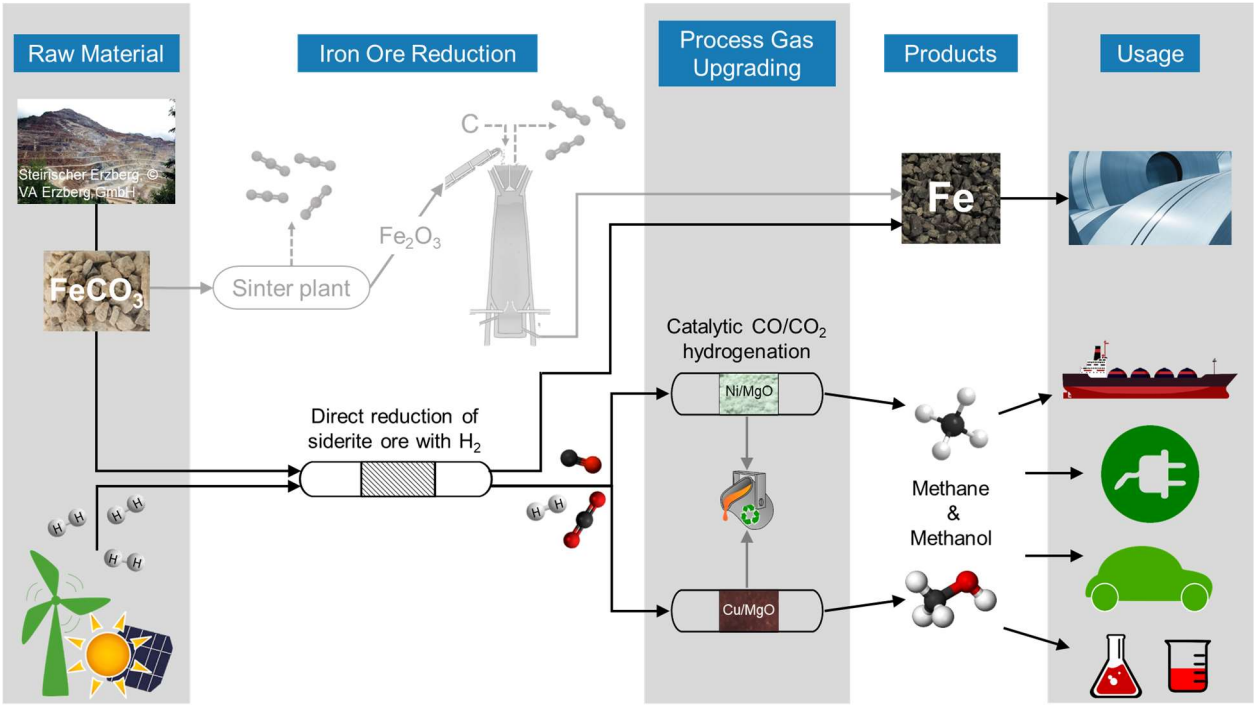
Techno-Economical Evaluation of Direct Reduction of Siderite Ore with Hydrogen

Topic suitable for Master Thesis

Industrial CO_2 emission mitigation necessitates holistic technology concepts, especially in high-emission industrial sectors like the iron and steel industry. A novel direct reduction technology with hydrogen reduces CO_2 emissions in iron production from siderite ore by more than 60%. Subsequent valorization of the process gas, consisting of unconverted hydrogen, carbon monoxide, and CO_2, by catalytic hydrogenation to methane and methanol completes the technology concept. This route gives access to CO_2 emission-lean iron production from siderite ore, fossil-free methane and methanol synthesis, and thus, improved energy density of the energy carrier hydrogen. The aim of this master thesis is a techno-economical evaluation of direct reduction of siderite ore with hydrogen, evaluating different hydrogen sources, considering exhaust air treatment, process scalability, and risk analysis and the implementation in a holistic process concept.



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