TIAN Yazhou and CARMA, 2016. Inclusions in Sartohay Chromitites and Implication. *Acta Geologica Sinica* (English Edition), 90(supp. 1): 241.

Inclusions in Sartohay Chromitites and Implication

TIAN Yazhou[1] and CARMA[2]

1 College of Resources and Environmental Engineering, Guizhou University, Guiyang 550025, China;
2 CARMA, State Key Laboratory for Continental Tectonics and Dynamics, Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China.

It is significant for recognizing the origin of chromitites to research the primary mineral inclusions in chromitites. A large number of primary mineral inclusions including CPXs, OPXs, olivines, aspidolites, Na-Cr pargasites, CPX exsolution lamellaes were discovered in Sartohay high-Al chromitites, this minerals were trapped in chrotites as single phase and multiple phase when the chromite crystallized. Hydrous minerals, aspidolites and Na-Cr pargasites, imply hydrous condition. Besides silicates, a lot of BMSs and PGMs were also found in chromitites, but neither PGMs nor many BMSs occurred as in situ inclusions in chromites, they all located in the cracks or interstitial matrixes between chromite grains.

Additionally, More than 20 mineral species, such as ultra-high pressure, highly reduced and crustally-derived minerals, were firstly discovered from 847kg sartohay high-Al chromitite by separation, including: native elements: Cr, diamond, Si, Fe; carbides: SiC; metallic alloys：FeCr，FeNiCr; Oxides: wüstite, rutile, ilmenite, hematite, chromite, magnetite, quartz; sulfides: Galena, sphalerite, millerite, heazlewoodite, arsenopyrite; silicates: forsterite, enstatite, diopside, serpentine, zircon, feldspar. Ca-Si perovskite and Ni-Co-Mn alloys were discovered by TEM and FIB. These minerals can totally compare with the minerals from high-Cr chromitite from Luobusa,Tibet and Polar Ural , Russia, which would indicate that Sartohay high-Al chromitite may have the metallogenic stage in deep mantle like the high-Cr chromitites.

On the basis of low pressure hydrous minerals and UHP diamonds in Sartohay high-Al chromitites, the model that the metallogenic stages both in deep mantle and in shallow upper mantle for the genesis of Sartohay high-Al chromitite has been proposed. The strongly reduced fluid enriched in Si, Cr, C, Fe, Ni produced by the partial melting of subducted slab in mantle transition zone, meanwhile, the diamond, moissanite, native Si, Fe, Cr, wüstite and FeNi alloy. These minerals then moves upward beneath oceanic spreading centers and are encapsulated in chromite near the top of the transition zone (<14GPa). At this stage, the chromite preliminarily enriches and upwells into the upper oceanic lithosphere mantle with the UHP and highly reduced minerals. The upward-migrating magmas result from slab breakoff pass through the slab and assimilate the subducted materials containing crustal rutiles and zircons. The magmas then go into the magma chamber beneath the back arc spreading ridge and lead to the melt/rock interaction happen on a large scale, and the former preliminarily enriched chromitite is redistributed, which facilitates Sartohay chromitite crystallization. Neither PGMs nor BMSs have been found as inclusions in chromite in that the parental MORB-like magma carried very little PGEs and was extremely S-poor. The BMSs such as millerite, heazlewoodite, and PGMs began to crystallize in the crack or interstitial matrix between chromite grains at the last stage of magmatic evolution.

* Corresponding author. E-mail: tianyazhou87@163.com