ESR 4: Biohybrid electrode materials for hydrogen evolution

Objectives
The PhD project will focus on the preparation of novel biohybrid cathode materials for hydrogen evolution, based on semi-synthetic or artificial hydrogenase catalysts. For this purpose, various dinuclear iron complexes will be synthesized and incorporated into suitable protein matrices, using methodologies previously developed in the host laboratories [Berggren et al. Nature 2013]. Methodologies will be developed to anchor such biohybrid catalysts onto nanostructured electrode substrates (carbon nanotubes, structured conducting polymers and nanoporous metal oxide materials). These hybrid materials will be characterized using a range of advanced spectroscopic techniques and their hydrogen evolution activity will be assessed using electrochemical methods coupled to chromatography. Selected materials will then be investigated for device implementation and analysed by means of life cycle assessment (LCA) and life cycle cost analysis (LCC).

This multidisciplinary project will involve the synthesis of organometallic compounds, the isolation and derivatization of host proteins, characterization and immobilization of artificial enzymes using surface chemistry methodologies and bio-electrochemical techniques for catalytic assessment. Moreover, a training on polymer design and sol-gel chemistry for catalyst immobilization and stabilization will be carried out. Finally, the student will assess the environmental and economic sustainability of the related technologies and products by means of LCA and LCC methodologies.

Host Institutions and Secondments
The candidate will complete a PhD with an interdisciplinary supervisory team and benefit from a world-class training programme, including placements with 5 international partners with the following employment schedule:

- 11 months at the Department of Chemistry - Ångström, Uppsala University (Sweden)
- 22 months at the Laboratory of Chemistry and Biology of Metals in CEA-Grenoble (France)
  including 3-month secondments at the University of Namur (Belgium) and Université de Pau et des Pays de l’Adour (France)
- 3 months in Eurecat (Manresa, Spain)
- 12 months in University of Uppsala (Sweden)

The candidate will be awarded a double PhD diploma of Uppsala University and Université Grenoble Alpes. PhD supervisors are Dr. Gustav Berggren (Uppsala University, www.kemi.uu.se and www.solarfuel.se), Dr. Vincent Artero (CEA Grenoble, www.solhycat.com). 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 chemistry or a related discipline (at the time of admission).
- Skills in inorganic and/or organometallic synthesis and biochemistry is expected
- Experience in electrochemical characterization of functionalized materials will be appreciated
- Familiarity with environmental, health and safety (EHS) requirements
- Strong interest in interdisciplinary scientific work
- Strong motivation to pursue a PhD degree
- Excellent communication skills and 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
Recruitment conditions
The candidate will be employed by the Uppsala University (Sweden), CEA (France) and EURECAT (Spain), on a standard MSCA salary base (including mobility and family allowance) during the first 3 years and 1 year under Swedish standards.
Successful applicants will be required to start October 1st 2018 at the latest 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 Sweden 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:

esr4-application@escaled-project.eu

Please put in the object of your email that you are applying for the ESR4 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)