モホ付近における高温熱水活動：北部オマーンオフィオライトWadi FizhにおけるDiopsiditeとAnorthosite

High-temperature hydrothermal activities around Moho: diopsidites and anorthosites in Wadi Fizh, northern Oman ophiolite

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Reaction products between hydrothermal fluids and uppermost mantle harzburgite-lowermost crustal gabbro have been reported along Wadi Fizh, northern Oman ophiolite. They are named mantle diopsidite or crustal diopsidite. They construct network-like dike crosscutting structures of surrounding harzburgite or gabbro. The mantle diopsidite is mainly composed of diopsidic clinopyroxene, whereas the crustal diopsidite is of diopsidic clinopyroxene and anorthitic plagioclase. Here, we report new reaction product, crustal anorthosite, collected in the lowermost crustal section. It is always placed in the center of the crustal diopsidite network. It mainly consists of anorthitic plagioclase with minor titanite and chromian minerals as chromite and uvarovitic garnet.

Aqueous fluid inclusions trapped in negative crystal are evenly distributed in the crustal anorthosite. Some of them include angular-shaped or rounded daughter minerals as calcite or calcite-anhydrite composite, which were identified by Raman spectroscopic analyses. We estimated their captured temperature at 530ºC at least by conducting microthermometric analyses of the fluid inclusions by Heating-cooling stage. Furthermore, we examined their chemical characteristics by direct laser-shot sampling method operated by laser ablation-inductively coupled plasma-mass spectrometer (LA-ICP-MS). The results indicate that the trapped aqueous fluids contain an appreciable amount of Na, but no K.

Hydrothermal fluids involved in the crustal anorthosite formation transported hydrothermally immobile Cr, which was probably provided from chromite seam in the uppermost mantle section to precipitate chromites and uvarovitic garnet in the lowermost crustal section. Cr got soluble by forming complexes with anions as SO_4^{2-}, CO_3^{2-} and Cl^-. In addition, these hydrothermal fluids transported Fe, Mg, Ti and rare-earth elements. Our temperature estimation for the crustal anorthosite formation requires rather lower temperatures (530–600ºC) with considering microthermometric results and mineral equilibria, thus later circumstance than the mantle diopsidite and crustal diopsidite formation. Therefore, a series of high-temperature hydrothermal events had been significantly contributing to the chemical flux occurring around the boundary between the mantle and crustal sections.

キーワード：熱水循環、中央海嶺、化学フラックス
Keywords: Hydrothermal circulation, Mid-ocean ridge, Chemical flux