JÜLICH
Forschungszentrum

The Institute of Energy Technologies - Fundamental Electrochemistry (IET-1) focuses on the development of performance oriented and sustainable materials and components for the electrochemical energy storage and conversion. Aiming to develop sustainable and cost-effective batteries, fuel cells and electrolyzers with improved energy and power density, longer lifetime at maximal safety is the challenge of the projects. These key technologies drive forward the energy transition and structural change in the Rhineland region. Further info on our exciting projects: https://go.fzj.de/IET-1

Join our team to the next possible date as

Research Associate - Machine Learning for Electrode Analysis and Digital Reconstruction

Your Job:

The Innovationpool Project "Data for Technology Assessment" (DaTA) aims to create a comprehensive, publicly accessible repository for technology data to support research in energy systems. This project focuses on advancing the TechDB database with AI-driven automated data collection, developing methods and tools for integrating heterogeneous data into multi-energy system design and operation, and creating reference test cases for comparative evaluation of new methods and algorithms.

We are seeking a Research Associate specializing in Machine Learning to contribute to the digital analysis and reconstruction of Solid Oxide Cell (SOC) electrode microstructures. This role is part of the Electrochemical Processing and System Technology department at IET-1, where our team is working to automate electrode analysis, specifically Focused Ion Beam-Scanning Electron Microscope (FIB-SEM) imaging, through data assimilation and model calibration. The goal is to develop physics-informed neural network models for electrodes and integrate these models as machine learning-based surrogate models for stack and system-level optimization. Your tasks in detail:

We look forward to receiving your application until 08.05.2025 via our **Online-Recruitment-System!**
Questions about the vacancy?
Get in touch with us by using **our contact form.**
Please note that for technical reasons we cannot accept applications via email.
www.fz-juelich.de

- Develop automated data processing pipelines to analyze SOC electrodes using physics-informed neural networks and related approaches
- Collect and process existing FIB-SEM images to digitally reconstruct and regenerate electrode microstructures using Generative Adversarial Networks (GANs) or similar techniques. Image segmentation may be required.
- Train and validate ML-based surrogate models using both experimental data (e.g., Electrochemical Impedance Spectroscopy - EIS) and numerical simulations
- Collaborate with numerical and experimental teams to define requirements and provide technical support
- Perform numerical simulations to support SOC stack and system design optimization
- Document and publish research findings in scientific journals and present at conferences

Your Profile:
- Master degree in Mechanical Engineering, Chemical Engineering, Applied Mathematics, Computational Science, or a related field; a PhD or equivalent experience is preferred
- Strong programming skills in Python, with experience in machine learning frameworks such as PyTorch or TensorFlow. Familiarity with physics-informed neural networks/operators is advantageous
- Knowledge of image processing and microstructure regeneration using GANs or similar methods is a plus
- Experience in interdisciplinary projects, demonstrating adaptability and a collaborative mindset
- A proactive and responsible attitude, with the ability to supervise students; prior experience in student supervision is desirable
- Excellent proficiency in English (spoken and written); knowledge of German is a plus

Our Offer:
We work on the very latest issues that impact our society and are offering you the chance to actively help in shaping the change! We support you in your work with:
- A large research campus with green spaces, offering the best possible means for networking with colleagues and pursuing sports alongside work
- Comprehensive training courses and individual opportunities for personal and professional further development
- Extensive company health management
- Ideal conditions for balancing work and private life, as well as a family-friendly corporate policy
- Flexible work (location) arrangements, e.g. remote work
- Flexible working hours in a full-time position with the option of slightly reduced working hours (https://go.fzj.de/near-full-time)
- 30 days of annual leave and provision for days off between public holidays and weekends (e.g. between Christmas and New Year)
- A large research campus with green spaces, offering the best possible means for networking with colleagues and pursuing sports alongside work
- Targeted services for international employees, e.g. through our International Advisory Service

In addition to exciting tasks and a collaborative working atmosphere at Jülich, we have a lot more to offer: https://go.fzj.de/benefits

The position is for a fixed term of 2 years. Salary and social benefits will conform to the provisions of the Collective Agreement for the Public Service (TVöD-Bund), pay group 13, depending on the applicant's qualifications and the precise nature of the tasks

assigned to them. All information about the Collective Agreement for the Public Service (TVöD-Bund) can be found on the BMI website: https://go.fzj.de/bmi.tvoed . The monthly salaries in euros can be found on page 66 of the PDF download.

We welcome applications from people with diverse backgrounds, e.g. in terms of age, gender, disability, sexual orientation / identity, and social, ethnic and religious origin. A diverse and inclusive working environment with equal opportunities in which everyone can realize their potential is important to us.

Further information on diversity and equal opportunities: https://go.fzj.de/equality