Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS31-02 会場:106 時間:5 月 24 日 09:15-09:30

東赤石超マフィック岩体のリザーダイト-ブルース石蛇紋岩：かんらん石からのトポタキシャル成長
Topotaxic replacement of olivine by a lizardite and brucite mixture in the Higashi-akaishi ultramafic body

水上 知行 [1*], 石神慎太郎 [1], 荒井　章司 [1]
MIZUKAMI, Tomoyuki[1*], Shintaro Ishigami[1], Shoji Arai[1]

[1] 金沢大学地球
[1]Earth Science, Kanazawa University

Fluid-rock reactions in the ultramafic system cause a wide variety of serpentinite. Analyses of the natural occurrences of serpentinite provide important constraints on contributions of variable factors controlling the development and related fluid chemistry. We present detailed petrological observations of lizardite and brucite (Liz+Brc) serpentinite, that is a retrograde product in a subduction zone environment, in the Higashi-akaishi ultramafic body.

We identified two end members of penetrative structures consisting of a fibrous Liz+Brc mixture: topotaxic vein and non-topotaxic mesh structure. Non-topotaxic vein can be regarded as an intermediate. Topotaxic veins are characteristically developed in a coarse-grained dunite and an optical X axis of a Liz+Brc mixture is sub-parallel to a c-axis of host olivine. Mesh textures overprint porphyroclastic textures of dunite and a Lis+Brc fibers are normal to olivine grain boundaries. The topotaxic veins are localized in the central part of the body whereas non-topotaxic mesh is more dominant in the peripheral part close to the surrounding schists.

Topotaxic veins preserve mineralogical and chemical zonings, indicating a Liz formation at a reaction front and a diffusive extraction of Fe to form magnetite (Mgt) at the center of the vein. Micro-Raman mapping reveals a close relationship between stripes of Brc and Mgt at a vein center. This indicates that Fe ion released at Ol-vein interface has transported through a channel filled by Brc. The Mgt formation was controlled by a reaction: Fe-rich Brc + SiO2 -> Liz +Mgt. A topotaxic relation between Ol and Liz(+Brc) is probably due to a low mobility of Si and high confining pressure. Non-topotaxic meshs show similar mineralogical features but they are rich in Liz and have abundant Mgt at the core. The difference between topotaxic and non-topotaxic replacements can be explained by mobility of elements and a supply of SiO2 depending on activities of aqueous fluids.

A topotaxic replacement of Ol by Liz+Brc possibly take place in shallow mantle where a supply of water-rich fluid is restricted. The case of the Higashi-akaisi body indicates that it can cause a significant amount of Liz+Brc serpentinite with stress-dependent anisotropic structures.