

Study of Chinese Continental Scientific Drilling (CCSD) PP6 Hole on the Macaokuang Peridotite Body, Rongcheng, Shandong Province, in the Sulu UHPM Belt

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CCSD-PP6 hole was drilled on the Macaokuang peridotite body, Rongcheng, Shandong Province, in the Sulu UHPM belt. The depth of the hole is 196.36m, in which the peridotite is 115.78m in thickness, and underlying rock is biotite gneiss. The peridotite is outcropped about 300m x 130m on the ground, and strongly weathered. However, it is fresh with weak serpentinization in the hole. Schistosity is developed in the rock. Serpentinization is strengthened near schistosity and close to gneiss. The peridotite is amphibole harzburgite to amphibole dunite, both of them without any phase boundary. Petrochemical analyses show the rock body poor in Al₂O₃ (averaged 0.61wt. %) and CaO (averaged 0.61wt. %) and rich in MgO, with averaged Mg# ($100 \times \text{Mg}/(\text{Mg}+\text{Fe})$) 92.13; total REE abundances to be much lower than that of pyrolite, and LREE abundances to be relatively enriched compared with HREE abundances; Sc, V, Sr, Zr, Rb, Ba, Th, Nb, Hf, and Y trace elements abundances to be all lower than that of pyrolite except for Pb, Co and Cl, which indicates that the peridotite is depleted mantle rock, lacking of mantle fluid metasomatism. Petrographically, the rock mainly consists of olivine (75-80%), serpentine (15%-10%), orthopyroxene (6%-3%), clinopyroxene (3%-0.5%), amphibole (0.5-5%), and spinel (0-0.5%). Olivine is about 0.06-0.5mm, containing early stage olivine and Cr-spinel. Pyroxene, mainly to be orthopyroxene, is commonly finer than olivine in grain size. However, there also found some isolated huge orthopyroxene porphyritic crystals, 5-10mm in size, full of dense exsolutions along its cleavages, which is quite different from those small grain orthopyroxene. Near the bottom of the peridotite, there scattered augen-like structural lherzolite, about 20-30mm in size, whose long axis is distributed parallel to the schistosity direction of the peridotite. The lherzolite possesses porphyritic fine grain blastic texture, with clear triple point junction, where huge orthopyroxene porphyritic crystal is in the center, while fine grain olivine, orthopyroxene and clinopyroxene surround the huge crystal. Thus it is indicated that the lherzolite has been partial melted and produced harzburgite-dunite, and the residual lherzolite was involved in the harzburgite-dunite. Amphibole, 0.5-1mm in size, euhedral to subhedral, weakly polychromatic, sometimes bended and containing olivine and Cr-spinel, is commonly of compositional ring texture, with exsolution texture center and transparent rim, and showing two different colour under cross-polars. Amphibole and serpentine all contain Cl element, and the strong the serpentinization is, the higher the Cl content in the rock. Amphibole as well as orthopyroxene porphyritic crystal should be the same stage metamorphic products and later experienced ductile deformation. Chromian spinel and magnesium aluminum spinel in the rock are commonly cracked and even mylonitized into finer grains, showing the whole rock body experienced later brittle deformation. Near the light red magnesium aluminum spinel can be found several grains of 10-60um garnet (Py_{67.94}Alm_{17.50}Uv_{2.40}Gro_{10.06}And_{0.53}Sp_{1.57}), which means that the peridotite had experienced transform from spinel phase to garnet phase and high-to ultrahigh pressure metamorphism.