Morphological and Compositional Analysis of Alluvial Gold: Los Ángeles Gold Placer (Cáceres, Spain)

Vanessa L. Escobar Duche, Santos Barrios Sánchez, Juan G. Barreiro, Kelvin dos Santos Alves
Universidad de Salamanca, Salamanca, Spain

The morphotextural evolution and geochemical composition have been investigated from alluvial gold grains recovered from the Los Ángeles Gold Placer in the Central Iberian Zone of the Iberian Massif to understand the origin and evaluate the type and distribution of unknown primary mineralization(s). The main results revealed that a mixture of populations of gold particles has been identified. The gold particles derived from their first sedimentary cycle are mixed with recycled gold sedimentary particles. The transport range, between 0 and 20 km, is compatible with the location of primary gold deposits in the west of study area, which are associated to breccias and quartz veins emplaced in metasediments of the Schists and Greywacke Complex. Chemical analyses show a binary gold alloy (Au:Ag) and three gold types can be differentiated: Au_1 (core of particles) is characterized by a range of 62.6-96.2 Au wt% with 3.8-37.4 Ag wt%; Au_2 (gold-rich rim) includes a range of 88.3-99.7 Au wt% with 0.3-11.7 Ag wt%; Au_3 (allotriomorphic gold micro-aggregates <10μm) is formed by 90.8-100.0 Au wt% and 0.0-9.2 Ag wt%. Au_1 shows trace elements in its composition (Cu ≤ 0.14 wt%, Te ≤ 0.08 wt%, Bi ≤ 0.09 wt%) and microinclusions (sulfides, sulfarsenides, and arsenides) that reflect the orogenic genesis of a primary hydrothermal gold deposit generated at temperatures between 350° and 500°C, with a multi-vein system related to vertical zoning and/or at least two hydrothermal mineralization pulses, associated to sulphidation stages with a probable contribution of magmatic and/or metamorphic fluids. The last stages of gold evolution include the alteration of primary mineralization, formation of a first paleoplacer, and then formation of the Los Angeles gold placer. Once formed, the primary gold or Au_1 was affected by supergene processes that modified its initial composition through Ag leaching and lead to formation of Au_2 and Au_3.