

ABSTRACT

Cijulang prospect is located at the Talegong District, Garut Regency, West Java, Indonesia. It lies within the Sunda-Banda Magmatic Arc and hosted by Tertiary calc-alkaline volcanic and volcanoclastic sequences comprising of andesite lava, lapillipi tuff, hydrothermal breccia, andesite and andesitic breccia. This study reports on geology, mineralogy, geochemistry and origin of epithermal mineralization from Cijulang prospect.

Hydrothermal alteration is hosted by andesite lava, lapilli tuff and hydrothermal breccia. It is characterized by silica core surrounded by extensive advanced argillic zone containing quartz-pyrophyllite-dickite/kaolinite, quartz+kaolinite/dickite, and quartz+alunite+pyrite assemblages. Advanced argillic zone grade outwards into argillic comprising quartz-kaolinite-illite-smectite-illite/smectite assemblage, and distal propylitic alteration dominated by quartz-chlorite-epidote-calcite-albite assemblage. Alteration was developed from the progressive cooling and neutralization of hot, acidic, magmatic vapor with the host rocks.

Sulfide and sulfosalt mineralization is hosted by an intensively silicified core and advanced argillic alteration. Mineralization occurs as massive late vug-filling, fracture-filling veins or veinlets, dissemination and/or breccia matrix. Common ore minerals include pyrite, enargite, luzonite, tennantite, chalcopyrite, covellite, galena, telluride, and emplectite. The common ore assemblages are pyrite-enargite/luzonite-covellite and tennantite-chalcopyrite-telluride and represent the formation of ore under the high- to intermediate- sulfidation state of fluid condition. Two metal stages were identified; an early Cu-rich, Au-poor stage, dominated by high-sulfidation-state sulfides, enargite-luzonite and a late Au-rich, Cu-poor stage, associated with intermediate-sulfidation-state sulfides such as tennantite-tetrahedrite and chalcopyrite and tellurides. Hydrothermal alteration system occurs along the strike-slip fault system. Alteration/mineralization was controlled by both permeable host rocks (volcanoclastic rocks) and geologic structures (strike-slip faults)

Volcanic and volcanoclastic rocks related to Cijulang mineralization show calc-alkaline signature. REE behave selectively in different alteration facies.. In silicic facies, REE are strongly depleted. In an advanced argillic facies, HREE are strongly depleted whereas LREE are quite immobile; in argillic zone, REE remain relatively unchanged. Alunites from the advanced argillic zone are magmatic in origin and exhibit a solid solution between alunite and natroalunite series.

Microthermometric data and characteristics of fluid inclusions from quartz veins of Cijulang prospect share the common characteristics of HS system. Low-salinity fluid inclusions with Th mostly $\sim 300^{\circ}\text{C}$ recorded in Cijulang prospect is similar to those of other high-sulfidation deposits.

The evolution of the hydrothermal system is characterized by an early stage acidic wall-rock alteration followed by a late stage of ore deposition. Hot and strongly acidic magmatic fluids, $\text{pH} < 2$ and $T > 250^{\circ}\text{C}$, were responsible for the leaching of the volcanic host rocks(s) forming vuggy quartz with advanced argillic alteration halo during the early stage which is followed by the later influx of less reactive and oxidized, metal-bearing fluids. Silica zone represents the location of paleo-water table. The hydrothermal fluids responsible for alteration are strongly oxidized, silica-saturated and the temperature of formation may have been $> 260^{\circ}\text{C}$. The presence of pyrophyllite indicates deep-seated formation. Gold may be likely transported by chloride complexes in acidic brines of magmatic derivation. Dilution, cooling and/or pH increase cause deposition of gold within the Cijulang HS system.

Keywords: Cijulang prospect, West Java, Indonesia, epithermal deposit, high-sulfidation

SARI

Prospek Cijulang terletak di Talegong, Kabupaten Garut, Jawa Barat, Indonesia. Itu terletak dalam Sunda-Banda Magmatik Arc dan diselenggarakan oleh calc-alkaline urutan vulkanik gunung api dan batuan yang terdiri dari lava andesit, tuf lapili, breksi hidrotermal, andesit dan breksi andesit. Penelitian ini focus pada geologi, mineralogi, geokimia dan asal tinggi-sulfidasi mineralisasi emas epitermal dari prospek Cijulang.

