Trace elements in quartz vein of Gubong gold deposit, Republic of Korea

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The Gubong gold deposit is located in the Cheonan metallogenic province which records a highest gold production areas in the Republic of Korea. The Gubong deposit is the richest gold deposit in the province and consists of five stages of massive quartz veins that fill fractures along fault shear zones orienting NE and NW hosted in Precambrian metasedimentary rocks (Gyeonggi massif).

Ores and alteration minerals of Gubong deposit are sericite, chlorite, epidote, illite, K-feldspar, plagioclase, biotite, quartz, calcite, magnetite, ilmenite, rutile, zircon, monazite, apatite, pyrite, gersdorffite, arsenopyrite, pyrrhotite, sphalerite, marcasite, chalcopyrite, galena, and electrum. Fluid inclusion microthermometry and textural relationships in veins indicate that early sulfide deposition is associated with H2O-CO2-NaCl bearing hotter hydrothermal fluids (203–432°C, ≤ 13.4 wt % NaCl) and late sulfide deposition is associated with H2O-NaCl bearing fluids (202–399°C, 3.9–17.3 wt % NaCl) cooled and diluted possibly by mixing with meteoric water.

Trace element analyses in quartz from veins were performed by using LA-ICP-MS (193-nm ArF Excimer laser combined with an Elan 6100 quadrupole mass spectrometer) at ETH Zürich. Concentration of trace elements in quartz including Li (<0.01–3.55 ppm), B (3.03–27.17 ppm), Na (3.23–72.79 ppm), Al (4.0–149.9 ppm), P (14.4–68.9 ppm), Sc (3.3–8.7 ppm), Ti (<0.10–1.43 ppm), Cr (<3.34–65.6 ppm), Ga (0.50–1.30 ppm), Ge (0.57–2.15 ppm), Rb (<0.01–0.50 ppm), Sr (0.01–3.13 ppm), Sn (<0.29–7.24 ppm), Sb (<0.05–0.42 ppm), and Bi (<0.01–8.30 ppm) are reported. Some trace elements (Al, Na, Ga, P, Li) tend to correlate positively. Titanium versus aluminum concentrations in quartz from Gubong deposit are plotted in the field of orogenic Au deposit suggested by Rusk (2012). We analyzed quartz from other numerous Korean Au-Ag and W-Mo deposits to compare hydrothermal fluid conditions and to provide a geochemical tool for mineral exploration.

Reference