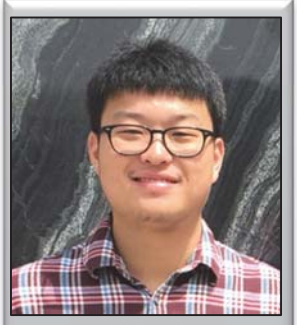

TRACE ELEMENT CONTENT OF HYDROTHERMAL PYRITE – BINGHAM AND TINTIC DISTRICTS, UTAH

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Pyrite crystals (from the Bingham and Tintic Districts, two high-temperature hydrothermal environments) with cubic, pyritohedral and octahedral habits were analyzed by LA-ICPMS, to test the following hypotheses: 1) Base metal, semi-metal and noble elements are present in measurable quantities (>1 ppm) and that various sets of elements are correlated (concentration). 2) Trace element concentrations may influence the development of a specific crystal habit. 3) Pyrite crystals in hydrothermal environments are zoned - The zoning pattern is a reflection of changing fluid conditions during crystal growth.

Two or three scan tracks were made on each crystal. Elements occurring in locally, relatively high concentrations include Ag, Au, As, Co, Ni, Cr, Mn, Cu, Pb, Os, Pt, and V. Some of these high values are arise from visible inclusions in pyrite along the scan track, some are from inclusions now ablated and no longer visible and others may correspond to submicroscopic inclusions in pyrite. Pyrite from both the Tintic and Bingham districts contain gold and silver minerals as inclusions and likely as sub-microscopic electrum grains. A variety of other mineral inclusions are present including copper phases.

This reconnaissance study illustrates the complexity elemental substitutions for Fe and S in pyrite and that microscopic and sub-microscopic inclusions of other phases are common. These data were insufficient data to evaluate the hypotheses that growth zoning is present in these crystals or that specific elements may be a factor in promoting the development of various crystal habits. Reported trace elements in bulk pyrite analyses may be the result of a variety of inclusions that are incorporated during pyrite growth.