

Hydrothermal Alteration, Mineralization and Breccias at the Zijinshan High Sulfidation Cu-Au Deposit, Fujian Province, China

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The Zijinshan ore field in Fujian province, southeast China, formed during the Yanshanian period. It contains a diverse array of ore deposits, including high sulfidation (HS) gold-copper, intermediate sulfidation polymetallic silver-base metal, and porphyry molybdenum (copper) deposits. The Zijinshan HS deposit is located in the middle of the ore field and contains 326 t Au and 2 Mt Cu. It is hosted by a 168 Ma granite pluton that was intruded by 110 Ma dacite dikes. Mineralization at Zijinshan is controlled by NW-trending normal faults which dip moderately to the northeast. These faults controlled the emplacement of the dacite dikes, synmineralized veins, and mineralized breccias.

Several stages of veins have been recognized within the lithocap, including premineralization quartz-pyrite veins with or without quartz alteration halos. There are also synmineralization alunite-pyrite-covellite-digenite veins, dickite-alunite-covellite-digenite veins, and syn- and postmineralization dickite and alunite veins. Premineralization veins do not have any preferred orientation. The synmineralization veins are preferentially strike northwest and dip moderately northeast and southwest. Postmineralization veins are northwest-striking and dip steeply northeast.

Three different types of breccias have been identified at Zijinshan: premineralization matrix-rich breccias, and synmineralization hydrothermally cemented, and dacite-cemented breccias. Premineralization matrix-rich polymict breccias occur as northwest-elongated dikes (avg 1 m wide). They are best developed in the center of high-grade ore zones in the southern part of the deposit. The clasts and matrix are intensely quartz altered.

Synmineralization hydrothermally cemented breccias occur in the center of the high-grade ore zones in the northern part of the deposit. The cemented breccias occur as subparallel breccia veins (avg 20 to 40 cm wide) that strike NW and dip <45° NE. The cemented breccias varied from monomict with granite clasts to polymict with granite, dacite porphyry, and quartz vein clasts. The hydrothermal cements include quartz and pyrite, locally with abundant alunite, dickite, digenite, covellite, and minor enargite. Clasts are commonly quartz-alunite-dickite altered.

The cemented breccias and the matrix-rich breccias are localized in different areas within the mine, and there is minimal superposition of the two breccia types. Where both are present, the hydrothermally cemented breccias cut the matrix-rich breccias. These features indicate two major stages of tectonic-hydrothermal events at Zijinshan.

Several hydrothermal alteration assemblages have been recognized at Zijinshan. Silicic alteration is pervasive. It is dominated by massive quartz, and locally vuggy quartz. Intense silicic alteration is spatially associated with the matrix-rich breccia bodies. Minor kaolinite and muscovite occur on the periphery of the silicic alteration zone.

Intense alunite alteration is spatially associated with hydrothermally cemented breccias and alunite veins. Dickite alteration is widespread correlated and spatially with dacite. All these alteration zones have narrow roots at depth, and broad distributions in the upper part of the deposit. The matrix-rich breccias, dacite porphyry dikes, and intense quartz alteration are localized in the southern part of

the deposit, implying that the fluid source is in the south. Oxide Au ores are associated with domain of intense silicic alteration, located in the upper parts of the lithocap.