Quartz Textures and Alteration during Au Mineralization, Abitibi Greenstone Belt

M.R. Francis[1], D.A. Schneider[2], C.J. Kelly[3]
[1]Department of Earth Sciences, University of Ottawa, Ottawa, ON, Canada; [2]Department of Earth Sciences, University of Ottawa, Ottawa, ON, Canada; [3]Department of Earth Sciences, University of Ottawa, Ottawa, ON, Canada

Abstract

Cathodoluminescent (CL) response of quartz has shown to reveal the complex history of fluid flow in hydrothermal ore deposits. Despite the success of CL in porphyry related systems, it has been greatly underutilized in orogenic gold deposits. This study aims to resolve the factors contributing to a significant grade change along the strike of a vein, by characterizing quartz of an auriferous quartz-carbonate vein at Hoyle Pond, in the Archean Abitibi greenstone belt. Textures detected by CL are a reflection of the physical and chemical environment of which the quartz formed. Four equidistant samples were collected along the length of the VAZ on the 1350 ml, and one from a splaying vein. The VAZ is a roughly N-S striking, massive high grade shear vein primarily hosted by mafic volcanic wall rock with noted tourmaline and white mica hydrothermal alteration proximal to the vein. In the south end, the vein is characterized by dull white/smoky grey quartz, trace calcite, approximately 4% pyrite content in the wall rock, and DDH assays as high as 441.7g/t. Progressing towards the north a decrease in quartz greyness, grade, and pyrite content is observed, with no change to alteration style. In the north the vein approaches a shear fault and the quartz becomes chalky white with a mottled appearance due to an increase in calcite content. The highest assay near the sample area is 12.7g/t with a pyrite content of 1-2%. Despite the fact that quartz is transparent, crystalline, optically and chemically homogenous in transmitted light and electron backscatter, textures are revealed by varying CL intensities. There are CL-bright patches and streaks that overprint multiple grains and CL-dark content infilling fractures within grains. These variations may be in response to discrepancies of certain trace elements from multiple fluid generations or recrystallization from post depositional deformation.