The Occurrences of Base Metal Mineralization in Cikadu-Cisungsang Area, Banten Province, Indonesia*)

Rosana, M.F., Haryanto, A.D., Yuniardi, Y., Yuningsih, E.T.
Department of Geology, Padjadjaran University
Jl. Raya Bandung Sumedang Km 21, Jatinangor, Sumedang 45363
rosanamf@yahoo.com; rosanamf@melsa.net.id

Abstract

The Cikadu-Cisungsang area is located in the Bayah gold district, Banten Province of Western Java. The base metal mineralization occurred in the limestone host rocks of Miocene age. The ore is occurring as banded and quartz vein within the limestone. The mineralized body is identified as hydrothermal breccias, banded sulfide-quartz and silicified limestone. The ore minerals consist of sphalerite, galena, arsenopyrite, pyrite, marcasite, silver minerals, chalcopyrite, and pyrrhotite. those are occur as hydrothermal breccias. Silver minerals of aguilarite, pyrargyrite, proustite, and canfildite occur as fine to very fine grained crystals in galena. Metal contents are mostly of Pb (~130,000 ppm), Zn (~2,9800 ppm), As (~7,300 ppm), Cu (~94 ppm), Sb (~151 ppm), Ag (~303 ppm), and Au (~1.88 ppm). The gangue minerals mostly are silica and small amount of calcite, and rarely clay minerals. The silica varies from fine to coarse-grained of quartz to chalcedony. Homogenization temperatures obtained from fluid inclusion in quartz are ranging from 240°C to 300°C, while the salinities are from 2.2 to 3.4 wt% NaCl eqv. Considering the mode of occurrence of ore and host rocks and the formation temperatures and depth the Cikadu-Cisungsang mineralized body might be formed in the mesothermal environment The present of canfildite mineral, which is uncommon in typical epithermal deposits, probably due to the reworking of older continent crust as the source of metal or magmatic activities, in which several dacitic lavas and intusions of similar ages are observed within the area. Further studies should be done with special attention from view point of island arc geologic and tectonic setting to clarify the time-spatial relationship of the base metal and gold mineralization in the Bayah district.

INTRODUCTION

The Cikadu-Cisungsang area is located southeast of Cikidang gold mine, Banten Province of Western Java (Fig.1). The tectonic setting of Western Java is influenced by subduction of the Indian-Australian Plate under the Eurasian continent. The gold ores of Western Java are an integral part of the geology of Western Java. Its major metallogenic event during the Miocene and the Pliocene are located in the Bayah Dome, a Tertiary-Quaternary volcanic structure at west end of Java, which is well known as gold district, where the Cirotan, Cikidang, Cikotok, and Pongkor gold mines are located. There are two noticeably different styles of epithermal gold deposits within the Bayah dome, both are gold bearing quartz veins; they are known as “Cirotan type” and “Pongkor type”. The Cirotan type (1.7 Ma, Marcoux and Milesi, 1994) is characterized by abundant sulfide minerals and its cockade texture, where as the Pongkor type (2.05 Ma, Milesi et al, 1999) is characterized by very low sulfide content, occurrence of adularia, calcite and manganese oxide.

The base metal mineralizations well observe in the Cisungsang and Bojong area (Rosana et al, 2006). These mineralized ore body is hosted by limestone of Miocene age and occur as

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a base metal bearing quartz vein which trending for about N80^{0}E and dipping about 75^0 to the south. Hydrothermal alteration is not well developing in the area, as mostly dominated by silicic alteration and locally argillic alteration. The mineralized body has some similarities in ore mineral compositions with the Cirotan type (Rosana and Matsueda, 2002).

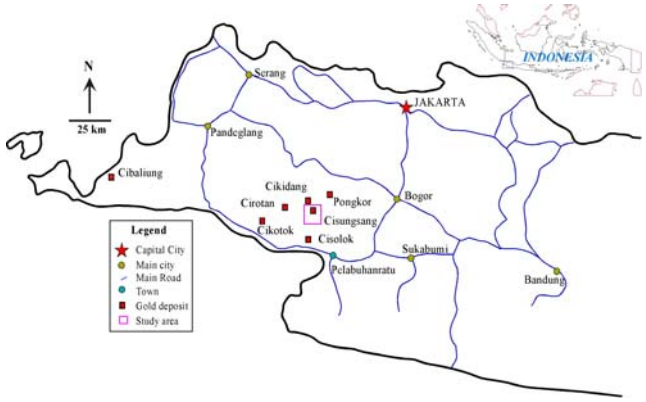

Fig. 1. Location of the Cisungsang area and other major gold deposits in Western Java

METHODS

The research is aimed to study the characteristics of the ore body and its distribution both lateral and vertical, and to know the economic potential of the ore. Detail geological and alteration mapping were applied to identified the geology of the area and the distribution of altered rocks and associated mineralized ore body. Samples were collected from outcrops of mineralized body and analyses were done for mineral identification by Petrography, mineragraphy and XRD analyses to identify the rock type and metal mineral contents and alteration minerals.; the minerals chemistry were analyzed by electron probe microanalysis (EPMA), AAS, ICP-MS and LA-ICP-MS; fluid inclusions thermometric analysis were done by Linkam using the criteria of Roedder (1984).

