

Textures of quartz veins in Hugo Dummett porphyry copper-gold deposit, revealed by cathodoluminescence

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Vein quartz from the Hugo Dummett porphyry Cu-Au deposit in Oyu Tolgoi, South Mongolia, displays numerous of quartz textures when observed using scanned cathodoluminescence imaging on the electron microscope. Six samples of quartz from 0.5-1.6 cm quartz-pyrite, quartz-bornite-chalcopyrite and quartz-bornite-chalcopyrite-pyrite veins bounded by advanced argillic alteration and from quartz veins were examined. Samples are from 908 to 1550 m depth within the main Cu mineralized zone.

Hydrothermal quartz from quartz-sulfide veins in the porphyry copper-gold deposit in Hugo Dummett was analyzed by SEM-CL, revealing the following textures: (1) euhedral growth zones (2) embayed and rounded CL-bright cores, with CL-dark and CL-gray overgrowths, (3) concentric and non concentric growth zones, (4) splatters and cobweb-like CL quartz, and (5) CL dark/bright microfractures. These textures indicate that many veins have undergone fracturing, growth of quartz into fluid-filled space and quartz dissolution of quartz.

Quartz-pyrite veins shows homogeneous texture (CL dark) which is indicating little internal lattice variation in quartz grains that grew under stable condition at high temperature and pressure.

Quartz-bornite-chalcopyrite and quartz-bornite-chalcopyrite-pyrite veins display embayed and rounded textures. These textures are caused by precipitation of CL-bright quartz, followed by CL-dark quartz into fluid-filled space. Splatter and cobweb texture is the result of corrosion of quartz along microfractures. All of the quartz vein types show concentric and non concentric zoned CL-gray/bright growth pattern that may result from variations in trace element abundances (e.g. Al, Ti, and Fe) in the quartz, related to chemical composition and physical conditions.

SEM-CL image reveals multistage crystal growth, zoning, microbrecciation and microfracturing that are observed within quartz-sulfide veins indicating hydrothermal process was complicate at the Hugo Dummett porphyry Cu-Au deposit.

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