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Chromium balance in a BOF converter

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To mitigate climate change and pollution of the environment, the steel industry has to decrease its CO2 footprint and increase its circularity. European steel companies are currently at the forefront of this transition towards green and circular steelmaking. Increasing the scrap input in the basic oxygen furnace (BOF) converter lowers the CO2 footprint and increases the circularity of the steel. However, when increasing the scrap input, the unwanted elements from the scrap, like copper and chromium, will increase in the steel product as well. To avoid negative effects of these unwanted elements on the steel product properties, a good overview is needed of where these elements come from and how much ends up in the steel.

For chromium, unlike for copper, the balance over the BOF process is complicated. Most chromium comes from the scrap, but the hot metal from the blast furnace contains typically around 0.01 wt% Cr as well. Depending on the process conditions in the BOF, the chromium partition between slag and liquid steel may differ.

In this study, a chromium balance over the BOF process is established, in which different sources of chromium, as well as how much ends up in steel, slag and dust, are included. Different scenarios, regarding different scrap types and amounts , and their effect on chromium partition are discussed.

Speaker Country

Netherlands

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Primary authors: Dr SCHRAMA, Frank NH (Tata Steel R&D & Delft University of Technology); Mrs BOTINHA LOPES CANCADO, Roberta (Delft University of Technology & Tata Steel R&D); Dr ROUT, Bapin K (Tata Steel R&D); Dr DOGAN, Neslihan (Delft University of Technology); Dr YANG, Yongxiang (Delft University of Technology)

Presenter: Dr SCHRAMA, Frank NH (Tata Steel R&D & Delft University of Technology)

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