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Value-Added Products from Recycling of Solid Waste in Steel Plants

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Abstract : Generation of solid waste is a major problem confronting the iron and steel industry around the world. Disposal of untreated wastes is no longer a viable solution in view of the environmental regulations becoming more and more stringent, as well as an increase in community awareness about the long-term hazards of indiscriminate waste disposal. The current work explores the possibility of converting some of the 'problematic' solid wastes generated during steel manufacturing operations, viz. dust from primary steelmaking, iron ore handling, and flux calcination processes, into value-added products instead of environmentally hazardous disposal practices. It was possible to develop a synthetic calcium ferrite, which helped to enhance the dissolution of calcined basic fluxes (e.g. CaO) and reduce the overall energy consumption during steel making. This, in turn, increased process efficiency and reduced greenhouse gas emissions. The preliminary results from laboratory-scale experiments clearly demonstrate the potential of utilizing these 'waste materials' that are generated in-house in iron and steel manufacturing plants. The energy required for synthesis of the ferrite may be reduced further by partially utilizing the waste heat from the exhaust gases. In the longer run, it would result in significant financial benefits due to reduced dependence on purchased fluxes. The synthesized ferrite is non-hygroscopic and this provides an additional benefit during its storage and transportation, relative to calcined lime (CaO) that is widely used as a basic flux across the steel making industry.

Keywords : calcium ferrite, flux, slag formation, solid waste
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