



Job Posting

Recruiting organisation

University of Stuttgart – Institute of Smart Sensors (IIS)

Subproject title

Miniaturized EPR spectroscopy and imaging for advanced electrode characterization

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 the University of Stuttgart, with a monthly gross salary of approx. 3,900 € (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 Doctoral Network “SPACER”. It will be carried out by one doctoral candidate at the University of Stuttgart, Institute of Smart Sensors (IIS), with PhD supervision by Prof. Jens Anders and co-supervision by Dr. André Buchau and Dr. Michal Kern, over a period of 36 months.

The IIS will contribute its internationally recognized expertise in miniaturized EPR spectroscopy and imaging, multiphysics simulations, and hardware prototyping. The doctoral project focuses on developing novel concepts for VCO-based detectors for EPR imaging, implementing and testing hardware prototypes, and performing advanced EPR experiments for redox flow battery electrode characterization.

The PhD student will benefit from world-class infrastructure at IIS, including high-field NMR/EPR magnets, high-speed arbitrary waveform generators, digitizers, gradient amplifiers, and facilities for 3D-printed electronics.



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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:

- EPR spectroscopy and redox flow battery electrode science,
- Modelling and hardware prototyping,
- Multiphysics simulations and experimental validation.

The University of Stuttgart offers:

- A stimulating research environment at one of Germany's leading technical universities (member of TU9).
- Access to state-of-the-art laboratory and cleanroom facilities.
- Participation in the Clusters4Future QSens initiative, connecting academia and industry in quantum sensing.
- A family-friendly working environment, with flexible working arrangements and strong support for work-life balance.

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 (or equivalent) in electrical engineering, physics, materials science, or a related discipline.
- Strong background in experimental physics,

spectroscopy, RF/microwave electronics, or related areas.

- Familiarity with integrated circuit design, signal processing, or multiphysics simulations is advantageous.
- Interest in cross-disciplinary research at the interface of sensor hardware and electrochemistry.
- Self-motivation, structured working style, and strong team-working ability.
- 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-DC11-UST

Email: application@iis.uni-stuttgart.de

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Application deadline: 30th September 2025