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## Geochemical Analysis of Native Gold from the Roman Mining Area of Pino del Oro (Zamora, Spain)

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In the Pino del Oro area there are two types of gold deposits: 1) hydrothermal veins with quartz and sulphides related to the Villalcampo shear zone that present abundant remains of Roman mining and 2) Quaternary placer deposits. Previous research works focused on the evaluation of its content, but did not characterize its geochemical composition. In this study, we have determined its "geochemical signature", which provides information about the primary deposit and could be used in the traceability of Roman archaeological pieces.

Six sediment samples along the Fuentelarraya creek (secondary) and 3 soil samples from the old mining works (primary) were washed with a sluice box and a pan. A total of 454 gold particles and 1 lode quartz fragment with visible gold were obtained. 660 analyses were carried out in gold using EMPA, while the mineral inclusions were determined by SEM. Two types of Au:Ag gold alloys have been identified: 1) Au1: Au75.32-83.44:Ag24.64-16.53 (Hg0.01-0.04, Te0.01) reflecting the geochemical signature of the primary source, and 2) Au2: Au99.49 resulting from a composition modified by supergene processes, mainly for placer particles. Mineral inclusions include arsenopyrite, galena, sphalerite, pyrrhotite, pyrite, chalcopyrite, cobaltite, gersdorffite, ullmanite and berthierite. Placer particles show higher Ag contents than particles from soils, which indicates that there is a vertical compositional zoning in the primary deposit. Previous studies of fluid inclusions indicate that gold precipitation took place at <200°C. The low fineness of Au1 could be indicative of a low formation temperature, coinciding with those results. Mineral inclusions are not associated with a specific composition of gold, but they would have previously precipitated between 250°C and 390°C.

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