

Characteristics of Gold Mineralization in the Salu Bulu Prospect, South Sulawesi, Indonesia

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The Salu Bulu prospect is one of the gold prospects in Awak Mas project which is located in Luwu District, South Sulawesi Province, Indonesia. The prospect is hosted in meta-sedimentary rocks of pre-Cenozoic Latimojong Formation which consists of dark (graphitic), green (chloritic) and red (hematitic) mudstone, siltstone, sandstone and intercalated meta-volcaniclastic rocks. The mineralized zones are approximately three meters thick and associated with stockwork veins and cataclastic breccias with an orientation sub-parallel and discordant to the foliation of the host rocks. Carbonatization (ankerite \pm calcite or dolomite), silicification, albitization and sulfidation (pyrite) are common in addition of minor sericitization.

Pyrite is the most abundant sulfide mineral which is commonly more abundant as disseminated in the altered host rocks than in veins. It shows different morphologies and textures: fine-grained, porous and deformed pyrites. Trace amounts of tennantite-tetrahedrite, chalcopyrite, bornite, galena, hematite and rutile are also present as inclusions in pyrite and rarely as discrete minerals. Covellite and chalcocite occur on the rim of some chalcopyrite, which are possibly of supergene origin. Bulk chemical compositions of strongly altered rocks and ore bodies indicate that Au content is correlated with Ag, Ni, Na₂O and Mo contents and show Au/Ag ratio ranges from 1.5 to 7 (average 4.4). Gold occurs as electrum and native gold as fracture filling and inclusion in pyrite with Au/(Au+Ag) ratio ranging from 66.2 to 78.5 atomic % and from 81.4 to 82.3 atomic %, respectively.

Fluid inclusions in mineralizing veins and matrix of cataclastic breccia are mainly liquid rich vapor-liquid H₂O inclusions and minor H₂O vapor inclusions. Laser Raman detected CO₂ and N₂ gases in these inclusions. Homogenization temperature (Th) of fluid inclusions in mineralizing veins ranges from 132 to 336 °C and that in the matrix of cataclastic breccia ranges from 148 to 368 °C, which homogenized into the liquid phase. Salinity of fluid ranges from 4.3 to 9.3 wt.% (average 7.4 wt.%) NaCl equivalent in mineralizing veins and from 5 to 9.5 wt.% (average 7.1 wt.%) NaCl equivalent in matrix of cataclastic breccia. Carbonate alteration was probably formed by CO₂ rich mineralizing fluid as it was confirmed by the presence of CO₂ in fluid inclusions, while albite alteration and the occurrence of albite in veins and matrix of cataclastic breccia indicates the presence of sodium-rich mineralizing fluid. Hydrothermal activity accompanied with deformation during formation of cataclastic breccia formed pyrite and gold. In the alteration halo of quartz-carbonate \pm albite vein and stockwork, gold precipitated as fracture filling and inclusion in pyrite.

Keywords: Meta-sedimentary rocks, pyrite, quartz-carbonate \pm albite vein, CO₂