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Influence of Hydrogen-DRI on the EAF process

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The steelmaking industry, as one of the major emitters of greenhouse gases, is undergoing a transformation towards greener technologies. One of the key players in this transition is the electric arc furnace (EAF), which is fed with scrap and direct reduced iron (DRI), with an increasing proportion of DRI used for high-quality steel grades. Traditionally, DRI production relies on natural gas as a reducing agent. To further reduce the carbon footprint of steel plants, it is planned to partially replace natural gas with hydrogen. However, carbon in the EAF process is not only an energy source but also plays a crucial role in metallurgical reactions, including foamy slag formation, oxygen and nitrogen control. The shift to hydrogen-reduced DRI introduces new challenges, particularly regarding the carbon content of the feed material. Lower carbon levels could impact slag foaming behavior, arc stability, and overall energy efficiency, while also affecting steel chemistry and process dynamics.
This study evaluates the impact of hydrogen-reduced DRI on the entire EAF process, considering factors such as process efficiency, material behavior, carbon footprint reduction, and metallurgical performance. The findings will provide valuable insights into how the steel industry can transition towards carbon-neutral production without compromising process stability and product quality.

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