Syn-metamorphic B-bearing fluid infiltrations deduced from tourmaline in the Main Central Thrust zone, eastern Nepal Himalayas

TETSUO KAWAKAMI[1], HARUTAKA SAKAI[1], KATSUSHI SATO

[1]Kyoto University, t-kawakami@kueps.kyoto-u.ac.jp

Mode of occurrence and chemical composition of tourmaline in pelitic schists from the inverted metamorphic sequence of Lesser Himalayan Sequences (LHS) are described in detail to deduce the chemical characteristics of tourmaline (Tur) formed through B-bearing fluid infiltration and to estimate the syn-metamorphic fluid compositions.

Metasomatic Tur from the tourmalinized wall rocks of Tur-Qtz veins and a Pl-Qtz vein shows significant increase in X_{Ca} [=Ca/(Ca+Na)] at almost constant X_{Mg} [=Mg/(Mg+Fe_{total})]. Plagioclase present in such veins are An-rich, and is not in equilibrium with Tur. These chemical characteristics of Tur are also confirmed in some Tur-rich (>1.0 vol%) pelitic schists. Therefore the Tur-rich pelitic schists are considered to have formed through B-bearing fluid infiltration. Ca-metasomatism observed in the pelitic schists adjacent to the metadolostone layers points to Ca-enrichment of the B-bearing fluid by passing through the metadolostone layers. Episodic infiltration of such fluids into pelitic schists resulted in production of abundant Tur with increasing X_{Ca} at almost constant X_{Mg}. The pelitic schists without Tur enrichment mostly show increase in X_{Ca} at broader X_{Mg}, possibly reflecting its growth over a longer period of time.

The fluid compositions that coexisted with Tur in the veins and Tur-rich and Tur-poor pelitic schists were estimated by applying experimentally determined fluid/Tur chemical relationships [1]. Assuming coexisting anion to be Cl, they all gave salinity of ~0.4-0.9 *mol/l* NaCl+$CaCl_2$. The Tur-bearing veins and Tur-rich pelitic schists that indicate syn-metamorphic B-bearing fluid infiltrations are widely distributed in the Main Central Thrust (MCT) zone of the LHS.

This observation supports that syn-metamorphic B-bearing fluid infiltrations from the MCT zone to the High Himalayan Crystallines (HHC) caused vapor-saturated partial melting of the HHC and formed Tur leucogranite melts.

[1] von Goerne, G., Franz, G., van Hinsberg, V.J., 2011. The Canadian Mineralogist, 49, 137-152.