Contribution ID: **419** Type: **Oral**

Comparative Analysis of CO and H2 Reduction Mechanisms in Electric Arc Furnace Dust

Tuesday 7 October 2025 12:10 (20 minutes)

Recovering valuable metals such as zinc and iron from steel mill residues is crucial in the steelmaking industry. Electric arc furnace dust (EAFD) represents the primary secondary resource for Zn recovery, as electric arc furnace (EAF) technology predominantly utilizes galvanized steel scrap as its main feedstock. Waelz process, which has been recognized as the best available technology (BAT), is the predominant method of EAFD treatment. The Waelz technology remains dominant in the industry due to its reliability, robustness, and operational simplicity. However, challenges arise from slag generation and CO_2 emissions. With increasingly stringent EU regulations and a growing emphasis on sustainability, efforts to enhance the Waelz process and develop alternative metallurgical technologies are intensifying. This study proposes a novel approach to mitigate the drawbacks of the Waelz process by substituting conventional carbon-based reducing agents with hydrogen (H_2). As part of the Horizon Europe-funded Dust2Value project, this research focuses on a detailed comparison of CO- and H_2-based reduction mechanisms for EAFD with the goal of efficient recovery of both Fe and Zn. The study employs thermogravimetric analysis (TGA), scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDX), and hot-stage microscopy to investigate reduction, sintering and melting behavior of EAFD samples. Our results show improved kinetics and overall reduction efficiency when using H2 as a reducing agent.

Primary authors: SHPILEVAIA, Eleonora; EISBACHER-LUBENSKY, Jan; SCHENK, Johannes (Montanuniversitaet Leoben); LEUCHTENMÜLLER, Manuel (Montanuniversität Leoben)

Presenter: SHPILEVAIA, Eleonora

Session Classification: Alternative Reduction Methods & Waste Utilization

Track Classification: Ironmaking - Direct reduction and smelting reduction