ESR 3: Novel electrode materials for hydrogen production based on molecular catalysts

Objectives
The PhD project will focus on the preparation of novel micro- to nanostructured (photo)cathode materials for hydrogen production, incorporating molecular H\textsubscript{2}-evolving catalysts. For this purpose, derivatization of selected platforms with suitable coupling functions (azide, activated ester groups) and anchoring groups (carboxylic or phosphonic acids, pyrene moiety) will be undertaken. Their grafting onto various electrode substrates (carbon nanotubes, transparent conducting oxides…) or suitable conducting polymers will then be achieved. The hydrogen production activity of the resulting electrodes will be assessed using (photo)electrochemical techniques coupled to chromatography; mechanistic analysis will be conducted using advanced spectroscopic techniques. Scalable inkjet and spray-coating methodologies will be developed to obtain large area cathode materials that will be implemented in a complete device.

This is a multidisciplinary project involving the synthesis of novel ligands and coordination complexes as well as conductive organic polymers, their immobilization onto electrodes using surface chemistry methodologies, spectroscopic and electrochemical characterizations and electrocatalytic activity assessment. Specific training courses in electrochemistry, catalysis, polymer chemistry and upscaling process will be provided to the Early Stage Researcher within the eSCALED joint training program.

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:

- 17 months in Commissariat à l’Energie Atomique et aux Energies Alternatives (CEA Grenoble, France), including a 3 month secondment in ICIQ (Spain).
- 9 months in UPPA (France), including a 3 month secondment in Eurecat (Spain).
- 10 + 12 months in University of Uppsala (Sweden).

This project will be developed under a co-tutelle agreement and the applicant will obtain a double degree from Université Grenoble Alpes (France) and Uppsala University (Sweden). PhD supervisors are Dr. Vincent Artero (CEA, France; www.solhycat.com), Pr. Leif Hammarström (Uppsala University; www.kemi.uu.se). The expected time for a PhD degree in Sweden is 4 years, and the last 12 months of the position will be in Uppsala, under the employment rules for Swedish doctoral students.

Qualifications
- Master’s degree in molecular chemistry, with strong organic/inorganic synthetic skills. In addition, knowledge in electrochemical and spectroscopic characterization techniques and/or experience in materials chemistry will be appreciated.
- Strong motivation to pursue a PhD degree and to develop a cross-disciplinary cutting-edge project.
- Excellent communication skills and willingness to work in collaborative projects with multiple partners.
- Self-motivation and the ability to achieve goals independently as well as to contribute effectively to the team and consortium.
- Very good English language skills.
- 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
ESR3 will be employed by the CEA (France), the University of Uppsala (Sweden) and University of Pau (France), on a standard MSCA salary base (including mobility and family allowance) during 3 years and 1 year under Swedish standards.

Successful applicants will be required to start latest 1 October 2018 for a period of 4 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 France 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, 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:
esr3-application@escaled-project.eu

Please put in the object of your email that you are applying for the ESR3 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 Stockholm Time (CET or GMT+1).