

**SUPERZONED GARNET IN YANGKOU PERIDOTITE,
SU-LU UHP BELT, EASTERN CHINA.**

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Two types of millimeter size garnet porphyroclasts (PC) are found in Yangkou peridotite in the Su-Lu UHP belt, eastern China. They are accompanied with fine-grained (0.1 - 0.2 mm) garnet neoblasts at the margin, but the Fe-Mg zoning trend shows an opposite sense in each type PC; Type A: Reddish garnet (ca. 4 - 6 mm in diameter) occurs in garnet-clinopyroxenite layer up to a few cm thickness and boudinaged in the host peridotite. Some grains have a relatively homogeneous core with Prp₃₂₋₄₂Alm₄₁₋₄₅Grs₁₅₋₂₂. MgO gradually increases towards the rim and FeO vice versa and the rim composition reaches ca. Prp₅₈₋₆₂Alm₂₅Grs₁₃₋₁₅. The garnet neoblast (Prp₆₇Alm₂₂₋₂₃Grs₅₋₇Uvr₃) is similar composition to the PC rim, but slightly magnesian and Cr₂O₃-rich. Randomly oriented clinopyroxene inclusions (0.5 - 1.5 mm length) are found in the core of the PC. Type B: A few porphyroclasts are observed in the fine-grained (0.1 - 0.2 mm) granoblastic matrix of the host garnet peridotite. The largest porphyroclast (ca. 3 mm in diameter) shows a slight chemical zoning: the core is richer in MgO (Prp₆₉Alm₁₇Grs₁₄) than the rim (Prp₆₅Alm₂₂Grs₁₁Sps₂). The garnet neoblast (Prp₆₆Alm₂₂₋₂₄Grs₅₋₆Uvr₅₋₇) has a composition similar to the PC rim. Although the both types of PC are almost free from Cr₂O₃ (ca. 0.1 wt%), the neoblasts developed at the margin of the both types of PC contain a significant amount of Cr₂O₃ (ca. 1.0 - 2.5 wt%).

The detail petrography of the host peridotite (YOSHIDA et al., 2004) suggests that Type B PC was formed pre-UHP stage at moderate P-T conditions (ca. 800 - 830 °C and 1.2 - 2.9 GPa) and the subsequent subduction caused UHP metamorphism at P-T conditions of 730 - 760 °C and 3.6 - 4.1 GPa accompanied with pervasive granulation of precursor phases and then finally exhumed almost isothermal conditions along with surrounding UHP meta-supracrustals (e.g. eclogite and UHP meta-granite). The compositions of Type B PC and the rim of Type A PC are identical to the composition range of garnet (prp₆₀₋₇₅grs₅₋₁₂) in the garnet peridotite in Caledonides, but the core of Type A PC has a similar composition to those of fine-grained eclogite in the Yangkou UHP unit.

These data envisage following growth history of porphyroclasts: Type B PC and Type A PC formed synchronously at the moderate depth in the host peridotite and in basaltic intrusion or trapped melt in the peridotite, respectively. Syn-UHPM granulation enhanced the element migration between the basaltic layer and the host peridotite, and then Type A PC modified its composition from the margin mainly by the volume diffusion.

The core composition of Type A PC is almost identical to "the reconstructed majoritic Grt" by YE et al. (2000), who envisaged the more deeper origin of the protolith, at the same outcrop. Our data, however, cannot support their idea.

References

- YOSHIDA, D., HIRAJIMA, T & ISHIWATARI, A. (2004): *Journal of Petrology*, 45, 1125-1145.
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