Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SMP46-P12 Room:Poster Time:April 28 18:15-19:30

Syn-metamorphic fluid infiltration and petrogenesis of leucogranites in the MCT zone in Eastern Nepal

KAWAKAMI, Tetsuo[1*] ; SAKAI, Harutaka[1] ; SATO, Katsushi[1]

[1]Graduate School of Science, Kyoto University

Syn-metamorphic fluid activity in the continental collision zone is of great importance especially for the petrogenesis of leucogranites and mass transfer through the fluid/melt extraction. Tourmaline (Tur) is a common accessory mineral in the crust having a wide stability field [1]. It is the most important sink of B in metapelites [2, 3, 4]. Although B behaves incompatibly under the absence of its sink minerals and is transported in fluid, once the *P-T-X* condition permits, it can be precipitated as Tur and other borosilicates in the site of fluid/rock interaction. Therefore, Tur can be a good tracer of B-bearing fluid [4]. Since Tur is a polar mineral, different concentrations of cations are incorporated at opposite poles of the crystal as a function of temperature up to 650°C, and this interpolar element partitioning in Tur can be used as a geothermometer [2, 5].

We have investigated the mode of occurrence of Qtz veins and Tur-rich veins in the MCT zone around Dhankuta, Eastern Nepal. In this area, pelitic schists are widely exposed and subordinate amounts of metamorphosed dolostone, quartzite and mafic rocks are intercalated with them. The metamorphic grade decreases from the Ky zone through the St zone to the Grt zone as the distance from the MCT increases toward the south.

Qtz veins are abundant in metapelites of this area. They are mostly deformed by the ductile deformation with top-to-S sense of shear during the activity of the MCT, and are found as lenses. In the Ky zone, Qtz veins contain mm- to cm-sized crystals of Ky and minor Pl. Grt and Ky are coarse-grained only at the vicinity of the Qtz veins, and Ky tends to be formed exclusively around the Qtz veins. This suggests that the fluid activity that formed the Qtz veins took place around the peak metamorphism of the Ky zone, and Si, Al, Na and Ca were mobile in the fluid. Preliminary *P-T* estimate of this fluid activity using Grt-Ky-Pl-Bt-Qtz assemblage gave ca. 8kbar and ca. 600°C. In the St and Grt zones as well, Grt tends to be coarser grained around the Qtz veins. Therefore, these veins are the evidence for the externally derived fluid that infiltrated during the prograde to peak metamorphism of each zone.

Unusually abundant Tur is locally found in metapelites of the MCT zone. It is localized in aluminous, Ms-rich layers and can be formed through the input of external B into the appropriate whole-rock composition for Tur growth. Such a B-bearing fluid infiltration continued from the prograde stage because Grt with prograde chemical zoning includes abundant Tur crystals. B-bearing fluid infiltration continued in the post-peak stage as suggested by the presence of Tur-rich vein cross-cutting the schistosity. Interpolar Ca/Na partitioning of Tur [5] gives 530-590°C for the temperature of the Tur-rich vein formation. A potential source of external fluid could be lower grade metasediments underlying these metamorphic zones, because syn-metamorphic dehydration reactions of hydrous minerals can supply not only H_2O but also B in the fluid.

B-bearing fluid infiltration during the prograde to post-peak metamorphism in the MCT zone is important for the petrogenesis of the Higher Himalayan (HH) and North Himalayan leucogranites whose source region and petrogenesis remain highly controversial [6]. Observation in this study supports the fluid-fluxed melting of the MCT zone or Higher Himalayan Crystallines (HHC) [7]. Tur-bearing leucogranite veins in the HHC just above the MCT could be a potential product of such a fluid fluxed partial melting that took place near the MCT.

References: [1] van Hinsberg et al, 2011, Can Min, 49, 1-16. [2] Henry & Dutrow, 1996, Rev Min, 33, 503-557. [3] Sperlich et al, 1996, Am Min, 81, 1222-1236. [4] Kawakami, 2004, TRSE, 95, 111-123. [5] van Hinsberg & Schumacher, 2007, CMP, 153, 289-301. [6] Guo & Wilson, 2012, GR, 22, 360-376. [7] Le Fort, 1981, JGR, 86, 10545-10568.

Keywords: fluid, tourmaline, boron, inverted metamorphism, partial melting, continental collision zone