Additive manufacturing of an electrode cooling system

Additive Fertigung einer Elektrodenkühlung

TECHNISCHE UNIVERSITÄT DARMSTADT

VES | Process Engineering of Electrochemical Systems

Bachelor Thesis / Master Thesis

Beginning:	Immediately or by appointment	**Supervisor:**	Anselm Brodersen, M. Sc.
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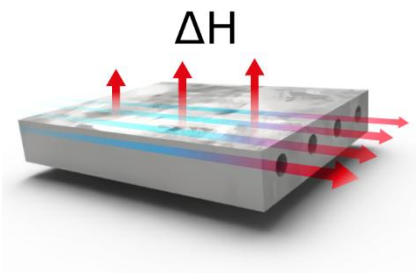
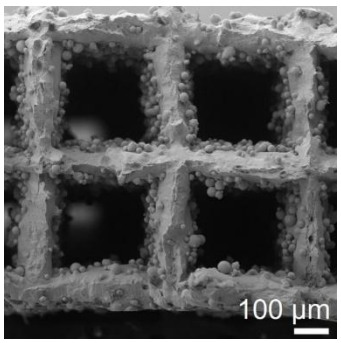
The topic:

Electrochemical systems play a vital role in the development of efficient, eco-friendly energy storage and conversion methods. Additive manufacturing is increasingly recognized as a promising approach for electrode production in these systems. In electrochemical systems, heat is often produced due to inefficient energy conversion or resistance losses. This affects the efficiency of the overall process. A possible solution is the creation of a cooling system that dissipates heat directly through channels within the electrode. This cooling system could be used in applications such as fuel cells.





Your task:

The goal is to fabricate and test a cooling system for electrodes. Cooling is achieved by pumping water through small channels inside the electrode. You will design and test different channel geometries for the electrode and evaluate their performance. The aim is to ensure uniform heat dissipation across the electrode while minimizing pressure loss in the cooling circuit. Ideally, the chosen solution should be scalable and adaptable to other geometries.

Work packages

- Design & additive manufacturing of the inlet and outlet of the cooling system using FDM & SLA
- Design & additive manufacturing of electrode prototypes using PBF-LB/M
- Experimental testing and iterative optimization

What you should bring

- Independent and reliable working style
- Interest in additive manufacturing & process engineering
- A cake

What we offer

- Introduction to various additive manufacturing processes (FDM, SLA, PBF-LB/M)
- A variety of 3D-printers for experimentation
- Experience in electrode design & fabrication

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