CHARACTERISTICS OF ALTERATION AND MINERALIZATION OF RORAH KADAL VEIN SYSTEM IN CIBALIUNG GOLD FIELD WESTERN JAVA,INDONESIA

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論　文　要　旨

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論文題名	CHARACTERISTICS OF ALTERATION AND MINERALIZATION OF RORAH KADAL VEIN SYSTEM, IN CIBALIUNG GOLD FIELD, WESTERN JAVA, INDONESIA （インドネシア、西ジャワ、チバリオン金鉱床のロラカダル脈の変質作用および鉱化作用に関する研究）		

論　文　内　容　の　要　旨

Java Island is part of the Sunda-Banda magmatic arc of Neogene age. The geological evolution of this area is influenced by subduction of the Indian-Australian Plate, below the Eurasian Plate since the Late Cretaceous. The gold mineralization of Western Java reflects to geological events during the Miocene-Pliocene and Pleistocene volcanism, including large low-sulfidation epithermal-type deposits in Indonesia such as; the Pongkor gold mine, the Cirotan and Cikidang gold (closed) mines. All of them are epithermal gold deposits situated in the Bayah Dome Complex, a well known western Java gold district. The Cibaliung deposit is an epithermal vein type Au-Ag deposit situated in the Miocene Honje Igneous Complex about 70 km west from the Bayah Dome Complex. The Cibaliung goldfield has several gold vein deposits and prospects, such as the Cikoneng and Cibitung deposits and the Cikeni, Cibeber and Rorah Kadal vein prospects. Since 2010 the Cikoneng and Cibitung quartz veins are operating for production. However, no detail study and exploration have been done in other veins. This study is focused on the Rorah Kadal vein as the most prosperous target.

The Rorah Kadal vein is located 700 meters south of the Cibitung vein. The comprehensive study is aimed mainly to define the alteration and mineralization characteristics that are responsible for the formation condition of the Rorah Kadal quartz vein and its relationship with the Cikoneng and Cibitung veins of the Cibaliung goldfield. The studies were conducted in order to clarify: 1) chemical composition of the host rock, 2) characterization of the hydrothermal alteration and its distribution, 3) ore mineral assemblages, 4) paleo temperature and depth of hydrothermal fluid, and the formation condition of the Rorah Kadal quartz vein and it is relationship to the Cikoneng and Cibitung quartz veins.

The result of this study is presented in this dissertation that consists of five chapters: Chapter 1 introduces the research background, objectives of the research, description of study area, previous work and significance of the research.

Chapter 2 introduces the geological setting, regional geology of western Java, relationship between the Sunda-Banda magmatic arc and mineralization in western Java. Further, it discusses the local geological setting in the research area in order to reconstruct stratigraphy and tectonic environments in which this mineralization was formed. In addition, it overviews the timing of the volcanic activity, and timing of mineralization in the Cibaliung area.

Chapter 3 examines the petrography and chemical characteristic of host rock, discussed the subsurface hydrothermal alteration, including method to identify the hydrothermal alteration minerals and its distribution. The host rock is the Honje Formation, mainly composed of volcanic breccia intercalated

with basalt, basaltic-andesite, and andesite lavas. Honje Formation is overlain by the younger Cibaliung Tuff. Major chemical composition indicates that the Honje and Cibaliung Tuff volcanic rocks belong to the calk-alkaline magma series. The subsurface hydrothermal alteration based on five drill core samples suggests that hydrothermal alteration zones are still preserved and useful to delineate the center and periphery of the hydrothermal system. This study defined three zones of alteration on the basis of the key alteration mineral assemblages: illite-smectite-adularia-quartz zone (Zone I); chlorite-chlorite/smectite mixed layer mineral zone (Zone II); and illite/smectite-calcite-quartz zone (Zone III). Representing a temperature of between 150 to 300 °C and a near neutral pH condition.

Chapter 4 discusses the textures and ore mineralogy of the Rorah Kadal quartz vein. The description includes method of identification, quartz vein textures, gangue and ore minerals assemblages and semi-quantitative analysis using scanning electron microscope - energy dispersive X-ray (SEM-EDX) to determine Ag content in electrum. The quartz veins in the Rorah Kadal show colloform, cockade (brecciated) and comb textures. The colloform banding is composed of quartz, adularia, clay minerals and ginguro bands. Ore mineral study was conducted on the quartz vein samples, especially those contain ginguro banding in colloform textures. SEM-EDX analysis has shown that the Ag/(Au+Ag) ranges from 44 to 70 at.%. The study revealed that the Rorah Kadal quartz vein consists of pyrite, chalcopyrite, galena, sphalerite, electrum and aguilarite. Gold is present mostly as electrum. Predominant gangue minerals are quartz, calcite and adularia. These silver/gold ratio in electrum and ore mineralogy assemblage are quite similar with those of Cikoneng-Cibitung veins. Brecciated texture indicates a dynamic condition of the hydrothermal system. In addition, the occurrence of adularia at colloform band is indirect evidence of boiling. This chapter also discusses the temperature and paleo depth of formation condition as well as the origin of the hydrothermal water responsible for the formation of the Rorah Kadal vein. The formation temperature was estimated using fluid inclusion microthermometry, by which the formation depth was estimated utilizing the boiling point to depth curve based on relative salinities. The experiment resulted in the homogenization temperature of about 180 to 330°C for the Rorah Kadal quartz vein. Final ice melting temperature was measured at -1.2 to -0.7 °C indicating much diluted hydrothermal fluid (salinity <4 wt% NaCl eqv.). The formation depth is estimated in the range from 169 to 259 meters depth beneath the paleo water table and pressure estimated to be around 18 to 27 bars.

Chapter 5 discusses and summarizes the mineralization in the Rorah Kadal vein and relationship to the Cibaliung goldfield. Based on this study of characteristics of the Rorah Kadal vein, it is clearly shown that the host rocks consist of volcanic rocks, typical for low sulfidation type epithermal mineralizatrion. The vein texture of colloform banded, neutral pH of hydrothermal fluid with temperature ranging and salinity represent the best texture and condition for hosting gold precipitation. Therefore, this typical epithermal characteristics can be used as a guide to search for new epithermal deposit in similar geological conditions in other regions.