

## ABSTRAK

Beberapa penelitian terdahulu telah dilakukan di Jawa Timur dan di antaranya menyebutkan Kabupaten Tulungagung sebagai salah satu area prospek di daerah Secang, dengan ditemukannya silika vuggy yang memiliki kadar Au tertinggi mencapai 8,3 ppm dan Cu mencapai 460 ppm, disinyalir memiliki potensi endapan epitermal sulfidasi tinggi. Meskipun demikian, belum ada studi yang menjelaskan tentang kondisi daerah penelitian terkait alterasi dan mineralisasi secara detail. Objek penelitian ini terletak di daerah Secang, Kecamatan Campurdarat, Kabupaten Tulungagung, Provinsi Jawa Timur. Berdasarkan stratigrafinya, daerah penelitian tersusun oleh batuan vulkanik Formasi Mandalika yang terdiri satuan breksi andesit dan satuan lava andesit yang diterobos oleh satuan mikrogranodiorit, kemudian diendapkan secara tidak selaras satuan breksi polimik dan satuan batugamping terumbu Formasi Campurdarat. Terdapat struktur geologi berupa sesar mendatar mengiri dibagian timur daerah penelitian dengan orientasi baratdaya—timurlaut (Sesar Pagersari) yang diikuti oleh sesar mendatar manganan berorientasi baratbaratlaut—timurtenggara (Sesar Pojok 1) dan sesar-sesar mendatar manganan berorientasi baratlaut—tenggara (Sesar Pojok 2 dan Sesar Tanggung) sebagai penyerta. Alterasi batuan terjadi pada hampir seluruh satuan batuan vulkanik dengan zona silisifikasi sebagai pusat zona alterasi terdapat pada satuan lava andesit. Zona alterasi yang terbentuk di daerah penelitian dari luar ke pusat yaitu zona kuarsa-klorit-karbonat+smektit (zona propilitik), zona kuarsa-kaolinit-ilit-smektit+diaspor (zona argilik), zona kuarsa-kaolinit-alunit-pirofilit-diaspor+ilit+smektit (zona argilik lanjut), dan zona silisifikasi. Mineral bijih yang terbentuk adalah mineral sulfida berupa pirit, tetrahedrit, kalkopirit, bornit, galena, dan kovelit. Endapan bijih di daerah penelitian terbentuk melalui proses hidrotermal yang dikontrol oleh sesar mendatar manganan Pojok 1 di bagian selatan dan kelurusan yang diinterpretasikan sebagai bidang lemah di bagian utara daerah penelitian, dimana fluida hidrotermal dari proses magmatik melewati jalur (*channel way*) berupa struktur sesar yang memotong satuan lava andesit dan breksi andesit sebagai batuan samping. Fluida hidrotermal membentuk vuggy quartz di bagian pusat diikuti oleh zona alterasi argilik lanjut dengan mineral penciri alunit, kaolinit, pirofilit, dan diaspor, serta zona alterasi argilik dan propilitik dibagian luar. Fluida hidrotermal tersebut membawa mineral sulfida dengan urutan pembentukan: tetrahedrit, pirit, kalkopirit, bornit, dan galena, serta kovelit yang terbentuk terakhir sebagai hasil dari oksidasi yang berasosiasi dengan hematit. Hasil geokimia batuan menunjukkan keterdapatan unsur Au berkisar antara 0,03—2,45 ppm, Ag <0,5—19 ppm, Cu 19—148 ppm, Pb <5—1520 ppm, Zn <5—520 ppm.

Kata kunci: Tulungagung, epitermal, sulfidasi tinggi, alterasi, *vuggy quartz*

## **ABSTRACT**

*Several previous studies has been carried out in East Java and Tulungagung Regency including in one of the prospect areas in the Secang area, with the discovery of vuggy silica which has the highest Au levels reaching 8.3 ppm and Cu reaching 460 ppm, allegedly has the potential for high sulfidation epithermal deposits. However, there are no studies that describe the condition of the research area related to alteration and mineralization in detail. The object of this research is located in the Secang area, Campurdarat District, Tulungagung Regency, East Java Province. Based on its stratigraphy, the study area is composed by volcanic rocks of Mandalika Formation, consisting of andesite breccia units and andesite lava units that are intruded by microgranodiorite units, then deposited unconformably polymict breccia units and Campurdarat Formation reef limestone. There are geological structure in the eastern part of the study area (left strike-slip fault) with southwest-northeastern orientation (Pagersari Fault), followed by right strike-slip fault with westnorthwest-eastsoutheastern orientation (Pojok Fault 1) and right strike-slip fault with northwest-southeastern orientation (Pojok Fault 2 and Tanggung Fault) as a companion. Rocks alteration occurred in almost all volcanic rock units with silicification zones as the center of alteration zone which occurred in andesite lava units. The alteration zones formed in the study area from outer to the center area are: quartz-chlorite-carbonate±smectite zone (propylitic zone), the quartz-kaolinite-illite-smectite±diaspore zone (argillic zone), quartz-kaolinite-alunite-pyrophyllite-diaspore±illite±smectite zone (advanced argillic zone), and silicification zone. Ore minerals formed are: pyrite, tetrahedrite, chalcopyrite, bornite, galena, and covellite. Ore deposits in the study area were formed through a hydrothermal process controlled by a Pojok Fault 1 in the southern part and a lineament that is interpreted as a channel the northern part of the study area, where hydrothermal fluid from the magmatic process passed through a channel way in the form of a fault structure that cutted andesite lava units and andesite breccias as wall rocks. Hydrothermal fluid formed vuggy quartz in the central part, followed by advanced argillic zone with the mineral identifiers of alunite, kaolinite, pyrophyllite, and diaspore, and argillic and propylitic alteration zones in outer part. The hydrothermal fluid carried sulfide minerals in the order of formation: tetrahedrite, pyrite, chalcopyrite, bornite and galena, as well as the latter formed covellite as a result of oxidation associated with hematite. The results of geochemistry showed that the Au element ranged from 0.03 to 2.45 ppm, Ag <0.519 ppm, Cu 19-148 ppm, Pb <5-1520 ppm, Zn <5-520 ppm.*

*Keywords: Tulungagung, epithermal, high-sulfidation, alteration, vuggy quartz*