

Palaeoproterozoic granite-hosted gold deposits in the Birimian terrane of Ghana

YAO, Y. and ROBB, L.J. Department of Geology, University of the Witwatersrand, Private Bag 3, WITS 2050, Johannesburg, South Africa.

Palaeoproterozoic gold deposits hosted in Birimian granitoids represent a relatively new type of gold mineralization, which complements the more productive shear-zone- (Ashanti) and quartz pebble conglomerate-hosted (Tarkwa) types in Ghana. Over 20 auriferous granitoids of both Belt and Basin types in the Birimian mostly occur as small steeply dipping stocks and are dominantly composed of granodiorite. Gold mineralization, which is characterized by quartz vein/stockworks that cut both the intrusions and their sheared wall rocks, and by pervasive alteration zones within the granitoids, post-dated granitoid emplacement and is related to brittle structures. Ore mineral assemblages mainly comprise pyrite and arsenopyrite, with minor chalcopyrite, sphalerite, galena, and native gold. Alteration mineral assemblages comprise quartz-sericite(muscovite)-sulphide(mainly pyrite + arsenopyrite)-carbonate±chlorite±tourmaline, suggesting mesothermal temperature and pressure conditions of ore formation. Mineralizing fluids from the granitoid-hosted gold deposits are typified by low-salinity (<6 wt. % NaCl equivalent) $\text{H}_2\text{O}-\text{CO}_2-\text{N}_2\pm\text{CH}_4$ compositions and underwent phase separation of an original homogeneous $\text{H}_2\text{O}-\text{CO}_2$ -rich fluid at 220 to 350 °C and 1 to 2.5 kbar. U-Pb rutile ages of mineralization (2133 ± 21 to 2086 ± 4) are 5 to 30 million years younger than the ages of corresponding granitoid emplacement. It is suggested that the granite-hosted gold deposits in Ghana were formed by metamorphism related to a late stage of the Birimian Orogeny at about 2130 to 2080 Ma.