Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.21715

Origin of an unusual sodium rich gold-mineralized metasandstones from Guiana Shield, Guyana, South America

DR. SERGEI ABRAMOV, PHD, CANDIDATE OF GEOLOGICAL SCIENCES

Guyana Geology and Mines Commission

Presenting Author: westabra@gmail.com

The origin and conditions of formation of Na-rich and gold-mineralized metasandstones have been investigated at the Aramatta gold ore occurrence in a Proterozoic greenstone belt of Guyana in the Guiana Shield (South America). These rocks are interbedded with amphibolites and schists. The metamorphic sequence is cut by a complex of granite dikes. All rocks belong to the Proterozoic stage of greenstone Guiana Shield development. Among all gold-bearing rocks, albite metasandstones turned out to be the richest. Macroscopically, the rocks resemble highly silicified fine-grained rocks. In such rocks, the Na2O content reaches 7-8 wt %, they consist of untwinned granoblastic oligoclase (60-70 vol %), augite, hornblende, rutile, zircon. The granoblastic structure of the rock indicates that sodium enrichment was not associated with metasomatic processes during regional metamorphism, but rather is the result of the formation of sodium-rich volcanic-sedimentary rocks. The fine grain rock matrix is cut by metasomatic bodies consisting of albite, potassium spar, epidote, tremolite, titanite, pyrite, pyrrhotite and micron native gold. Sulfide contents reach 5 vol %. Quartz is present in trace quantities (1-2 %). The latest stage is represented by albite-epidote symplectites, which are replacing by minerals from previous stages. The compositions of minerals were studied using a microprobe. Using the method of pseudo-sections (Connoly, 2005), it was established that the rocks underwent metamorphism corresponding to the amphibolite facies at a temperature of 600-650C and a pressure of 4-4.5 kbar, fO2 about HM-1. Probably, the strong oxidation of early metamorphic associations could be inherited from the primary compositions of volcanic-sedimentary rocks. It was also established by modeling that the epidote-tremolite-sulfide aggregates were formed in conditions: P=0.5 -1 kb, T= 400-450C, in fluid-dominant conditions. The fluid was reduced in nature (QFM+2), contained H2S and was saturated with SiO2, as indicated by the development of tremolite rather than sodium amphiboles. Consequently, gold-bearing mineral associations were formed in near-surface conditions during the interaction of metamorphic rocks with reduced silica-saturated fluid. Such characteristics of the fluid suggest that the fluid had an origin associated with the degassing of granite bodies, and did not result from amphibolite facies minerals dehydration at deeper depth.