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Zinc flexible RecoDust process

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The RecoDust process is an innovative pyrometallurgical technique designed for the efficient separation of iron and zinc from steel mill dust, a byproduct of steel production. This process addresses the growing demand for sustainable resource recovery in the metallurgical industry, offering an environmentally friendly and economically viable solution for the recycling of valuable metals. Unlike conventional methods, the RecoDust process relies exclusively on gaseous reducing agents, eliminating the need for solid carbon-based reductants and reducing carbon emissions.

Steel mill dust, containing significant amounts of zinc and iron oxides, is introduced into the so-called Flash-Reactor. Gaseous reducing agents, such as hydrogen or natural gas, are injected into the system, selectively reducing zinc oxide to metallic zinc vapour while leaving iron oxides largely unaffected. The zinc vapor is then condensed and collected separately, allowing for the recovery of high-purity zinc. The remaining iron-oxide-rich fraction is called RecoDust slag, this can be reintegrated into the steel production cycle, contributing to a circular economy within the metallurgical sector.

This process offers several advantages over traditional recycling methods. The use of gaseous reductants enhances process control and improves energy efficiency. Additionally, the RecoDust process supports the decarbonization efforts of the steel industry by reducing the reliance on fossil fuels and lowering greenhouse gas emissions.

Trials with the RecoDust pilot plant, which is located at the Chair of Thermal Processing Technology, have proven the technology with a input of up to 250 kg per batch and a dosing rate up to 300 kg/h. The results show a high separation of zinc using different kinds of dusty feedstocks which allows the reuse of both products of the RecoDust process.

In the future within the ReMFra project (Grant agreement ID: 101058362) further trials with dusts from EAF and the HIsarna process will be tested.

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