

Paper Number: 5443

Precious metals in shear zones affecting ultrabasic rocks: examples from Western Sahara

Lehbib Nayem, S.¹, Melgarejo, J.C.¹, Arribas Moreno, A.², Marriott, C.³, Combs, J.³, Lyche, Ch.³, Bach Oller, N.⁴, and Merino Pérez, I.⁵

¹Fac. Geology, Univ. Barcelona, c/Martí i Franquès, s/n, 08028 Barcelona, Spain, slehbib@ub.edu

²Escuela Técnica Superior de Ingenieros de Minas y Energía, Madrid, Spain

³Hanno Resources Ltd, Perth, Western Australia

⁴University of Geneva, Switzerland

⁵University of Strasbourg, France

Three main styles of hydrothermal alteration zones, associated with major regional shear zones that cut Precambrian materials, crop out in Western Sahara. They are found in the Reguibat shield, located in the northern part of the West African Craton, and comprise: a) listwänites from the Zug ultramafic complex, b) listwänites from the Bir Malhat stratiform complex and c) fuchsite-bearing quartz veins in the quartzites from Miyek.

The 2733 Ma Zug dike extends in direction NNE-SSW for more than 150 km in length across Mauritania and Western Sahara [1]. Peridotites at the west side are affected by different grade of listwänitic alteration when are affected by hydrothermal fluids related to Archean shearing.

The Bir Malhat stratiform complex (Western Sahara and Mauritania) crop out for more than 400 km² and is made up by peridotites, gabbros and anorthosites. These rocks are affected by Proterozoic shearing. This complex contains stratiform chromite deposits including PGM and stratiform Ti-V deposits. The ensemble is affected by Proterozoic shearing, and the ultramafic rocks are affected by a pervasive listwänitization.

In both scenarios the rocks with a higher listwänitization lose the texture and the mineralogy of the initial igneous rock following the next paragenetic sequence: serpentinization (accompanied with development of Ni ores), dolomitization (accompanied with development of hydrothermal chromite and kammererite), silicification (accompanied with crystallization of magnetite, cinnabar and tellurides), and calcitization (including a wide paragenesis of sulphides, sulphosalts, arsenides, native gold, PGM as laurite-erlichmannite and a complex mineral association of REE minerals, zircon, scheelite and barite). Hence, Cr is leached from the ultramafic rocks during these processes and re-precipitated as chromian chlorite and/or secondary chromite in the listwänites.

The same shear zones are found cutting other rocks as the thick series of Precambrian quartzites in the vicinity of Miyec (Western Sahara). Quartzites from this domain are affected by silicification and development of Cr-rich muscovite (fuchsite), along with concentration of REE minerals and zircon, barite and sulphides.

Therefore, it is concluded that Cr, Au and PGE could be partly mobilized from the mafic complexes during the listwänitization processes by the hydrothermal fluids associated with the shearing. Further transport to shallower crustal levels could help to precipitate these elements in other rocks as the

quartzites. The mineral sequence in these orogenic gold deposits can be the result of a mixture of sources: a) PGE, Au, Cr, V from ultramafic rocks intruded in the deep crust, b) W, Ba, Pb, Bi, REE, Sb and others from the hosting crystalline acid rocks.

References:

[1] Tait J (2013) *Lithos* 174: 323-332

