ESR 12: Assembly of New Fluorinated Proton Conducting Membrane coupled with catalyst-immobilized Porous Polymer Electrode for CO₂ Reduction

Objectives
The PhD project will focus on the elaboration of an artificial leaf based on fluorinated membranes/(enzymatic/synthetic metal complex) CO₂ reduction electrodes stacks. This thesis deals with micro and/or hierarchically porous bio-inspired polymer electrode functionalized with enzymes/synthetic metal complex will be stacked/deposited on a new fluorinated proton electrolyte membrane PEM/anode for the CO₂ electrochemical reduction to fuels production.

- Synthesis and modification of polymers suitable for catalyst support, i.e. either sulfonated or triphenyl methane dye based polymers.
- Grafting of enzymatic/synthetic metal complex for CO₂ reduction on conductive formulation.
- Develop microporous electrode via breath figure methodology.
- Optimize electrode coating onto membrane.
- Implementing scalable printing techniques for depositing modified polymers on large area conductive substrates, up to A4 sheet.
- Optimization of the results and up scaling of the synthesis and process.

Host Institutions and Secondments
The student will complete a PhD with an inter-disciplinary supervisory team and benefit from a world-class training programme, including placements with 5 international partners in the following sequence:

- 3 months in University of Stuttgart (Germany)
- 3 months in Namur (Belgique) - secondment
- 7 months in UPPA (France)
- 12 months in Eurecat (Spain)
- 8 months in University of Stuttgart (Germany)
- 3 months in Riva Batteries (Germany) - secondment

The candidate will be awarded a double PhD diploma of University of Stuttgart and Université de Pau et des Pays de l’Adour. PhD supervisors are Dr Jochen Kerres (University of Stuttgart, www.uni-stuttgart.de), and Prof. Laurent Billon (UPPA, www.univ-pau.fr).

Qualifications
- Master’s degree in polymer and physical chemistry.
- Strong interest in rheology of complex fluids and film adhesion especially.
- Expertise on printing techniques and thin film formation/characterization.
- Interested in the conductive and electrical characterization of functional materials and stacks.
- Strong interest in interdisciplinary scientific work.
- Strong motivation to pursue a PhD degree and to develop a cross-disciplinary cutting-edge project.
- Excellent communication and writing skills.
- Willingness to work in collaborative projects with multiple partners.
- Very good English language skills.
- Self-motivation and the ability to achieve goals independently as well as to contribute effectively to the team.
- Willing to travel within the EU and spend extended periods of time in various EU countries.
- Familiarity with environmental, health and safety (EHS) requirements.
Recruitment conditions

The candidate will be employed by University of Stuttgart (Germany), UPPA (France) and Eurecat (Spain), on a standard MSCA salary base (including mobility and family allowance) during 3 years. Successful applicants will be required to start latest 1 October 2018 for a period of 3 years. Candidates are required to meet the Marie Sklodowska-Curie Early Stage Researcher eligibility criteria (https://ec.europa.eu/research/mariecurieactions/sites/mariecurie2/files/msca-itn-fellows-note_en_0.pdf). At the time of the appointment candidates must have had less than four years full-time equivalent research experience and must not have already obtained a PhD. Additionally, they must not have resided or carried out their main activity (work, studies, etc.) in Germany for more than 12 months in the last 3 years immediately prior to the starting date.

Any appointment will be conditional upon satisfactory references, the fulfilment of any conditions specified in the offer of a place on a PhD programme, and confirmation of the right to work in the EU and ability to secure a valid visa.

Selections will be made regardless of gender, nationality, religion, ethnicity and cultural background, but aiming for a good balance among the group.

Selection process

A first selection process will consist of a screening of the curriculum vitae, academic course transcripts, a motivation letter and 2 recommendation letters. The short-listed candidates will be interviewed by teleconference/skype by the selection committee. The selected candidate will be approved by the selection committee.

Apply for this job

Send your application (CV, motivation letter, 2 recommendation letters together with academic course transcripts, all documents should be in English) to the following address:

esr12-application@escaled-project.eu

Please put in the object of your email that you are applying for the ESR12 position within the eSCALED project.

Please check that you meet all eligibility criteria

The closing date for receipt of applications is 20 May 2018, 18:00 CET