Textural Characteristics of Adularia Dendrites in Banded Quartz Veins from the Midas Deposit, Nevada

Lauren R. Zeeck[1], Thomas Monecke[1], T. J. Reynolds[2], Katharina Pfaff[1]
1. Center for Mineral Resources Science, Department of Geology and Geological Engineering, Colorado School of Mines, Golden, CO, USA, 2. FLUID INC., 1401 Wewatta St. #PH3, Denver, CO, USA

The middle Miocene low-sulfidation epithermal Au-Ag Midas deposit is located in the Northern Nevada Rift in north central Nevada. Since 1998, Midas has produced over 2.2 million ounces of gold and 26.2 million ounces of silver. Total measured and indicated resources at the end of 2021 graded 0.43 ounces/ton gold and 5.7 ounces/ton silver, though grades can locally exceed 10 ounces/ton. High-grade ores are confined to crustiform veins composed of quartz and adularia.

In this study, the adularia textures of high-grade ore samples were examined to identify the processes responsible for the formation of this gangue mineral. Micro-X-ray fluorescence elemental mapping revealed that the adularia commonly forms dendritic aggregates in the crustiform veins. The adularia dendrites can be up to several millimeters in size and are comprised of sub-millimeter, fine-grained rhombic crystals. Correlative microscopy involving optical microscopy, quantitative automated mineralogy, and scanning electron microscopy were employed to determine the relationship between adularia and ore minerals. Adularia is typically located in colloform silica bands that host only few ore minerals. Most of the ore minerals are hosted by distinct ginguro bands.

Phase separation of the hydrothermal liquids is widely interpreted to be the process responsible for the deposition of adularia and the ore minerals. Though adularia-bearing colloform bands in the crustiform veins at Midas contain ore minerals, these bands are not the primary host to ore. Adularia and the ore minerals have not been coprecipitated under the same conditions. It is hypothesized here that although adularia and the ore minerals may have formed by similar processes, the amount of vapor produced during phase separation may have controlled mineral deposition at any given time and location along the controlling structure.