Paper Number: 4612

Sulphide and PGE distribution in the 'Flatreef' at Turfspruit, Northern Limb of the Bushveld Complex, South Africa

Beukes, J.J., van Rensburg, D.J., and Gauert, C.D.K.

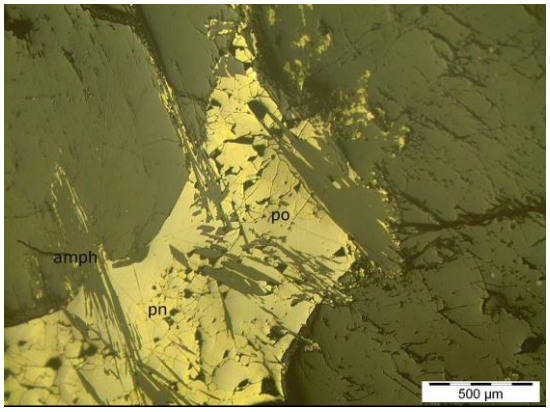
Department of Geology, University of the Free State, P.O. Box 339, Bloemfontein, South Africa: email: Jarlenb7@gmail.com

---

The proposed study will be investigating the 'Flatreef' orebody at the Turfspruit farm which is in the Southern sector of the Northern Limb of the Bushveld Complex. The 'Flatreef' is the flat to gently dipping down-dip extension of the original Platreef discovery. The stratigraphy of the Northern Limb in which the Platreef is found is not consistent, but magmatic unconformities are inferred. This applies especially in the lower parts of the Platreef stratigraphy where the mineralisation is concentrated. Although numerous investigations have been done on the Platreef, the accepted genetic models still require refinement for laterally variable reef sections in specific places. Therefore, this initial study will be focusing on trace elemental and isotopic characteristics of mineral quantifying country rock contamination of the magma at Turfspruit. The investigation aims at understanding the role of crustal contamination in the mineralization process and the identification of magma replenishment in the Flatreef.

The main objectives of this study is a) to establish the effect of country rock contamination and assimilation on sulphide immiscibility and PGE scavenging as ore-forming processes on a microscale; determination of mineral textures, chemical zonation and isotopy using Tornado µ-XRF, LA-ICP-MS, SIMS and FE EMPA, b) to validate models for sulphide formation by comparing S isotopes of disseminated sulphides with sulphide inclusions in chromite, and c) to visualise the behaviour of sulphide melt in the cumulus mush of the Flatreef in order to quantify the distribution of sulphides and possible PGMs in 3D by the use of High Resolution X Ray Computed Tomography.

Two drillholes intersecting the Critical Zone of the Flatreef were sampled at approximately 3 meter intervals. Preliminary microscopy shows that silicates such as olivine have undergone serpentinisation and interstitial plagioclase is poorly preserved, altering to sericite, in samples which are not fresh. Late stage alteration is prominent along microstructures, producing secondary silicates such as tremolite and actinolite which replace primary sulphides (Fig. 1a) and remobilise sulphides along veins in the T1 feldspathic pyroxenite (Fig. 1b). The assumed mixed magmatic-sedimentary-meteoric source of the fluids still has to be established using O isotopy.


amph
po
pn
500 µm

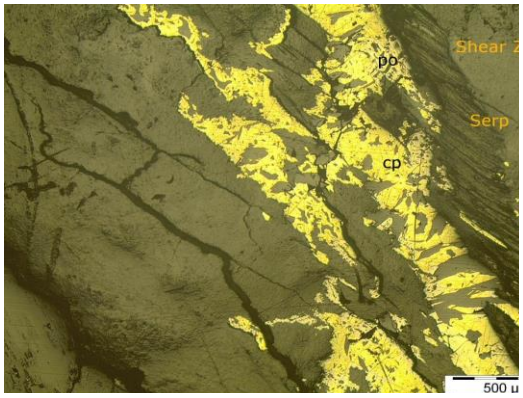

po
Serp
cp

Figure 1: Reflected light microscopy of a) Sample JDJ-12A from T1 with replacement of sulphides by secondary silicates; b) Sample JDJ-15 from T1 illustrating the partial remobilisation of chalcopyrite and pyrrhotite along a vein and possible shear zone.