

# Stanford

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## Angela Halfpenny

Director, Integrated Shared Laboratory Management, Stanford Doerr School of Sustainability - Dean's Office

### Bio

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#### BIO

As a structural geologist and microscopist, my research interests focus on understanding how the Earth deforms across all scales by characterizing the macro and microstructures recorded in the rocks. My work focuses on the interactions of deformation processes, geochemical controls and preservation potential to improve our understanding of the evolution of the system, whether that is a fault or fold or shear zones to economic deposits and gemstones. I am particularly interested in how various deformation processes interact and how fluids can facilitate these processes. I also focus on developing new ways to prepare and analyze samples to broaden our use of existing analytical capabilities and improve coincident data collection allowing the same area to be analyzed via multiple techniques to provide a greater understanding.

#### CURRENT ROLE AT STANFORD

Director, Integrated Shared Laboratory Management

#### EDUCATION AND CERTIFICATIONS

- Masters of Earth Science, University of Liverpool, UK , Earth Science (2002)
- PhD, University of Liverpool, UK , Structural Geology (2007)

#### SERVICE, VOLUNTEER, AND COMMUNITY WORK

- Strategic initiatives Chair for the Microanalysis Society (MAS)

### Professional

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#### PROFESSIONAL INTERESTS

Quartz Gemstones Color Controls: Integrating Hand Specimen, Geochemical, and Crystallographic Data for Source Determination. Using modern technologies such as portable, hand-held x-ray fluorescence devices with SEM based CL/BSE/EDS to determine the colour controls. Attempting to determine the “source” (where the sample was formed), by using ratios of the elements which contribute to the characteristic colour such as blue or rose, determined by non-destructive handheld XRF analysis to produce certification for “Ellensburg Blues”.

Coincident Data Collection: Preparation of Polished Resin Mounts for Coincident Data Collection from Multiple Analytical Techniques, Development of a Systematic workflow. One of the new aspects of this work was the incorporation of machine-readable, quick response (QR) codes into the resin mounts. Originally the aim was to place a single QR code in the back of the mounts but this would have blocked the transmitted light path. I came up with the idea of placing a collar around the edge of the mount therefore keeping the transmitted light path clear. The other advantage of the collar was that it contained an orientation line, allowing for easy coincident data collection from multiple analytical facilities.

Controls on Gold Mineralisation and Preservation: focusing on controlling mechanisms of ore generation across various scales and determine how these mechanisms interact to cause the formation of high-grade ore deposits. Understanding the fluid pathways which bring gold enriched fluids from their deep source to their point of deposition is essential for determining the differences in the mineralisation mechanisms which form low-grade versus high-grade ore deposits. Determining the links between macro- and microstructures utilizing combined EDS/EBSD analysis, combined with other geochemical techniques (microprobe, XRF, XRD) to understand the formation of ore systems and their evolution through time.