

Exsolution lamellae in cr-spinel and olivine from podiform chromitite in the Luobusa ophiolite, Tibet

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Recently we discovered unusual exsolution lamellae in Cr-spinel from podiform chromitite in the Luobusa ophiolite, Tibet. They are rod-shaped lamellae, several micrometers wide and several tens micrometers long. An analytical transmission electron microscope analysis revealed that most exsolution lamellae were Ca-rich cpx and that some were SiO₂ phase as coesite. The occurrence of coesite directly suggests that the exsolution lamellae were generated under the UHP condition over 3 GPa (90km deep). In this study, some types of exsolutions were observed in olivine from podiform chromitite, 1:rectangular cr-spinel lamellae, 2:symplectic lamellae of clinopyroxene and magnetite, 3:lamellae of clinopyroxene. Previous studies have suggested that these exsolution lamellae in olivine were generated during cooling process from relatively high temperature condition (e.g. Arai, 1978 and Moseley, 1984).

Massive, disseminated, nodular and dunitic orbicular are the most common textural types of the podiform chromitite. We confirmed that the occurrences of exsolution lamellae were quite different from each chromitite types in spite of uniform chemical compositions. Cr-spinel in massive and nodule types have many exsolution lamellae but disseminated-type around nodule does not have. Olivine in dunitic orbicular type have abundant exsolution lamellae but olivines among disseminated-type are almost exsolution free. Since exsolution lamellae usually indicate decompression and/or cooling process or oxidizing process, single magma process is not responsible for the discrepancy of exsolution lamellae. Based on the occurrence of exsolution lamellae in cr-spinel and olivine, we need to consider multi-process magmatism, including high-temperature and/or high-pressure conditions, for the podiform chromitite genesis.