

## **PETROLOGY AND MINERAL CHEMISTRY OF THE ULTRAMAFIC ROCKS IN P.METTUPALAIYAM AREA, TAMIL NADU, INDIA WITH SPECIAL REFERENCE TO THE OCCURRENCE OF Cu, Ni, Cr AND PGE**

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### **Abstract**

The ultramafic rocks of P.Mettupalaiyam area, forming a part of Mettupalaiyam Ultramafic Belt, Tamil Nadu, India was studied for petrographic characterization, mineral chemistry and geochemistry of Cu, Ni, Cr and Platinum group of Elements (PGE). A total of 37 rock chip samples were collected and analysed for the trace elements Cu, Ni and Cr and PGE using HR – ICP – MS, and mineral chemistry was estimated with an automated wave-length dispersive CAMECA SX 100 electron microprobe. The petrological studies reveal the presence of hypersthene and diopside as the major constituents of pyroxenite and magnesio-hornblende in amphibolite. The  $\Sigma$ PGE concentration varies between 19 and 1798 ppb with an average of 212 ppb in the 37 samples. A total of 5 samples collected from the pyroxenite have yielded more than 500ppb while 11 samples including 2 samples from amphibolite which have yielded  $\Sigma$ PGE between 100 and 500 ppb, which indicates a notable PGE mineralisation. The trace element analysis reveals Cu: 3-284ppm; Ni: 146-553ppm and Cr: 610-4625ppm. The presence of chromite accounts for the higher concentration of Cr, while nickeliferous pyrite and pentlandite account for Ni. Pd/Ir ratio which indicates that the ultramafic rocks are enriched in Platinum group PGE (PPGE) over the Iridium group PGE (IPGE). PGE concentrations normalized with primitive mantle values indicate that PPGE (Pt, Pd) are enriched over IPGE (Ir, Rh, Ro) with a distinct positive Pd-anomaly, which may be inferred as a result of partial melting of the upper mantle aided by ultra-high temperature metasomatism. Ni/Cu vs Pd/Ir and Ni/Cu vs Pd/Pt depicts ultramafic rocks in komatiite, ophiolite and layered intrusion fields, suggesting an Mg rich parental magma generated by the partial melting of upper mantle and emplacement into the crustal rocks through deep seated weak planes.

*Keywords:* Mettupalaiyam Ultramafic Belt, pyroxenite, magnesio-hornblende, ophiolite, pentlandite.