Geochemical features of garnet exsolutions in mantle xenoliths (Yakutia, Russia)

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A set of mantle xenoliths (Obnazhennaya and Udachnaya kimberlite pipes) containing large ortho- and clinopyroxene crystals (up to 3 cm long) with garnet exsolution lamellae and grains was studied. Both thick (up to 1000 μm) and thin (50-100 μm) lamellae as well as cores and rims of rock-forming granular garnets were analyzed with LA-ICP-MS.

Geochemically exsolved and rock-forming garnets have similar MREE distribution. LREE in the first one are higher than that in granular garnet, with $[La/Ce]_n$ ratio >1, up to 1.8 in peridotite and to 3.2 pyroxenite xenoliths. In contrast, HREE abundances in rock-forming garnet are usually higher on several chondrite units than that in exsolved garnet. The REE distribution in garnet precipitated from pyroxene have its own peculiarity – curved or "square-root"-shaped patterns (Figure 1). Variation of geochemistry for several generations of garnet results from the trace element fractionation during cooling and exsolution process controlled by diffusion. Thus, LREE enrichment in exsolved garnet is inherited from the pyroxene host.

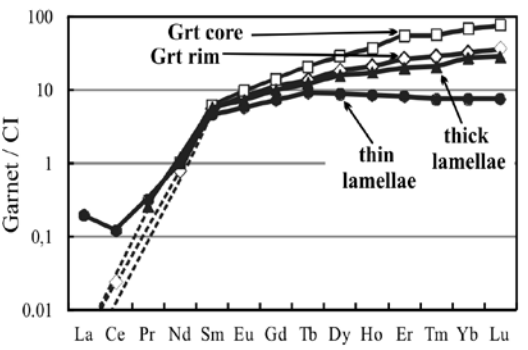

Figure 1: A bright example of fractionated REE patterns.

The study was supported by RSF grant of №15-17-30012. The work with LAT was funded by NSF grant EAR-1144337.