# Exsolved magnetite and clinopyroxene in olivine from Haladala gabbro, west Tianshan, NW China

YUNXING XUE

School of Earth and Space Sciences, Peking University, Beijing 100871, China (yfzhu@pku.edu.cn)

Exsolution textures found in ophiolites and eclogites [1-4] are significant in understanding the geodynamics. The studied Haladala gabbro has intruded carboniferous volcanic strata. Obvious lithological zoning could be observed in planform; the inner is troctolite-olivine gabbro and the outer is gabbro. Both troctolite and olivine gabbro show cumulate textures, with olivine and plagioclase as cumulate minerals; whereas post cumulate minerals are pyroxene, phlogopite, amphibole and opaque minerals. Cumulated olivine contains one group of magnetite exsolved rods. The width of these rods is <2μm and the length is <10μm. In some cases, magnetite rods may intergrowth with exsolved clinopyroxene in olivine. These Cpx, 3μm in width, are euhedral-subhedral generally.

Exsolution of clinopyroxene + magnetite from olivine is due to the $f_{O2}$ rise and temperature drop [5]. The exsolved magnetite contains lots of $Fe^{3+}$. All three rocks have crystallized magnetite at late magma process, which also support the uprising of $f_{O2}$. $Fe^{3+}$ formed in olivine with $f_{O2}$ increase during cooling and magnetite exsolved from olivine. Clinopyroxene formed around magnetite vie diffusion in this process. The observed exsolution texture is significant to understand the crust evolution of west Tianshan, which is a key issue of geodynamic [6-12].

[1] Zhu YF, Ogasawara Y (2002) *Inter. Geol. Rev.* **44**, 831-836. [2] Zhu YF *et al.* (2005) *Acta Petrologica Sinica* **21**, 405-410. [3] Zhu YF *et al.* (2006) *Acta Petrologica Sinica* **22**, 2833-2842. [4] Zhang LF *et al.* (2005) *Amer. Miner.* **89**, 180-186. [5] Markl *et al.* (2001) *Amer. Miner.* **86**, 36-46. [6] Zhu YF *et al.* (2007) *Acta Petrologica Sinica* **23**, 1785-1794. [7] Zhu YF, Zeng YS, Gu LB (2006) *J. Asia Earth Sciences* **27**, 61-77. [8] Zhu YF, Zhou J, Zeng YS (2007) *Ore Geology Reviews* **32**, 337-365. [9] Zhu YF (2007) *Geological Bulletin of China* **16,** 510-519. [10] Zhu YF, Song B (2006) *Acta Petrologica Sinica* **22,** 135-144. [11] Zhu YF, Xu X (2006) *Acta Petrologica Sinica* **22,** 2833-2842. [12] Zhu YF *et al.* (2005) *Chinese Science Bulletin* **50**, 2201-2212.

# Preliminary investigation on the economic mineralization in listwaenites from Sahl-Abad Area, Southeast Birjand, Iran

A. YAGHUBPUR[1] AND A. ABEDI[2]

[1]Department of Geology, Tarbiat Moalem University, 49 Mofateh Av. Tehran, Iran

[2]Department of Geology, Shahroud University, Iran (ayaghubpur@yahoo.com)

An important type of gold mineralization is hosted by listwaenite-beresite that is the alteration products in the ophiolite zones. The listwaenite-beresite alteration is typical in the late stage of fold belt development, and/or tectonic and magmatic activated terrains. It indicates a low-to-moderate temperature range in metasomatic rocks and it may be associated with gold, silver, arsenic, uranium, antimony, mercury, zinc and lead mineralization. This type of alteration also seems to be a good indicator for Au, PGE and Hg mineralization.

The listwaenite investigated through the study area cropping out in the vicinities of Jannat-Abad, Ali-Abad and Gazdez villages located about 100 km southeast of Birjand, in the state of South Khorasan, Iran. The rock units cropping out in the Sahl-Abad area include ophiolitic mélange with the age of emplacement of upper Cretaceous, flysh of Cretaceous-Paleogene age, Neogene's conglomerate and younger age volcanic rocks.

Several samples of listwaenites were collected and geochemical analyses of these samples using emission spectrometry for 40 major elements, atomic absorption analyses for mercury, ICP-MS for 70 major elements were carried out in the laboratories of IGEM and IMGRE Institutes, Russian Academy of Sciences.

Mineralogical investigations indicate that the listwaenites of Ali-Abad and Jannat-Abad area are carbonaceous and siliceous listwaenite, respectively.

Using geochemical modeling for listwaenites in the study area on the basis of As-Ag/Cu-Sn and As-Sb-Ag/Co-Cu-Ni ratios indicate that the listwaenites of Ali-Abad area is actually a barren type rocks, while the Jannat-Abad rocks could be considered as an anomalous area with possibility of deep seated mineralizations. In the present study Zn-Ni-Cr-B-Mn-Ca/Co-V-Mo-Ti-Ba-Si ratios is used to separate different types of economically important listwaenite in the Sahl-Abad area.