

Structuring of carbon-based electrodes for the application in redox flow batteries

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Project Publications

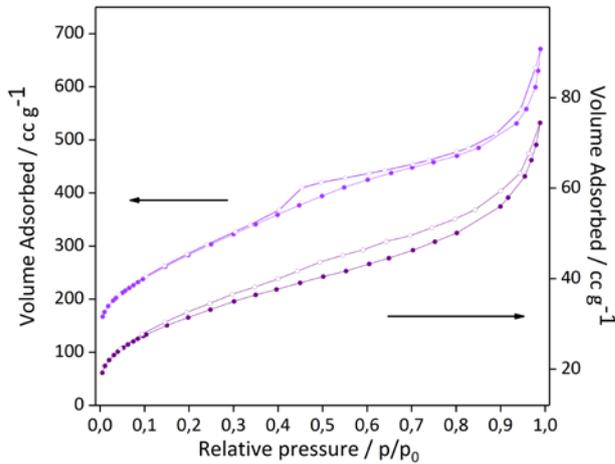
M. Schnucklake, S. Kuecken, A. Fetyan, J. Schmidt, A. Thomas, C. Roth, Salt-templated porous carbon-carbon composite electrodes for application in vanadium redox flow batteries, *Journal of Materials Chemistry A*, 2017, DOI: 10.1039/C7TA07759A.

Project Summary

My project is linked to redox flow batteries and I would like to increase the surface area of carbon materials used as electrodes in these batteries. I am dealing with the synthesis of heteroatom-doped high porous **carbon carbon composite materials**. In addition to the development of such novel materials I focus on the characterization of their structure and their electrochemical performance. My research also includes the evaluation of the composites for the application as electrodes in **vanadium redox flow batteries**.

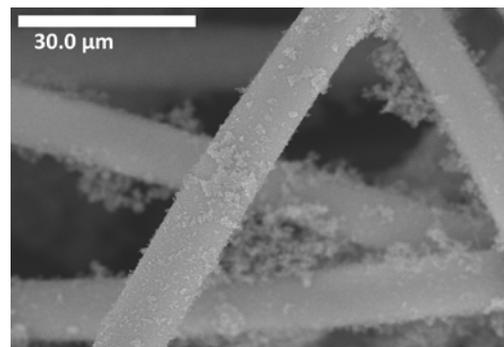
The material is synthesized using the **salt-templating method**, where a selected salt is applied to act as a porogen. The morphology of the resulting material could be affected by different parameters, for instance the composition of the porogen influences the pore size distribution.

The electrode is characterized with various methods. To analyze the porosity of the composite electrode nitrogen sorption measurements are applied and SEM images are taken for a detailed insight into the morphology (see below).



Nitrogen sorption isotherms of composite electrode (lower line) derived from salt template synthesis and bulk material (upper line). The porous carbon-carbon composite electrodes show a 100 times increased surface area (126 m²/g) compared to common electrodes (<0.5 m²/g).

SEM image of the composite electrode. Material deposits in the form of flakes on individual fibers and also in the gaps between the fibers can be observed.



Acknowledgement: The figures are reproduced from "Salt-templated porous carbon-carbon composite electrodes for application in vanadium redox flow batteries" published by the Royal Society of Chemistry in the Journal of Materials Chemistry A (DOI: 10.1039/C7TA07759A).