Petrographic and geochemical characterization of the Archean fine granitoid: example of the Bakoudou gold deposit in Gabon

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Gabon is a country in central Africa whose geological history is part of the geological context of the African continent. The lands found throughout the country show a great geological diversity which is reflected in formations whose ages range from the Archean to the recent Cenozoic and which contain important natural resources such as Bakoudou gold and Comilog manganese deposits, located in the southeast of the country at the level of the Chaillu Archean massif which is an extension of the Congo Craton. The Bakoudou gold deposit, owned by the Moroccan mining group MANAGEM since 2005-2006, is enclosed in Archean finite granitoid (2.7-2.5 Ga) (Cahen et al., 1984).

Macroscopically, these granitoids have a grainy texture and mostly appear dark to clear gray. Visible minerals include quartz, potassium feldspars and ferromagnesian minerals. Some samples show a pinkish color, indicative of altered feldspars. The various minerals observed on a microscopic scale are amphibole (more precisely green hornblende), biotite, feldspar plagioclase (anorthite-intermediate-albite, microcline), orthoclase (orthosis) and apatite. There are also some altered minerals such as chlorite, sericite, muscovite and epidote. Geochemically, these Bakoudou granitoids belong to a highly potassic calc-alkaline series. The petrographic and geochemical characterization of these granitoids revealed three main facies hosting the mineralization, namely: granites, granodiorites and quartz diorites.

The results obtained, through metallogenic analysis, show that the quartz veins comprise quartz as the main mineral. Then come the gold mineralization, and the sulfides that are included in the quartz or in the muscovite biotite relics contained in the geodes and fractures filled by the quartz. The presence of a cataclase zone undergone by these quartz veins would have resulted in a recrystallization of the small quartz grains (2nd generation) and created openings allowing the emplacement and/or redistribution of sulfides, gold and calcite. All these results, as well as the presence of gold and sulfides in the biotite relics contained in the quartz, suggest that placing gold within the quartz veins is the result of the circulation of fluids in cracks generated by intense tectonics. The association of sulfides, gold biotite relics and calcite, confirmed that the mineralization phase is genetically linked to a hydrothermal process that affects the rock host. These are epigenetic mineralization poor in sulfides.

Keywords: Gabon, granitoid, Bakoudou gold deposit, associated mineralization