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Discovery of the first orogenic gold deposit in central Tibet

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The Shangxu gold deposit is located in the middle western part of the Bangonghu-Nujiang Suture, central Tibet, China. Detailed drill-core logging indicates this is a classic orogenic gold deposit, a type of deposit that has rarely been reported in central Tibet. Owing to the poor accessibility and extremely high altitude, this belt received little attention in the past and the exploration work along it is just at an initial stage. Although it shows metallogenic potential for porphyry Cu deposits, the discovery of other types of deposits is rare. Yet the identification of a new economic orogenic gold deposit will draw more attention to the belt. The Shangxu gold deposit is a primary gold deposit with medium-scale gold resources discovered along thie suture and it represents an important new type of exploration target for the region.

Mineralization at the Shangxu deposit is structurally controlled by a series of nearly E-W trending, high-angle faults within Early-Middle Jurassic sandstone, siltstone, quartz-rich greywacke, and carbonaceous slate, which have undergone low-grade metamorphism. Regional tectonic activities have led to the country rocks suffering strong regional deformation and metamorphism, transforming these into a series of mylonites. They possess mylonitic texture, and foliation-lineation structure, flow structure, or directional structure. The shape of the porphyroclasts is augen-like, or lenticel or spindle in form. Recrystallization is obvious and due to hydrous sheet minerals, such as sericite, and chlorite, the rocks display silky luster and banded texture surrounding the porphyroclasts, which show plastic flow. The wallrocks also have the typical ductile shearing characteristics, similar to a domino structure, and an asymmetrically rotated porphyroclast system.

The primary gold mineralization is closely associated with sulfide minerals, which occur in fault-related quartz veins or as disseminations in fracture zones and wallrocks. Based on petrographic observation, the ore minerals are composed of native gold, pyrite, arsenopyrite, gersdorffite, galenite, sphalerite, chalcopyrite, and pyrrhotite. Graphite has also frequently been observed in core, and it displays good crystallinity and occurs as euhedral crystals or breccias in the quartz-carbonate veins or surrounding wallrocks. Gangue minerals mainly consist of quartz, potassium feldspar, sericite, ankerite, calcite, chlorite, and kaolinite. Accessory minerals, such as apatite, rutile, monazite, and zircon, have also been recognized.

Our comprehensive studies conclude that the Shangxu gold deposit shares many characteristics with typical orogenic gold deposits in terms of ore-controlling stuctures, mineralization styles, petrography of host rocks, fluid compositions, and source of fluids. Based upon petrographic observation, microthermometry, Raman spectroscopy analysis and H-O isotopic analyses, the ore-forming fluid is noted to be a low-medium temperature, low salinity, low density, CO_2-rich fluid, and initially was metamorphic in origin and later mixed with meteoric water. The identification of an orogenic gold deposit has important implications for regional exploration in the Bangonghu-Nujiang metallogenic belt.