

Experimental Analysis of Particle Electrode Interaction in Iron Oxide Reduction

Experimentelle Analyse der Partikel-Elektroden- Interaktion in der Slurry Eisenoxide-reduktion

Bachelor thesis / Master thesis

Beginning: Flexible

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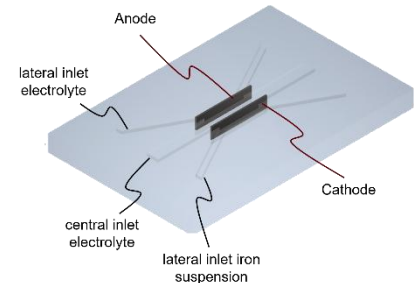


Figure 1: Microfluidic device

The topic

Large-scale energy storage is a critical challenge for achieving a green economy. The metal energy cycle presents a promising approach by allowing cyclic combustion and reduction processes without CO₂ emissions. Among potential energy carriers, iron powder stands out due to its favorable combustion characteristics. However, a major challenge remains: developing an efficient reduction process to regenerate iron from iron oxide without relying on intermediate hydrogen production.

Your Task

At VES we investigate the direct electrochemical reduction of iron oxide slurry. Since this is a new approach, the fundamentals are yet to be understood. During your thesis you will investigate the charge transfer and the interaction between the iron oxide particles and the electrode. For this, you will develop microfluidic electrochemical cells, where the iron oxide particles have multiple contact with the electrodes. Afterwards, you will perform electrochemical measurements to quantify which electrochemical cell achieves a higher interaction.

Work packages

- Design and fabrication of microfluidic devices (See figure 1).
- Conduction of electrochemical measurements.
- Data analysis

What you should bring

- Enjoy/Interest in practical work.
- Independent and reliable working style.
- A cake :)

What we offer

- You will learn about process engineering and electrochemical methods.
- Working in team with scientific staff.
- Gain practical experience in an engineering task.
- Close supervision.

If you have any questions, please do not hesitate to contact me personally, by phone or via email (German or English).