MINERALOGICAL INVESTIGATION OF SULFIDE-OXIDE MINERALIZATION IN THE MISHO MAFIC-ULTRAMAFIC COMPLEX (NW IRAN)

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The mafic-ultramafic complex of Misho is exposed in the north-western part of Iran. The Misho mountains are part of the Central Iran domain which consists of a Precambrian crystalline basement, Paleozoic platform sediments, Cambrian to Triassic sedimentary and magmatic rocks representing Gondwana marginal terranes (STÖCKLIN, 1968; ALAVI, 1991).

The ore mineralization is hosted in the mafic portion (gabbro) of Misho complex. Two different types of mineralization, sulphides and oxides, were identified. The sulphide ore bodies are mainly composed of pyrrhotite accompanied by chalcopyrite, pentlandite, sphalerite, pyrite and troilite. Representative texture shows the typical sulfide–silicate relationships as net-textured sulfides enclosing silicate. The oxides mineralization consists of ilmenite (< 5%) and with small amounts of magnetite as solid inclusions in pyrrhotite. Primary sulfide was replaced by pyrite, marcasite and violarite during alteration states.

Selected samples of sulphides were investigated at the E. F. Stumpfl microprobe laboratory (University of Leoben, Austria). Pyrrhotite as a main sulfide phase contains 59.50 - 64.05 % Fe, 0.01 - 0.32 % Ni, 0.0 - 0.07 % As and 0.0 % of Co. Whole rocks analyses show that the total platinum-group element concentrations in sulfide rich gabbro are very low.

Chemical composition of the sulfide minerals and their texture suggest that they were formed in a magmatic immiscible sulfide Fe-Ni-Cu system. The early crystallization phases consisted of gabbro without associated Fe-Ni-Cu sulphide mineralization. This was followed by later progressive crystallization which depleted silicate-oxide phases from residual magma. The last stage of crystallization formed predominantly of sulfide minerals by accumulation of immiscible magmatic sulfide droplets. Thermometry investigation based on exsolution texture of chalcopyrite-sphalerite and chalcopyrite-pyrrhotite suggests that the sulfide zone probably formed at temperatures about 400 °C.

ALAVI, M. (1991): Geol. Soc. Am. Bull., 103, 983-992.
STÖCKLIN, J. (1968): Bull. Am. Assoc. Pet. Geol., 52, 1229-1258.