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Department of Materials Engineering

The University of Tokyo

Melting of Platinum Group Metal (PGM) Concentrates in South Africa

by

Dr. Johan Nell

Mintek, South Africa

e-mail: johann@mintek.co.za

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PGM concentrates are melted in submerged-arc furnaces to form an iron-nickel-copper matte and a silicate slag that is discarded. The matte is subsequently oxidized to lower the concentrations of iron and sulfur, while at the same time, increasing the PGM grade. As is the case with most metallurgical operations, the success of PGM melting lies in the ability to form a 'good' slag. For the melting of PGM concentrates the slag should be designed to have the following characteristics:

- A low viscosity to allow clean slag-matte separation.
- A low liquidus temperature to avoid excessive superheating of the matte.
- The ability to dissolve all the chromium present in the concentrate to avoid the formation of refractory chromium-bearing spinel and to avoid the transfer of chromium to the matte.
- A limited solubility of nickel, copper and cobalt as oxides.
- Chemical compatibility with the refractory lining in the furnace (in modern, water-cooled furnaces this is consideration is less important)

It is difficult, if not impossible; to satisfy these requirements in the confines of the matte melting environment and I will elaborate on the metallurgical problems that are encountered.

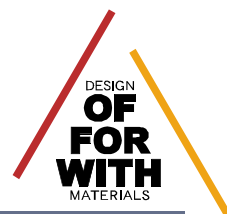
Organizer:

Prof. Toru H. Okabe (岡部 徹)

Tel: 03-5452-6314 (出川@岡部研)

For registration contact Ms. Momoko DEGAWA

E-mail: komomo@iis.u-tokyo.ac.jp



COE Committee in Department of Materials Engineering