Geochemical Characteristics of Two Types of Ores from Jinshan Shear Zone-hosted Gold Deposit, Jiangxi, with a Discussion on the Mechanism of Two-stage Mineralization*

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Abstract: Two types of gold ores, siliceous mylonite and quartz vein, formed at the first and second stages of mineralization respectively, can be clearly recognized in the shear zone-hosted gold deposit at Jinshan, Jiangxi. Similarity in REE and trace elements between the siliceous mylonite and the country rocks indicates that the ore metals were supplied by the surrounding strata during the first stage of mineralization. On the other hand, as indicated by fluid inclusion data, the ore-forming fluid at the second stage was of meteoric origin and the precipitation of gold was caused by phase separation.

Key words: shear zone; gold deposit; geochemistry; mechanism of two-stage mineralization; Jiangxi

The Jinshan gold deposit in Dexing, Jiangxi Province, is a large deposit typical of the shear zone type in South China. Descriptions of it are available in a number of previous studies in which the deposit was thought to be formed through reworking related to metamorphism (Zhu Kaijun et al., 1991) or through a process in relation to magmatic intrusion (Huang Hongli et al., 1990). A two-stage mineralization is proposed in this paper based on systematic studies of the two types of ores in the deposit.

Geological Characters of the Two Types of Ore

Northwest of the deep fault zone in Northeast Jiangxi, the Jinshan deposit is situated at the southern margin of the east sector of the Jiangnan Ancient island Arc. The low-grade metamorphic rocks of the Proterozoic Upper Shuangqiaoshan Group are the major strata exposed in the area where intensive Yenshanian magmatism is commonly seen.

Several other gold deposits of less importance (Xikuang, Jinshan, Xinjiang, etc.) are also known in the area. Controlled strictly by the NNE-striking brittle-ductile shear zone, the

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orebodies of all these deposits are hosted in the Upper Shuangqiaoshan Group (in the top parts of the carbonaceous phyllite, beneath the tuffaceous phyllite).

Two types of gold ores can be noticed in the Jinshan deposit: the mylonite ore and the quartz vein ore. Occurring mostly in the core of the shear zone, the mylonite ore shows almost uniform content of gold which is found associated with pyrite and arsenopyrite disseminated in the mylonite. The mylonite exhibits a fine saccharoidal texture, composed predominantly of fine-grained (recrystallized) quartz, with larger, highly deformed quartz grains occasionally found. Judging from the textural features, it is thought that the mylonite was developed from a pre-existing rock via intensive shearing and metamorphism with quartz segregated and recrystallized and gold mineralization resulting from metasomatism of an infiltrating ore-forming fluid.

The quartz-vein ore is constituted by lens-shaped quartz veins in the shear zone, with high but variable gold content (tens to 1000 g/t). The gold occurs as native gold in coexistence with pyrite, chalcopyrite, sphalerite and galena. Two types of quartz can be distinguished in the auriferous quartz veins. One is anhedral, relatively large in size (several mm to several cm across), and highly deformed (highly sheared, showing undulatory extinction). The other is fine saccharoidally textured with individual grains measuring 1 to several µm, distributed around the former. It is thought to be a partially mylonitized product from the coarse-grained anhedral quartz, indicating that the quartz-vein ore must have resulted from brittle-ductile shearing. Gold in the quartz-vein ores is for the most part associated with fine-grained and saccharoidal textured quartz, with only a small part occurring in the fractures in coarse-grained quartz. This suggests that both infiltration-metasomatism and filling should be important during this stage of ore formation. It is also noticed that the higher the extent of fracturing and mylonitization, the higher the content of gold in the ore, which is consistent with what has been reported from some other shear zone-hosted gold deposits in the world (Bonnemaison et al., 1990).

As may be inferred from the above, the Jinshan gold deposit was formed in two stages. In the first stage gold-bearing sulphides were formed via the infiltration and metasomatism of the ore solution accompanying mylonitization under a condition of intensive shearing. During the second stage, gold was precipitated as native gold via the infiltration-metasomatism and filling of the ore solution in pre-existing quartz veins also as a result of intensive shearing.

Geochemical Characters of the Auriferous Siliceous Mylonite

REE

As can be seen from Table 1 and Fig. 1, the auriferous siliceous mylonite is characterized by: 1) low ΣREE (6.0×10^{-6} \sim 51.8 \times 10^{-6}); 2) moderate fractionation between HREE and LREE (Ce/Y=5.6\sim7.7); and 3) apparent Eu depletion. These are consistent with the REE patterns of the Upper Shuangqiaoshan Group (Liu Yingjun et al., 1989), and are in common with the post-Archean sediments.