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

SCG65-08 会場:201B 時間:5 月 20 日 11:15-11:30

高圧低温型変成堆積岩から発見された高 Li/B 流体包有物
Fluid inclusions with high Li/B ratio found from HP/LT type metasediments

吉田 健太 [1*], 平島 崇男 [1]
YOSHIDA, Kenta[1*], HIRAJIMA, Takao[1]

[1] 京都大学大学院理学研究科地球惑星科学専攻
[1]Graduate School of Sciences, Kyoto University

Recent studies invoked that the variation of peculiar fluid soluble light elements, such as Li, B and Cl, are capable of suggesting generation depths of fluid released in subduction zones (Scambelluri et al., 2004; Marschall et al., 2007). Crush-leached (CL) fluids extracted from quartz (Qz) veins intercalated with metabasites of the Sanbagawa metamorphic belt show high Li and B concentrations, whose Li/B ratios show a positive correlation with metamorphic grade of the host rocks, i.e., from 0.02 for pumpellyite-actinolite facies to 0.27 for eclogite facies (Sengen et al., 2009). Furthermore, CL fluids extracted from three samples of Qz veins (IR04, IR27 and IR28) intercalated with metasediments in proximal to the eclogite mass in the Besshi district show much higher Li/B ratio (0.36-1.99). Yoshida et al. (2011a) reported Li/B ratio of dehydrated fluids derived from tourmaline-free metasediments showing higher values than those expected from metabasites for the same grade, suggesting that Li/B ratio of dehydrated fluids was controlled by the rock types of host rocks.

To inspect other factors controlling Li/B ratio of dehydrated fluids, Qz fabric, microthermometry-Raman spectroscopy of fluid inclusions and hydrochemical facies of CL fluids were investigated for abovementioned three samples with high Li/B ratio.

Qz grains in the veins show foam microstructure with almost no intracrystalline deformation structures, suggesting that their fabrics are formed at high-T and low-differential stress conditions and that they have escaped from the later stage deformation during the exhumation stage of the metamorphic belt.

Each sample contains two or three kinds of fluid inclusion assemblage (FIA) indicating that they suffer multistage fluid activities in their P-T trajectory. IR04 has three kinds of FIA, FIA-04a, -04b and -04c. FIA-04a, composed of high saline aqueous fluid (7.0-8.7 mass% $NaCl_{eq}$) and CH_4 gas, are arranged at intragranular planes. Rare annular shaped fluid inclusions are observed within FIA-04a, suggesting that the host rock suffered compression after their entrapment. FIA-04b is arranged at intragranular planes, consisting of single/two phase inclusions of CH_4-CO_2-N_2-H_2 fluid. FIA-04c is two phase inclusions, composed of high saline aqueous fluid (8.7-9.5 mass% $NaCl_{eq}$) and CH_4-N_2 mixed gas. IR27 contains two kinds of FIA, FIA-27a and -27b, arranged at trans/intra granular planes, respectively. FIA-27a is composed of high saline aqueous fluid (5.7-10.5 mass% $NaCl_{eq}$) and CH4-N2 mixed gas. The occurrence of FIA-27b is restricted to the wall-adjacent Qz grains and their sizes are too small to determine the compositions, though part of them are considered to be aqueous fluid. IR28 has two kinds of FIA, FIA-28a and -28b. FIA-28a, arranged at intra/trans granular planes, is composed of CH_4-N_2 mixed gas and no water is detected. FIA-28b is characterized by the arrangement along intra/trans granular planes and composed of low-saline aqueous fluid (0.9-2.2 mass% $NaCl_{eq}$) and CH4-N2 mixed gas, showing irregular shapes with large size (up to ˜40 micron).

CL fluid of IR28 shows dominance of HCO3, which is known as the characteristics of pore fluid in near surface fracture of continental crust (Bucher and Stober, 2010), and is commonly observed in Qz veins showing strongly deformed fabric (Yoshida et al., 2011b). The low salinity of IR28 is also similar to that of later-stage veins (Okamoto et al., 2008), although the timing of entrapment of FIA-28a and 28b still remain unclear. However, textural observation shows FIA-04a was trapped during the prograde stage and FIA-04b, 04c, 27a, could have been trapped during peak stage or the early stage of the exhumation. CL fluids of IR04 and IR27 are dominant in Na-Cl type. These observations suggest that hydrochemcial facies of deep fluids and texture and Qz veins are potential signposts looking for the pristine deep fluids.

キーワード: 流体包有物, Li/B 比, 沈み込み帯, 三波川帯, クラッシュリーチ法, エクロジャイト
Keywords: fluid inclusion, Li/B ratio, subduction zone, Sanbagawa belt, Crush-Leach method, eclogite