Kinetics and textural development of quartz veins

ATSUSHI OKAMOTO[1] AND NORIYOSHI TSUCHIYA[2]

[1]Graduate School of Environmental Studies, Tohoku Univ. Japan (okamoto @mail.kankyo.tohoku.ac.jp)
[2]Graduate School of Environmental Studies, Tohoku Univ. Japan (tsuchiya@mail.kankyo.tohoku.ac.jp)

Quartz veins generally contain various textures. To understand the relationship between developments of vein textures, crystallization mechanism and physico-chemical environments in fluid-filled cracks, we conducted hydrothermal flow-through experiments at 150-430 °C and 30 MPa. The reaction tube is diameter of 10 mm and length of 31 cm, that was set to produce a horizontal flow path.

First, we determined precipitation rate constant from dissolution of 31 g quartz sand (1 - 2 mm) at flow rate of 1.01 g/min. Si concentration of solutions in outlet increases 0.6 to 290 ppm in temperatures of 150-390 °C. From the Arrhenius plot, the activation energy is estimated to be 51.1 kJ/mole, which is consistent with previous estimates for temperature <300 °C [1]. Our result also suggests that the reaction was surface-controlled in advective flow.

Second, we employed precipitation experiments of quartz with granite plates (4.5 x 4.5 x 30 mm) at 430 °C for 50 hours, under which the degree of supersaturation, $C_{Si}/C_{Si,eq}$ = 3-4. We found two types of quartz growth occurred simultaneously. On granite surfaces, quartz grew epitaxially on pre-existing quartz grains. In other parts, sedimentation of euhedral quartz crystals (size of 0.01-0.5 mm) occurred. These textures in different sites are similar to elongate-blocky and blocky textures in natural quartz veins, respectively. Our results suggest that nucleation could occur even under relatively low supersaturation, and that the vein textures would be controlled by the ratio of quartz surface area / mass of water (crack aperture).

[1] Rimstdt & Barnes (1980) *Geochim Cosmochim Acta* **44**, 1683-1699.

Rare Earth Elements (REE) geochemistry of Iron mineralization of Sarikaya (Yozgat, Turkey)

N. OKSUZ[1] AND S. KOC[2]

[1]Bozok University, Department of Geology, 66100, Yozgat, Turkey (noksuz@erciyes.edu.tr)
[2]Ankara University, Department of Geology, 06100, Ankara, Turkey (koc@eng.ankara.edu.tr)

Iron mineralization in Sarıkaya (Yozgat) was observed in three different locations named Büyükören, Karabacak and Uzunkuyu-Atkayası, situated 25 kilometers to the west of Sarıkaya district. This process of mineralization is syngenetically related to the rocks with calc-alkaline composition which metamorphosed into amphibolite as a result of the metamorphism of basalts. In the paragenesis of mineralization the main mineral components are magnetite and hematite, and to a small extent pyrite and chalcopyrite. Among the mentioned regions, magnetite mineralization is commonly observed particularly in Büyükören and Karabacak, whereas hematite mineralization is seen in the region of Uzunkuyu-Atkayası [1].

The REE data from ore samples in the study area were used to organize chondrite-normalized spider diagrams separately for each region. Accordingly, negative Eu anomaly was detected in Büyükören region, whereas negative Ce as well as both negative and positive Eu anomalies were detected in the regions of Uzunkuyu-Atkayası and Karabacak. The fact that LREE values were higher than those of HREE in the spider diagram suggests that mineralization was influenced by a felsic rock [2]. This further indicates the presence of a hydrothermal mineralization [3-9].

In the ore samples from the research region, $(Eu/Sm)_{CN}$ ratios vary between 0.1-2.65, whereas $(Sm/Yb)_{CN}$ ratios between 0.15-10.72. $(Eu/Sm)_{CN}<1$ and $(Sm/Yb)_{CN}>1$ ratios point the fact that Fe-containing sediments formed the mineralization [10]. These values showed that the all the ore formation in the region was not formed from sedimentary Fe layers. The $(La/Lu)_N$ ratio in the ore samples of the region was observed as varying within the range of from 0.52 to 59.43, which points to the mid-acidic and high-temperature conditions of the magnetite mineralization in the region as well as its magmatic origins.

[1] Oksuz (2007) *Ankara Unv*. Doctoral thesis. [2] Khan & Naqvi (1996) *Mineral Deposita*. [3] Ozmen & ve Koc. (2001) [4] Singh & Rajamanı (2001) *Geochimica et Cosmochimica Acta.Economic Geol.* [5] Jiang *et al*. (2002) *Chemical Geology*. [6] Peng & Palmer (2002) *Economic Geol.* [7] Sagiroglu & Sasmaz (2004) *Journal of Asian Earth Sciences*. [8] Fitzgerald & Gillis (2006) *Marine Geology.* [9] Ghaderi *et al*. (2006) *Research School of Earth Sciences.* [10] Fernandez & Moro (1998) *Mineralium Deposita*.