Paper Number: 345

PGE - bearing sulphides in mafic-ultramafic sills and dykes of Krishnarajpet and Hadanur- Tagadur belts, Western Dharwar Craton (India).

Tom, N. G.[1] *Mohanty, M.*[2] *and Korakoppa, M. M*[3]

[1] *Geological Survey of India, NER-Shillong, Meghalaya-793003, e-mail: nibin_tom@yahoo.com*
[2] *Geological Survey of India, SUKG-Bangalore, Karnataka-560078*
[3] *Geological Survey of India, NCEGR-Bangalore, Karnataka-560078*

Anomalous PGE content in magmatic pyrrhotite- pentlandite- chalcopyrite ± pyrite assemblages are reported from pegmatoidal orthopyroxenite, cumulus clinopyroxenite and hornblendite dykes from Krishnarajpet and Hadanur-Tagadur belts, Western Dharwar Craton, Karnataka. The PGE-bearing base metal sulphides (BMS) analysed by EPMA recorded Palladium-PGE content up to 3500 ppm (0.001 apfu) in pentlandite $(Fe_{29.17-32.65}\,Ni_{32.95-34.09}\,Co_{1.24-1.49}\,Pt_{0-0.001})_9\,(S_{33.24-34.37})_8$ in orthopyroxenite dyke. Other BMS phases are pyrrhotite $(Fe_{58.53-60.02}\,Ni_{0.14-0.28})_2\,S_{39.52-38.83})$ and chalcopyrite $(Cu_{30.62-34.01}\,Fe_{28.4-44.65}\,Ni_{0-1.37}\,Co_{0-0.88})\,(S_{32.58-36.11})_2$ with rare pyrite. Ocelli structures, field relations and chemical signature of these dykes suggests mixing and mingling of peridotite – pyroxenite melts at different levels. Abundance of apatite; zircon, barite and inclusions of REE-phases indicate metasomatic alterations. High fO_2 conditions inferred from barite, gold grains, PGE-bearing sulphide to magnetite alterations and FeO- MgO content of the rocks also supports this.

Magmatic BMS blebs, fine gained disseminations associated with magnetite and rare ilmenites (PGE-bearing) in orthopyroxenite and clinopyroxenite indicates a younger age-unconstrained mantle replenishment episode. The observed REE, trace and major element content and U-shaped REE pattern of orthopyroxenite is consistent with low degree fractional melting of a highly depleted spinel lherzolite within mantle wedge zone. The channelized flow of the melt during ascent is envisaged to explain the acquired mantle signature and magmatic sulphides. The magmatic BMS are possibly acquired at source and subsequent interactions with variably depleted wall rocks resulted in sulphide saturation. PGE-bearing hornblendite could represent altered clinopyroxenite. Trapping of BMS within silicates implies their inability to exsolve PGE probably due to high fO_2 conditions, even after melt attained saturation.

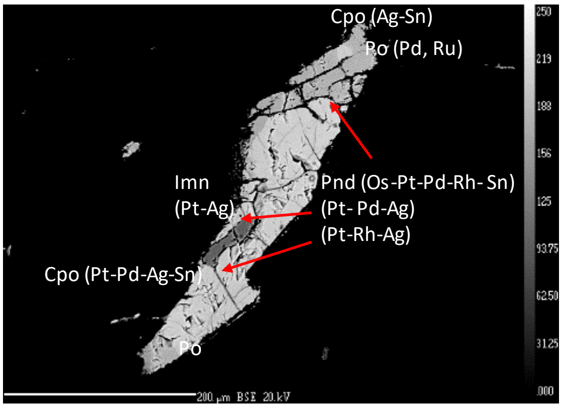

Fig-1: BMS assemblage with PGE-assemblage in orthopyroxenite dyke.

A plume – pyroxene melt hybridization model could explain fully the heterogeneity of olivine/ pyroxene –aphyric units of the study area. Unusually high Fe_2O_3/TiO_2 (3-7), high Al_2O_3/TiO_2 (>16), variable $[La/Sm]_N$, positive Ce, Pb, Ti, Hf, Nb, Zr, Eu and negative Sr anomalies provides supportive evidences. Our study is significant in the sense that, PGE-bearing BMS is reported for the first time in younger dykes from WDC. As such, PGE exploration activities were concentrated in the altered sulphide-deficient and non-chromiferous ultramafic- mafic olivine aphryric sub-volcanic flows; devoid of any significant PGE mineralization. With the current find, we thrust upon targeting the younger pyroxenite dykes of Hadanur- Tagadur belt emplaced within altered aphyric rocks and similar association elsewhere. Detailed sampling along assimilation zones with sedimentary rocks could identify favourable loci for PGE mineralization.