RESULTS

The mineralized ore body, both in Cisungsang and Bojong area are cropped out in the limestone of the Cimapag Formation of Miocene age. The ore is occurring as banded sulfide-quartz minerals vein within the limestone. The mineralized body is identified as hydrothermal breccias, banded sulfide-quartz and silicified limestone stages. The boundary between these three stages is not well developing, but from its outcrops and its hand

specimen can be differentiated clearly. The silicified limestone stages is characterized by gray color of limestone which replace by silica and small quartz veinlet, rarely disseminated pyrite which replaced foraminifera fossil and calcite. This is representing the altered limestone host rocks The banded sulfide-quartz stage is characterized by thin banding of pyrite-arsenopyrite-marcasite, galena, sphalerite, chalcopyrite and quartz. This stage is characterized by it yellow to gray color of metal. The hydrothermal breccia comprising of fragmen banded sulfide-quartz ore, silicified limestone, altered pumice and pyroclastic tuff in chalcedonic to fine quartz matrix. Its shos dark brown to yellowish brown color and become more yellowish if dominated by prite-arsenopyrite and chalcopyrite minerals.

The ore minerals consist of sphalerite, galena, arsenopyrite, pyrite, marcasite, silver minerals, chalcopyrite, and pyrrhotite. those are occur as banded sulfide-quartz and hydrothermal breccias. Silver minerals of aguilarite, pyrargyrite, proustite, and canfildite occur as fine to very fine grained crystals in galena (Rosana, 2004). It has not been observed in pyrite, arsenopyrite, chalcopyrite, or sphalerite. At present there has not been found any gold or electrums observe under the microscope. Metal contents are mostly of Pb (~130,000 ppm), Zn (~2,9800 ppm), As (~7,300 ppm), Cu (~94 ppm), Sb (~151 ppm), Ag (~303 ppm), and Au (~1.88 ppm). The gangue minerals mostly are silica and small amount of calcite, and rarely clay minerals. The silica varies from fine to coarse-grained of quartz to chalcedony. The chemical composition of the sphalerite indicating high content of iron, which is vary from 13.6 to 19.6 mol % FeS. The arsenopyrite exhibit extreme chemical variation in As and S, ranging from 24 to 33 mol % As (Rosana and Matsueda, 2002).

The fluid inclusions are vary from 10-200 μ m, aqueous and two-phase; liquid and vapor, they comprise primary and secondary inclusions, either in quartz and calcite Homogenization temperatures obtained from fluid inclusion in quartz are ranging from 240°C to 300°C, while the salinities are from 2.2 to 3.4 wt% NaCl eqv.

DISSCUSSIONS

The Cisungsang and Bojong mineralized body occurs as banded sulfide-quartz vein. It crop out in form of hydrothermal breccia in the upper part in the limestone host rock of Cimapag Formation. The mineral assemblages are dominated by sulfide minerals of iron with high content Pb-Zn-Cu-As-Ag and significant amount of Au. The ore occurrence and

its mineral assemblage make it different type of mineralization in compared to the Cikidang deposit, which is only about 4 km apart (Rosana & Matsueda, 2002).

The micrometric results of fluid inclusions either from calcite and quartz hosted fluid inclusions indicated a homogenization temperature of ore zone is from 240°C to 300°C with low salinity of less than 4 wt% NaCl eqv. Applying method of Haas, 1971, the depth of ore deposition may be estimated. However, as the boiling phenomena was not observed uncertainty in the fluid inclusions, the temperature of boiling is assuming based on the temperature of fluid inclusions from the maximum high content of ore minerals assemblage (polymetallic stage), which shows wide range temperature. The depth of about 400 m of ore deposition is suggested, if the boiling is occurred at about 240℃, up to about 1000 m if boiling happen at 300℃ (Fig.2). It suggested that the ore deposition in the Cisungsang and Bojong ore are at shallow mesothermal about 240 to 300℃ of low sulfidation base metal systems, which characterized by it low grade gold, pyrite is dominant sulfide, with Pb>Zn>Cu, quartz gangue is dominated over carbonate, and increasing of Fe-content of sphalerite is correlated with increase in temperature.

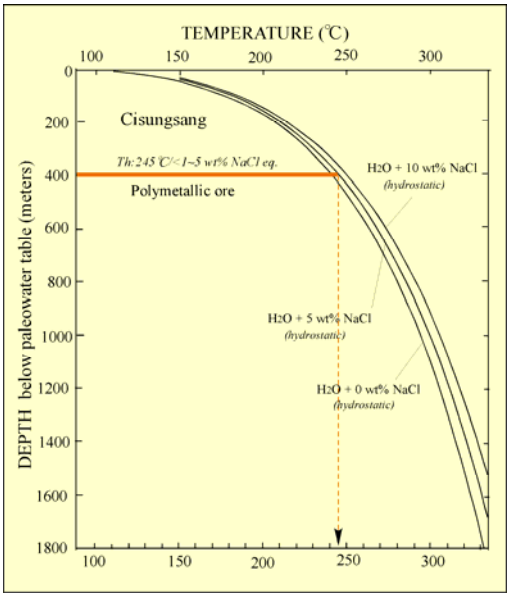

Fig. 2. Boling point-depth curve suggesting for formation of ore deposition of the Cisungsang deposit fluid inslucions data.

CONCLUSIONS

Considering the mode of occurrence of ore and host rocks and the formation temperatures and depth the Cikadu-Cisungsang mineralized body might be formed in the mesothermal environment The present of canfildite mineral, which is uncommon in typical epithermal deposits, probably due to the reworking of older continent crust as the source of metal or magmatic activities, in which several dacitic lavas and intusions of similar ages are observed within the area. Further studies should be done with special attention from view point of island arc geologic and tectonic setting to clarify the time-spatial relationship of the base metal and gold mineralization in the Bayah district.

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