Trace Element Composition and Cathodoluminescence of Quartz in the Tsunheg Tungsten Deposit in Western Mongolia

Amitan Baatar[1], Jamsran Erdenebayar[2], Takeyuki Ogata[2], Takeyuki Ogata[2], Yondon Majigsuren[1]
1. MUST, Ulaanbaatar, Mongolia, 2. MiReSLab, Akita, Japan, 3. Mongolian University of Science and Technology, Ulaanbaatar, Mongolia

The Tsunkheg tungsten deposit is located in Nogoonnuur soum of Bayan-Ulgii province about 1,600 km from Ulaanbaatar, Mongolia. The Tsunkheg deposit is tectonically located in the Mongol Altai and Khovd deep fault zones and is characterized by the development of numerous faults to the northwest and northeast.
The Tsunkheg deposit consists of six large quartz-wolframite veins, 0.15 to 0.45 m wide, 400 to 600 m long, and one stock body with a diameter of 80 m in the central part. The bodies are mainly almost vertical and continuous to the 300-m depth. The quartz-tungsten veins contain scheelite, sulfide minerals: chalcopyrite, bornite, arsenopyrite, and molybdenite tetrahedrite; and carbonate minerals: siderite, malachite, azurite, fluorite, and beryllium. The tetrahedron has high silver content. The average contents of wolframite in the quartz veins are 2.5 to 5%, and in the stock body 0.24%. Cathodoluminescent (CL) texture and trace element signatures of quartz from the Thunkheg deposit have been investigated to discuss their genetic significance. Results show that the pre-ore quartz (QI) displays a bright and homogeneous luminescence texture, (QII) generally shows a bright and oscillatory luminescent texture, and the syn-ore quartz (QIII) generally has a dark and homogeneous (or slightly mottled) luminescent texture that may result from annealing of original CL textures; the post-ore quartz. EPMA analyses suggest Ti, Al, K, Fe, and Ca are the most abundant elements in various generations of quartz and mainly occur as solid solutions within the crystal lattice, in which Al can be incorporated into quartz by substituting Si in the crystal lattice, with additional cations (e.g., K, Na, Li, and Ca) to keep the charge balance. The low Ti concentration and oscillatory euhedral growth zones of CL textures suggest that syn-ore quartz (QII) may have precipitated from a low-temperature hydrothermal fluid.