

## Platinum Value Chain

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### ABSTRACT

South Africa hosts 70% of the world's platinum-group element (PGE) resources. Its sustainable management is of utmost economic importance to South Africa and indeed to the world, since the PGE are raw materials for a growing sector of high-tech applications. This holistic project will investigate the chain of natural and industrial processes involved in the formation and utilisation of PGE resources. Scientists from a wide range of disciplines are involved, realizing a first truly multi-disciplinary and multi-faceted scrutiny on the behaviour PGE from ore formation to end-user, and beyond.

We intend to use state-of-the-art analytical tools, and theoretical advances, to generate new models for ore formation, which in turn could inform the development of enhanced beneficiation protocols. Furthermore, investigation of the natural leaching and redistribution of the PGE during weathering will be done, and the results used to assess anthropogenic PGE dispersal along highways and relevant industrial sites, with emphasis on their biologic availability.

There are three sub-projects, which will focus on investigations into: 1. Primary controls on the natural distribution of the PGE (i) in the mantle, (ii) during magma generation and fractional crystallization, (iii) during magmatic ore-forming processes, and (iv) during post-depositional hydrothermal processes. 2. Sustainable mining, recovery and beneficiation of PGE ores, by quantifying preferred PGE mineralogy and mineral association modes in primary ores, and during the primary flotation circuit. 3. The environmental footprint of PGE recovery and industrial deployment, especially during the weathering cycle.

The project extend far beyond the authors and their institutions. Currently, there are six researchers from four institutions in South Africa involved, and four from three German counterparts. Three mining companies have provides samples and/or data and/or support, and three students are already well advanced in their studies.

**Key words:** Platinum-group elements, magmatic ore formation, beneficiation, weathering.