



Linder Höhe
D-51147 Köln
Telephone: +49 (0)2203 601-0
Internet: <https://www.dlr.de>

Kennedyallee 50
D-53175 Bonn
Telephone: +49 (0)228 882-0
E-mail: dlr-daad-program@daad.de
Internet: <https://www.daad.de/dlr>

DLR – DAAD Fellowships

Fellowship No. 595

Research Area : Energy

Research Topic: **Advanced Electron Microscopy for electrochemical energy conversion devices**

DLR Institute: Institute of Engineering Thermodynamics, DLR Stuttgart

Position: Postdoctoral Fellow

Openings: 1

Job Specification:

The department of Electrochemical Energy Technology focuses on the research and development of fuel cells, electrolyzers and batteries.

The advanced characterization, and in particular advanced electron microscopy of functional materials in electrochemical energy conversion devices is at the forefront to unravel the performance of functional materials, especially when it comes to interfaces and complex microstructures for instance 3D structures such as porous electrodes. This of special relevance for the high temperature technologies such as Solid Oxide or Proton Conducting Ceramic cells that are the focus of the group high temperature cells and stacks (HTZS).

Affiliated to the group HTZS, your work consists in:

- The development of the FIB-SEM method for the 3D analysis of porous electrode structures in High Temperature Solid Oxide Cells and Proton Conducting Ceramic Cells.
- The analytic support and contribution with 3D analysis to the project PERFECT.
- The post-mortem analysis of selected samples to highlight microstructural changes and to elucidate aging processes in Solid

Oxide and Proton Conducting Ceramic Cells and Stacks, including sample preparation.

- Contribute to the supervision of students and Ph.D. students.
- Reporting and writing of scientific publication.
- Active participation in scientific conferences and workshops.
- Participation to ZEISS Training for the advanced analytic techniques with the FIB-SEM.

Beyond these specific activities, following transversal activities at the scale of the department are foreseen:

- Supervise the sample preparation laboratory (Metallography).
- The development of the scientific investigation methods, and the analytical tools for the FIB-SEM for all technologies the field of electrochemical energy conversion.
- Pro-active engagement in the acquisition of projects with a main focus on the use of advanced electron microscopy methods for electrochemical energy conversion devices (all technologies: i.e. fuel cells, electrolysers, batteries) and their development in coordination with the group leaders and the responsible person for the FIB-SEM.
- The share of activities is expected to be max. 50% of experimental work and 50% for the other activities.

We are looking to expand our expertise in advanced electron microscopy techniques, in order to obtain a quantitative understanding of such degradation processes and to help guiding future technology development efforts on the different technologies covered by the department including fuel cells, electrolysers and batteries. **The objective is to foster scientific excellence with the FIB-SEM device at the scale of the department and to reach a sustained activity with successful project acquisition and participation in a time period of 2 years.** In the future, it shall be explored opportunities to upgrade the FIB SEM with additional detectors to perform for instance SIMS or STEM investigations.

Required Qualification: Doctoral degree from an accredited university, with major in materials science, engineering, or physics. The applicant must demonstrate an expertise in the use of scanning electron microscope and related investigation techniques for research, and sample preparation methods. Excellent track records in scientific publications.

Advantageous Skills: Experience with transmission electron microscope (STEM/TEM) and related methods is advantageous. Knowledge and or practical experience of spectroscopic methods such as SIMS, WDS is also advantageous. Practical experience applied to the different classes of materials (ceramics, metals, polymers, glasses, organic materials) is advantageous. Competences in algorithms and image analysis are highly welcome. Team work capability and pedagogic skills are highly welcome.

English competence: See requirements on www.daad.de/dlr

Earliest Start Date: As soon as possible

Application Deadline: until position is filled

Further Information: <http://www.dlr.de>
<http://www.daad.de/dlr>