

High Ni and Mg olivine as a time recorder of chromitite P-T history

MIURA, Makoto^{1*} ; ARAI, Shoji¹ ; YAMAMOTO, Shinji² ; SHMELEV, Vladimir³

¹Department of Earth Sciences, Kanazawa University, ²Department of Earth Science and Astronomy, University of Tokyo,

³Institute of Geology and Geochemistry, Ural Branch Russian Academy of Sciences

High Ni and Mg olivines were found in dunites enveloping podiform chromitites from Oman, Ray-Iz and Luobusa ophiolites. These high Ni and Mg olivines occur only in dunite adjacent to chromitite. This characteristic suggests subsolidus Ni and Mg diffusion from the chromites of the chromitite. In the case of dunite enveloping concordant chromitite from Oman ophiolite, olivines show high NiO (up to 0.5 wt %) and Fo (around 92 mol %) contents. This is not the case, however, for the dunite envelope around the discordant chromitite in the Oman ophiolite. On the other hand, olivines in dunite enveloping UHP chromitites from Ray-Iz and Luobusa ophiolites are extraordinarily high in Fo value (94 - 96) and NiO (around 0.5 wt %). Silicate exsolution lamellae in spinel from UHP chromitites and concordant chromitite suggest that these chromitites have experienced substantial cooling, and probably decompression, for a longer period than the discordant chromitite from Oman. According to the well-known Ni and Mg diffusion coefficients in olivine, the high-Ni and -Mg olivine in the dunite envelope may constrain the cooling duration of the chromitite and the history of ophiolite. Podiform chromitites are enigmatic in origin, and their origins should be systematically classified to understand concerning mantle processes. Their temporal relationship is a clue to solve this problem.

Keywords: Olivine, Ni and Mg diffusion, Podiform chromitite, Low pressure chromitite, Ultra-high pressure chromitite, P-T history