Contribution ID: **26** Type: **Oral Presentation - Full Paper will be submitted**

Investigation of the reoxidation and material behaviour of directly reduced pellets

Wednesday 21 May 2025 11:40 (20 minutes)

European steel companies are endeavouring to switch to the use of directly reduced ores for steel production. Therefore, in future the transport of iron pellets directly reduced with hydrogen by rail to various melting works will play an increasingly important role. Along with this change, the quality parameter of the metallization of the material is essential for further processing. In the present study, pellets were therefore reduced with H2 and tested for their reoxidation behaviour under realistic conditions on a laboratory scale.
Pellets reduced under conditions similar to the Midrex-process were used for comparison as well as the accompanying fines of these pellets, to illustrate the influence of the largest possible specific surface area. Furthermore, the storage tests were carried out in defined container geometries –simulated with various boxes –in order to be able to assess the influence on the material to be transported. To represent all possible conditions that can occur during transport by rail, parameters with different temperature and humidity were defined. The procedure for analysing is based on an optical assessment as well as a recording of the change in mass over a defined period of time in order to be able to precisely record the increase in weight due to the different reoxidation behaviour caused by the simulated environmental conditions. Furthermore, computer tomography images of specific H2-reduced pellets were taken at defined process stages to quantify the change in the material structure both externally and internally. This allows conclusions to be drawn about the cracking potential, which can be linked to the reoxidation behaviour. The findings obtained on a laboratory scale indicate a significant influence of the particle size and the oxidation conditions of the pellets as well as of the environmental conditions and the container geometry during the storage period on the reoxidation behaviour.

Author: TAFERNER, Bernd (Montanuniversität Leoben)

Co-authors: SCHENK, Johannes (Montanuniversitaet Leoben); EISBACHER-LUBENSKY, Jan (Montanuniversität Leoben); SCHANNER, Richard (INNOFREIGHT Solutions GmbH); GLUSCHITZ, Peter (INNOFREIGHT Solutions GmbH)

Presenter: TAFERNER, Bernd (Montanuniversität Leoben)

Session Classification: CO2 mitigation in iron and steelmaking

Track Classification: CO2 mitigation in iron and steelmaking