

Timothy Kerry

Post-doctoral Researcher



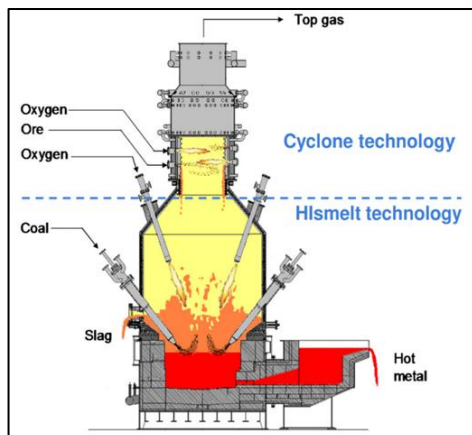
Tel: +31 (0)15 2787978
E-mail: t.j.kerry@tudelft.nl

Research topics: Metals extraction, refining and Recycling, materials characterisation, pyrometallurgy, ironmaking, circular economy

Maximising Zn enrichment in Hlsarna Process Dust

Research activities:

The Hlsarna process, owned and operated by Tata Steel, is a breakthrough smelting reduction process for the production of liquid hot metal from iron ores and coal. Hlsarna is capable of operating with a significantly reduced carbon footprint, has a high raw materials flexibility and requires very little raw materials pre-processing compared to the blast furnace route.

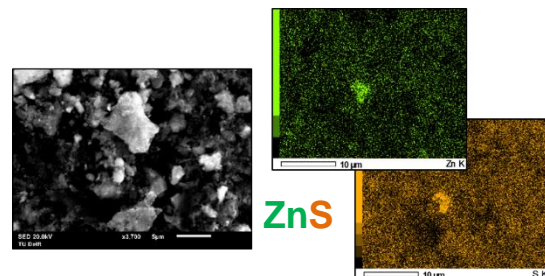


Schematic of the Hlsarna furnace showing the combined processes involved

In the past, Zn-containing dust has been injected into Hlsarna. In this study it was demonstrated that it was possible to concentrate the Zn into the process dust. This is valuable as the zinc industry has a demand for secondary sources to offset the need for primary ores. Therefore, this project aims to enrich the levels of Zn in Hlsarna dust for its direct use in Zn smelting.

Initial work has been made on characterisation of the input materials in to the Hlsarna furnace. Different Zn-bearing materials have been considered such as dusts from BF and BOF furnace operations along with galvanized steel scrap, primarily from automotive applications.

The concentration and forms of Zn present have been investigated along with particle size distributions, moisture analysis and microscopic study.



SEM micrograph of BF Dust with EDX mapping showing presence of ZnS

Preliminary studies have also taken place using a horizontal furnace to investigate the kinetics of Zn vaporization from the input materials. Temperatures ranging from 600-1100°C have been utilised under a controlled atmosphere, the samples remained in the furnace for 5 minutes. It has been observed that Zn has fully vaporized within this time at temperatures above 850°C.