**ESR 13: Low-cost Integration of efficient robust and inexpensive catalysts in membrane electrode assembly for PV-Electrolyser technology**

**Objectives**
The PhD project will deal with the integration in electrolyser of stable and efficient catalysts based on metal complex catalysts or on materials developed recently by the Institute Català d'Investigació Química (ICIQ), Uppsala University (UU) and CEA-Saclay (CEA) partners. Molecular catalysts, either in their molecular state or immobilized in suitable MOFs or carbon nanotubes, and Metals chalcogenides as molybdenum Sulphide coordination polymers will be investigated for water oxidation and protons reduction. These catalysts will be formulated and deposited either on electrodes or membranes (furnished by University of Stuttgart (USTUTT)) according low cost and manufacturing processes such as inkjet-printing, spray... The optimisation of the catalytic performances of the materials electrodes will be also investigated by the addition of conductive additives and the formatting of the inks. The electrolyser cells fabricated in this work will be ultimately powered by perovskite PV cells developed by Solaronix (SOLAR) and by the Fondazione Istituto Italiano di tecnologia (IIT).

The candidate will make anodes and cathodes based on coordination complex catalysts and incorporate them in PV-Electrolyser technology. Different tasks will be addressed during this Ph. D project:
- Synthesis of water oxidation and proton reduction catalysts based on coordination complexes modified.
- Functionalization of conducting organic materials and MOFs for immobilization of molecular catalysts.
- Formulation of inks with commercial or newly synthesized ionomers.
- Electrochemical characterizations of catalysts toward water splitting and hydrogen evolution at different pH.
- Fabrication of membrane electrode assemblies using implementing scalable printing techniques such as ink-jet printing, ultrasonic spray deposition, ...
- Characterizations and stability assessment of Perovskite Solar Cells.
- Implementation of MEA in an electrolyser cell coupled to a perovskite solar cell.

**Host Institutions and Secondments**
The candidate will complete a PhD with an inter-disciplinary supervisory team and benefit from a world-class training programme, including placements with 6 international partners.
- 10 months in CEA-Saclay (France)
- 6 months in University of Stuttgart (Germany) - secondment
- 6 months in ICIQ (Spain) - secondment
- 3 months in IIT (Italy) - secondment
- 8 months in University of Uppsala (Sweden)
- 3 months in Solaronix (Switzerland)
- 12 months in University of Uppsala (Sweden)

PhD supervisors are Prof. Leif Hammarström (Uppsala University, www.kemi.uu.se) and Dr. Bruno Jousselme (CEA-Saclay, www.universite-paris-saclay.fr). 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, material science, or related disciplines.
- Inorganic and organic synthetic skills.
- Interested in the catalytic and electrochemical characterization of the functional materials and their application in electrolyser.
- Strong interest in interdisciplinary scientific work.
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
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 student will be employed by the CEA-Saclay (France), the University of Uppsala (Sweden), and Solaronix (Switzerland), on a standard MSCA salary base (including mobility and family allowance) during 3 years and 1 last 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 Skłodowska-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, 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 application form, curriculum vitae, 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:
esr13-application@escaled-project.eu
Please put in the object of your email that you are applying for the ESR13 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 Paris Time (CET or GMT+1)