Alterasi hidrotermal diinduk oleh lava andesit, tuf lapili, dan breksi hidrotermal. Hal ini ditandai dengan inti silika dikelilingi oleh zona argilik yang luas yang mengandung kuarsa-pyrophyllite-dikit/kaolinit, kuarsa+kaolinit/dikit, dan kuarsa+alunit+kumpulan pirit. Canggih argilik zona kelas luar ke argilik terdiri kuarsa-kaolinit-ilit-smektit-ilit/kumpulan smektit, dan distal propilitik perubahan didominasi oleh kuarsa-klorit-epidot-kalsit albite kumpulan. Alterasi ini dikembangkan dari pendinginan progresif dan netralisasi panas, uap magmatik asam dengan batuan host.

Sulfida dan sulfosalt mineralisasi di-induk oleh intensif silisifikasi dan alterasi argilik. Mineralisasi terjadi sebagai besar akhir vug-mengisi, fraktur-mengisi vena atau veinlets, disseminasi dan/atau matrix breksi. Bijih yang umum termasuk pirit, enargit, luzonite, tennantite, kalkopirit, covellite, galena, teluride, dan emplectite. The kumpulan bijih umum adalah pirit-enargit/luzonite-covellite dan tennantite-kalkopirit-telluride dan mewakili pembentukan bijih bawah tinggi negara-sulfidasi kondisi cairan negara menengah. Dua tahap logam diidentifikasi; tahap awal Cu kaya, Au-miskin, didominasi oleh sulfida-sulfidasi-tinggi negara, enargit-luzonite, dan akhir Au-kaya, tahap Cu-miskin, terkait dengan sulfida menengah sulfidasi negara seperti tennantite-tetrahedrite dan kalkopirit, dan telurides. Sistem alterasi hidrotermal terjadi sepanjang sistem sesar strike-slip. Alterasi/mineralisasi dikontrol oleh batuan permeabel host (batuan gunung api) dan struktur geologi (sesar strike-slip).

Batuan vulkanik dan gunung api yang terkait dengan Cijulang mineralisasi acara calc-alkaline tanda tangan. REE berperilaku selektif dalam facies teralterasi

yang berbeda. Dalam facies silikat REE yang kuat habis. Dalam facies argilik, HREE yang sangat habis sedangkan LREE cukup bergerak; di zona argilik, REE relatif tidak berubah. The alunites dari zona argilik yang magmatik di asal dan exhibit solusi yang solid antara alunit dan seri natroalunite.

Data mikrotermometrik dan karakteristik inklusi fluida dari urat kuarsa dari Cijulang prospek berbagi karakteristik umum dari sistem HS. Low-salinitas inklusi fluida (<5wt. %NaCl) dengan *Th* sebagian besar ~ 300°C disimpan di prospek Cijulang adalah serupa dengan deposito tinggi sulfidasi lainnya.

Evolusi sistem hidrotermal ditandai dengan tahap awal teralterasi asam di batuan induk diikuti dengan tahap akhir dari deposisi bijih. Cairan magmatik panas dan asam kuat, pH <2 dan *T* > 250°C, yang bertanggung jawab untuk pencucian batuan induk vulkanik (s) membentuk rongga kuarsa dengan canggih alterasi argilik halo pada tahap awal yang diikuti dengan masuknya kemudian kurang reaktif dan mengoksidasi cairan logam-bantalan zona Silika merupakan lokasi tabel paleo-air. Cairan hidrotermal yang bertanggung jawab untuk perubahan yang sangat teroksidasi, silika-jenuh dan suhu pembentukan mungkin telah >260°C. Kehadiran pyrophyllite menunjukkan pembentukan mendalam. Emas dapat mungkin diangkut dengan kompleks klorida di air asin asam derivasi magmatik. Pengenceran, pendinginan dan/atau peningkatan pH menyebabkan pengendapan emas dalam sistem Cijulang HS. Kata kunci: Cijulang prospek, Jawa Barat, Indonesia, deposito epitermal, tinggi sulfidasi

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