



Job Posting

Recruiting organisation

Fraunhofer Institute for Chemical Technology (ICT)

Subproject title

Nano and micro structuring of carbon electrode surface.

Starting date

1st April 2026 (or earlier if preferred)

Salary

The Doctoral Network "SPACER" is financed by the European Union under the framework of the program HORIZON Europe, Marie Skłodowska-Curie Actions. The doctoral candidate will be hired for 36 months under contract by Fraunhofer ICT, with a monthly gross salary of approx. 3900 € (including mobility allowance, but excluding other allowances that depend on eligibility, e.g. family allowance, special needs allowance).

Background Information

Marie Skłodowska-Curie Doctoral Networks are joint research and training projects funded by the European Union. Funding is provided for doctoral candidates from both inside and outside Europe to carry out individual project work in a European country other than their own. The training network "SPACER" is made up of 21 partners, coordinated by Fraunhofer ICT in Germany. The network will recruit a total of 17 doctoral candidates for project work lasting for 36 months.

SPACER aims to develop new architectures for porous electrodes to improve the power density and energy efficiency of redox flow batteries (RFB), enabling affordable and durable long-duration energy storage. The approach is to use hierarchical structures, i.e. complex material layers that can be optimized to specific battery chemistries and flow phenomena from the microscale up. The developed technologies will be validated in half-cells and full working batteries at industrial partners at TRL 6.

Our objectives

- Multiscale **modelling** to better understand RFB behavior and identify optimal hierarchical shaped pore- and electrode-structure to encounter optimum electrolyte as well as electrical flow.
- **Prototyping** of the identified structures via stereolithographic, 3D printing and textile techniques like tufting, machine-based embroidery techniques or non-interlaced 3D pre-forming.
- Development of **advanced imaging and characterization technologies** (X-ray micro tomography, EPR imaging and spectroscopy) to evaluate performance of electrodes and to map electrolyte chemical composition in micrometer resolution, allowing validation of the model predictions.
- **Validation and evaluation** of the RFBs with optimized hierarchical electrodes.

Job Description

The advertised subproject is fully funded by the Marie Skłodowska-Curie European Training Network "SPACER". It will be carried out by one doctoral candidate at Fraunhofer ICT, (PhD supervision at University of Bayreuth in Germany) over a period of 36 months.

The Fraunhofer Institute for Chemical Technology ICT in Pfinztal near Karlsruhe is one of approx. 75 Fraunhofer institutes in Germany. Its department for Applied Electrochemistry covers research on batteries, fuel cells, electrolyser, sensors and flow batteries. The Redox Flow Battery Group has been working for over 15 years in the fields of electrochemical characterization of materials such as electrodes, membranes and electrolytes, cell and stack development, system characterization and development, novel and optimized electrolytes, manufacturing methods and industrial scaling. The investigations and developments range in size from atoms to the MW range for application in the grid.

The goal of this doctoral thesis is to apply various procedures such as electrochemical wet treatment, covalent bonding, targeted surface functionalization to modify the surface of carbon electrode materials.

The recruited researcher will investigate the influence of treatment procedures on the surface and electrochemical properties of carbon electrodes.



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These modified electrode materials will be used for better understanding of vanadium electrode reactions, which provide a basis for vanadium flow battery chemistry and the possibility to reduce battery costs by optimization of the materials. The developed procedures for carbon surface modification will be upscaled to meso-scale to test modified materials in laboratory cells, i.e. battery prototypes.

Benefits

The recruited researcher will have the opportunity to work as part of an international, interdisciplinary team of 17 doctoral candidates, based at universities and industrial firms throughout Europe. She/he will be supported by two mentors within the SPACER project, and will have multiple opportunities to participate in professional and personal development training. Through her/his work she/he will gain a unique skill-set at the interface between material science and battery technology, including modelling and prototyping of electrode materials, characterization of electrodes using spectroscopical and electrochemical techniques at different levels from nano-scale to micro-scale.

She/he is expected to finish the project with a PhD thesis and to disseminate the results through patents (if applicable), publications in peer-reviewed journals and presentations at international conferences.

Requirements

Qualifications/experience

- In accordance with the European Union's funding rules for doctoral networks, applicants must NOT yet have a PhD
- Very good master's degree in chemistry, material science, chemical process engineering or a related discipline
- Familiarity with instrumental analytical techniques in chemistry, surface chemistry or physics (electrochemistry is an advantage)
- Experience and interest in working in a chemical laboratory, in a cross-disciplinary, collaborative project
- Willingness to cooperate with project partners, who perform modelling and data management, to report results in conferences and project meetings.

- Self-motivation, well-structured working style as well as ability to contribute effectively to the team.
- Fluency in English (German is beneficial)

Mobility

The applicant must not have resided or carried out her/ his main activity (work, studies etc.) in Germany for more than 12 months in the past 3 years.

How to apply

Please send your CV by e-mail (preferred) or by post, quoting the reference SPACER-DC1-ICT.

Annabelle Maletzko

Email: annabelle.maletzko@ict.fraunhofer.de

Fraunhofer Institute Chemical Technology
Joseph-von-Fraunhofer-Str.7
D-76327 Pfinztal

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