Morphotextural and Geochemical Analyses of Gold Particles Related to the Pinalejo Epithermal System (Salamanca, Spain)

Kelvin d. Alves[1], Juan G. Barreiro[1], Santos B. Sánchez[1], Lorena O. Menor[2], José M. Marchena[1]
1. Universidad de Salamanca, Salamanca, Spain, 2. Universidad Complutense de Madrid, Madrid, Spain

Understanding the morphological and geochemical evolution of gold particles during their transport is essential to define prospecting models for primary and secondary gold deposits (alluvial). In this work, we studied primary and alluvial gold samples from remains of Roman mining. The primary Au is hosted in shear-related epithermal quartz dikes (fluid inclusions: Th= 188.19-256.79°C), where the gold fill intercrystalline spaces in the quartz, which condition their morphology. Compositionally, primary gold shows a varying bimetallic alloy (Au_{90-94}-Ag_{10-6}). Alluvial gold particles were collected at nine points distributed along 4.5 km of the Pinalejo-Tenebrilla creek. Mean values of CFI, CSF, and Shilo morphological indexes are 3.15, 0.38, and 2.16, respectively. These values are consistent with transport distances of less than 5 km. Morphology analysis points to a complex mixture of two populations along the creek. All alluvial particles show a core-rim texture. Core alloys show a compositional range (Au_{72-98}-Ag_{28-2}) and inclusions of galena, cobaltite, and chalcopyrite. The gold-rich rims (Au_{98-99}-Ag_{2-1}) are the result of supergene processes (Ag-leaching) during the transport of the particles. Taking into account the chemical and morphological variation of gold particles, it is proposed that the Pinalejo epithermal system is an extended orogenic vein-field with a vertical/lateral compositional zoning, where undiscovered primary sources may exist.