Epigenetic gold mineralisation in BIFs, Gadag schist belt, Western Dharwar craton, South India

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Gold mineralisation in late Archaean Banded Iron Formations (BIFs) has become a well known phenomenon in recent times in the cratonic areas of the world. The present study area, Gadag schist belt forms northern continuation of Chitradurga schist belt. Gold values in the BIFs of this area range from 0.6 to 2.88 ppm.

The ΣREE concentrations in these BIFs range from 3.88 to 51.58 ppm. The REE patterns show mild positive Eu anomalies, which are similar to the modern hydrothermal iron rich sediments deposited near Mid Ocean Ridges. Eu anomalies coupled with ΣREE in these BIFs clearly shows that the iron, silica and REE along with sulphur and precious metals have been provided to the depositional basin by primary hydrothermal solutions emplaced at MOR vent sites. Some amount of sulphur and gold appears also to have been provided to form the sulphides and gold in these BIFs by secondary hydrothermal solutions circulating through the associated volcanogenic rocks.

It is inferred on the basis of observed field geological, petrological and geochemical data, that the gold mineralisation is structurally controlled and epigenetic type.

The La-La iron-oxide (Cu–Au–REE) deposit, China: REE mineralization

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La-La deposit has been be distinguished as an iron-oxide (Cu–Au–REE) deposit recently []. La-La deposit contains 120 million tons of 0.9% Cu, 0.14% rare earth oxides and 0.16g/t Au, with an average iron content of approximately 15%. The deposit is hosted by intermediate to basic volcanic rocks with subsidiary sedimentary rocks, metamorphosed at amphibolite facies. Electron and microprobe analysis and inductively coupled plasma mass spectrometry have been used in the investigation of the REE minerals. Five major REE-bearing phases have been identified: REE-bearing apatite, bastnaesite, monazite, allanite and xenotime. REE-bearing apatite is the most abundant: it occurs as porphyroblasts in biotite-schist, granulitite, and massive magnetite ores. Allanite replaces biotite and intergrowths with chlorite and copper sulfide usually. Bastnaesite, monazite and xenotime occur in cross-cutting veins; they also occur as inclusions in REE-bearing apatite, paralleled to the *c*-axis of the apatite.

The REE mineralization involved at least three stages. The preliminary concentration of REE formed as an integral part of the Middle Proterozoic volcano-plutonic event. The secondary mineralization happened at the regional metamorphism event, about 1000 Ma, formed REE-bearing apatite and a few monazite. In another regional tectonic thermal event, aged in 800Ma, hydrothermal fluid depleted some REE mineral inclusion from REE-bearing apatite and leached REE from the apatite. Moreover, the fluid introduced more LREE. Both of the REE introduced by the fluid and that leaching out from the apaite, formed bastnaesite, xenotime, allanite and monazite. This event made a farther concentration of REE.

The copper ores at LaLa have an average rare earth oxides content of 0.14%. Copper grade and the content of REE have a positive correlation in the ore. The value of LREE/HREE ranges from 11 to 67. The REE-bearing apatite contains 0.5% to 7.7% rare earth oxides.

These observations suggest that LaLa deposit were formed in multi-periods and by different mineralizations.

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Reference

[1] Li Z., Hu R. and Wang J. (2002) *B.M.P.G.* 21, 258-261. (Chinese, with English abstract).