

Characteristics of chromitites from the Higashi-akaishi ultramafic complex: Implications for origin of UHP chromitite

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Ultrahigh-pressure (=UHP) chromitites, which contain UHP minerals such as diamond and coesite, have been observed from ophiolites in Tibet and the Polar Urals. However, their nature, i.e. origin, frequency of appearance and P-T path, are still controversial because of insufficiency of detailed petrographic studies. Systematic observation and classification of various chromitites and enclosing peridotites from some localities are required.

Chromitites in the Higashi-akaishi ultramafic complex in the Cretaceous Sanbagawa metamorphic belt, Japan, is one of keys to interpret the origin of UHP chromitite. The Higashi-akaishi ultramafic complex is characterized by the presence of garnet in some peridotites and pyroxenites, and interpreted as a high-P metamorphic (up to 3.8 GPa) complex originally formed at a lower-P subduction zone mantle. The chromitites in the Higashi-akaishi ultramafic complex had also experienced the high-P metamorphism. They will provide us with information on the behavior of low-P chromitite upon compression via subduction.

Spinel in the Higashi-akaishi chromitite contains various inclusions, i.e. numerous needle- and blade-like diopside lamellae, and is free of primary inclusions of hydrous minerals, such as pargasite and Na phlogopite. Solid-phase secondary inclusions are mostly composed of chlorite and serpentine. Chromian spinels in the Higashi-akaishi chromitite show high Cr#s (0.8 to 0.85) and low Ti contents (<0.1 wt%), suggesting an arc-related feature. Spinel in the Higashi-akaishi chromitite and surrounding peridotite were sometimes fractured by deformation.

The Higashi-akaishi chromitite is similar in features of inclusions in spinel and spinel chemistry to the UHP chromitites from Tibet and the Polar Urals. This similarity suggests that some of the characteristics of the UHP chromitite can be formed by compression of low-P chromitite, e.g., recycling via a subduction zone. In addition, such diopside lamellae in spinel of the Higashi-akaishi chromitite are typically found from some low-P chromitites from the Oman ophiolite and the Iwanai-dake ultramafic complex, Japan. Their occurrence suggests that the UHP Ca-ferrite (or Ca-titanite) type spinel precursor is not a prerequisite for exsolution of silicate lamellae.

Keywords: Podiform chromitite, The Higashi-akaishi ultramafic complex, Spinel, Exsolution lamella, Ultrahigh-pressure chromitite