Melt-peridotite interaction: Origin of garnet pyroxenite in the lithosphere mantle beneath the eastern China

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Garnet pyroxenites within the peridotite are potential source of ocean-island lavas and offer a direct evidence for the heterogeneity of lithospheric mantle. They can be formed by high-pressure metamorphism of subducted slab or fractional crystallization during magmatic process. However, some ones are generated by melt-peridotite interaction, which plays an important role in understanding the mantle evolution.

In this study, garnet pyroxenite xenoliths from Nushan Cenozoic basalt in the eastern China are investigated in detail. Garnet pyroxenite vein in the spinel-lherzolite is mainly composed of coarse clinopyroxene, orthopyroxene and garnet with fine olivine. Clinopyroxene, orthopyroxene and olivine have similar Mg# ranging from 88 to 90 that is obviously higher than Mg# of typical garnet pyroxenite formed by fractional crystallization. Clinopyroxene exhibits uniform convex-upward REE patterns without Eu and Sr anomalies, implying that this garnet pyroxenite is not generated by high-pressure metamorphism of gabbro in the subducted slab. A orthopyroxene-riched zone exists between garnet pyroxenite vein and the host spinel-lherzolite, which is always considered as a result of melt-peridotite interaction in the experiment [1,2]. Furthermore, MgO and Mg# in olivine, clinopyroxene and orthopyroxene are systematic increasing from the vein to the host spinel-lherzolite, which is also consistent with melt-peridotite interaction process. $^{87}Sr/^{86}Sr$ ratios of clinopyroxenes in this garnet pyroxenite determined by LA-MC-ICP-MS are 0.7027-0.7039. Thus, we suggest that melt-peridotite interaction induced by asthenosphere-derived melt occurs in the mantle beneath the eastern China. Such process converts olivine to clinopyroxene and orthopyroxene resulting in the formation of garnet pyroxenite and contributes a lot to the destruction of the craton.

[1] Rapp *et al*. (1999) *Chemical Geology* **160**, 335-356. [2] Zhang *et al*. (2012) *Lithos* **149**, 91-99.