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Mineralogical and geochronological study of epithermal gold mineralization in Kerta, West Java, Indonesia

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To elucidate the temporal and spatial distribution of gold mineralization in Kerta, West Java, Indonesia, geochemical, mineralogical, and geochronological studies were conducted. The Kerta gold mineralized area is located along the western flank of the Bayah Dome Complex, within a well-known gold district hosting high-grade gold deposits (e.g., Ponkor, Cikidang, Cikotok) and several base metal occurrences. Exploration in the Kerta area was initiated in 2007 by the local mining company, PT AGC Indonesia. Although gold mineralization was confirmed by geochemical anomalies and geophysical surveys, systematic and scientific investigations to determine the mineralization model have not yet been conducted.

The alteration minerals identified by XRD and petrography are chlorite and sericite. The assemblage of alteration minerals suggests that the host rock was altered by hydrothermal fluids at a near-neutral pH. The estimated ore-forming temperature range based on the fluid inclusion microthermometry was 180-260 °C.

A quartz vein (Core no. CSD-21, depth 241.5 m) containing electrum was divided into four bands in terms of mineralogy during microscopic observation. Band I, formed at the contact with the conglomerate host rock, comprises fine-grained quartz ± pyrite. Band II is composed of coarse-grained quartz and adularia. Band III is rich in sulfides, mainly pyrite and chalcopyrite. Band IV is composed of comb quartz growing towards the center of the vein. The fact that electrum and the other silver-bearing minerals could be observed only in Band II suggests the gold mineralization was specific to this one episode. It is reported that rhombic adularia may form during boiling of the ore fluids [1]. In addition, previous studies indicate that boiling is an important mechanism of gold precipitation [2]. Thus, the observed rhombic adularia is interpreted as indicating boiling within a high-grade ore zone in the Kerta area. Gold content in the electrum ranges from 35-40 atomic %. The concentration of gold is locally as high as 90 ppm.

Adularia in quartz veins, collected from drill core (Core no. CSD-22, depth 252 m), was used for ⁴⁰Ar/³⁹Ar age dating. The measured age was approximately 4.20 Ma. Previous studies [3] indicated that the source of the mineralization and associated volcanic rocks is underlying ancient continental crust that melted and was remobilized during the Pliocene volcanic and hydrothermal events in the Bayah Dome Complex area. The gold-silver mineralization in Kerta area appears to have been caused by the Pliocene volcanic activity, which is similar to the other deposits in the Bayar Dome Complex.

Based on the fluid inclusion microthermometry, gold-silver ratios in electrum, and FeS contents in sphalerite, gold mineralization in the Kerta area can be classified as low-sulfidation epithermal type.

Variations in the ore mineral assemblage may reflect the lowering of sulfur fugacity in the hydrothermal system during the mineralization event.

References:

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