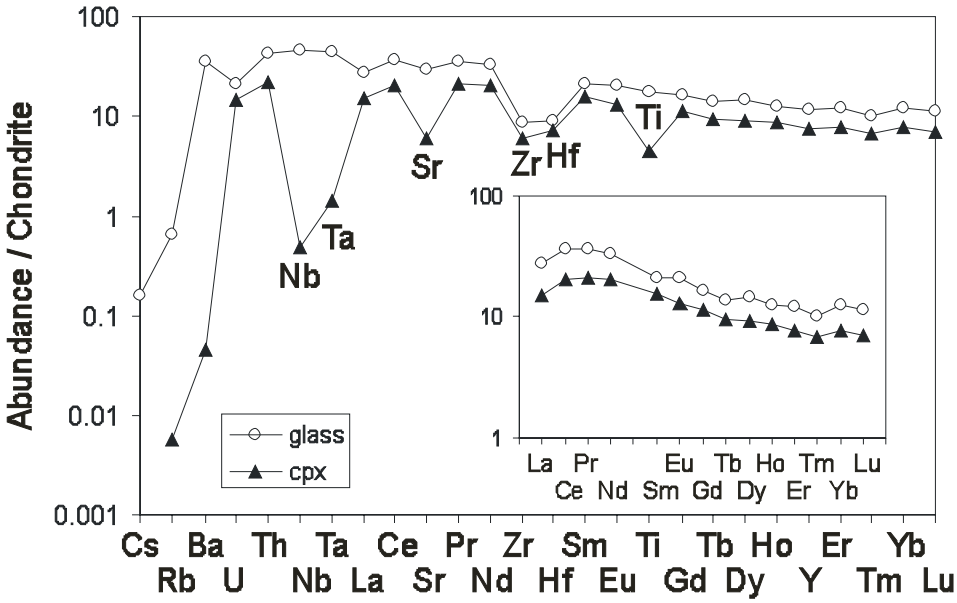

Fig.2. Comparison of trace element partitioning between glass and primary clinopyroxene with some amphibole/clinopyroxene partition coefficients from the literature (Eggins et al. 1998; Yaxley and Kamenetsky 1999; Zack et al. (1997).