

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

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**Contact:**

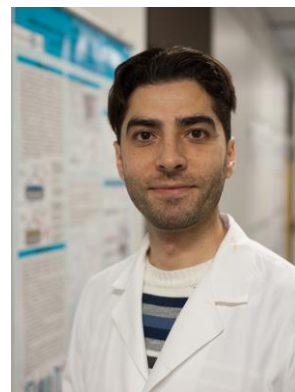
M.Sc. Abdulmonem Fetyan

Room: 15.03

Telephone: (030) - 838 55430

Email: Abdul.fetyan@fu-berlin.de

**ORCID:** <https://orcid.org/0000-0002-8960-9861>



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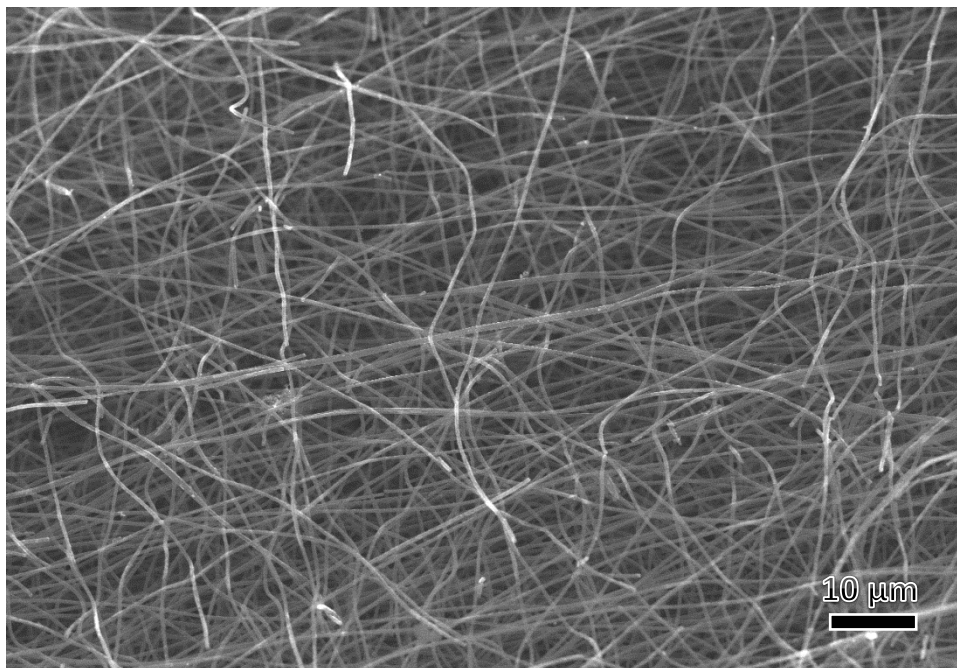
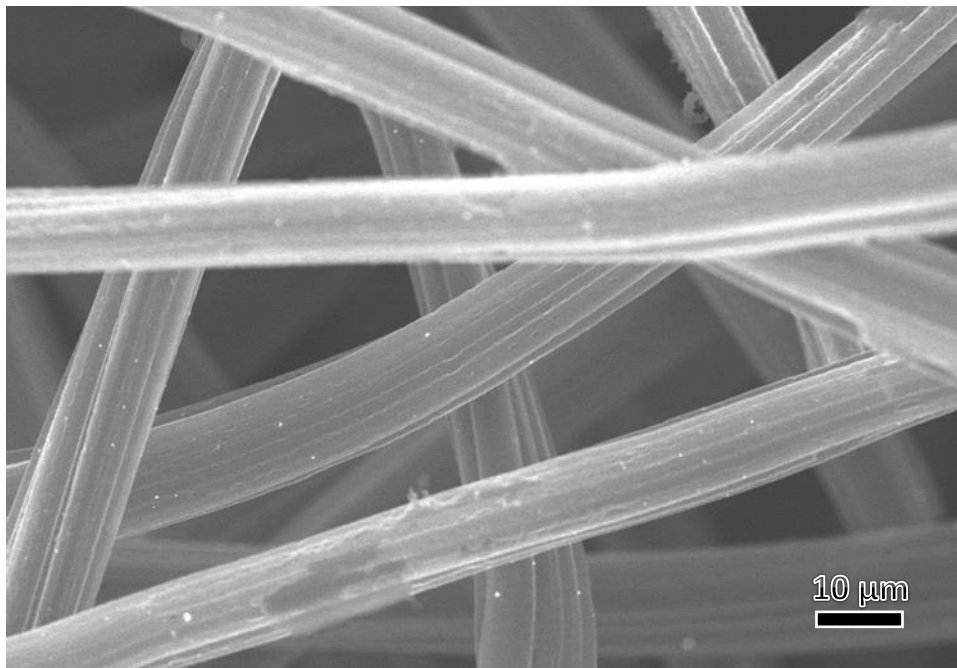
## Project Publications

- 1- A. Fetyan, I. Derr, M.K. Kayarkatte, J. Langner, D. Bernsmeier, R. Kraehnert, C. Roth, Electrospun Carbon Nanofibers as Alternative Electrode Materials for Vanadium Redox Flow Batteries, *ChemElectroChem*, 2 (2015) 2055-2060.
- 2- A. Fetyan, G. El-Nagar, I. Derr, P. Kubella, H. Dau and C. Roth, A Neodymium Oxide Nanoparticle-Doped Carbon Felt as Promising Electrode for Vanadium Redox Flow Batteries, *Electrochimica Acta* (under review).
- 3- A. Fetyan, G. El-Nagar, I. Lauermann, M. Schnucklake, J. Schneider and C. Roth, Detrimental Role of Hydrogen Evolution and its Temperature-Dependent Impact on the Performance of Vanadium Redox Flow Batteries, *PCCP* (under review).

## Project Summary

**Vanadium redox flow batteries** are a promising large scale technology candidate to store energy harvested from renewable sources. Carbon electrodes are used due to their low cost and wide operating potential range. However, pristine carbon felts normally exhibit poor electrochemical activity. Enhancing the electrochemical activity of carbon felt electrodes is considered as one of the main challenges to boost the performance of redox flow batteries. Different approaches could be used to improve the activity of the felts. In our group we focus on the development of carbon nanofibers and modification of commercial carbon felts by metal oxides:

- Freestanding conductive network carbon-based nanofibers could be produced by **electrospinning**, this network can replace the commercial carbon felts and be used directly as an electrode in vanadium redox flow batteries.
- Another aspect is the deposition of neodymium oxide on carbon felts to decrease the **degradation** phenomena of the treated felts and give more stable performance of the cell.



SEM images comparing commercial SGL GFA3 Carbon felt and electrospun carbon nanofibers. (Images are taken at the same magnification).