14 Marie Skłodowska - Curie Positions for Early Stage Researchers in the Field of Artificial Photosynthesis

The eSCALED consortium, in collaboration with the Horizon 2020 Marie Sklodowska-Curie programme, is delighted to offer 14 Early Stage Researcher positions. The successful candidates will enrol in double PhD programs involving 2 partner universities, starting latest in October 2018, for ground-breaking research on Artificial Photosynthesis Devices.

Artificial photosynthesis, defined as a manner to store solar energy in chemical bonds (solar fuels) has the potential to provide significant economic, environmental and social benefits. A cost effective and reliable process would have a tremendous societal impact since this achievement could transform European and worldwide energy production, distribution and policies in the near future. However, it still represents a significant scientific and technological challenge. eSCALED is an innovation-oriented project using bioinspiration as a creative enhancing tool.
The eSCALED collaborative project brings together for the first time, 11 internationally recognized academic and industrial research groups. The project has an interdisciplinary scientific approach integrating the latest knowledge on (bio-)catalysis, photovoltaics, polymer chemistry and nanostructuration by self-assembly. eSCALED is expected to generate breakthroughs in the development of artificial photosynthetic leaves as photoelectrochemical devices, educate highly trained researchers and induce novel cross-disciplinary collaborations.

eSCALED will provide the Early Stage Researchers with exciting high mobility projects in a multicultural environment. The students will register for a PhD and work under the supervision of an international and interdisciplinary team of supervisors towards solving a specific challenge related to the eSCALED project. In parallel, the eSCALED framework will offer the young researchers an enhanced and comprehensive training, tailored workshops, a summer school, and lectures to facilitate sharing of knowledge, acquisition of new skills and career development.

ESR 1: Microporous functional electrodes for Electrochemical Water Oxidation

ESR 2: Molecular water oxidation catalysts for photo-electrochemical water splitting

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

ESR 4: Biohybrid electrode materials for hydrogen evolution

ESR 5: Encapsulation of synthetic metal complexes for catalytic carbon dioxide reduction in nanostructured electrodes

ESR 6: Porous Bio-inspired Polymer Electrode Functionalized with Enzymes for Catalytic Carbon Dioxide Reduction

ESR 7: Proton-conducting membranes for artificial leaf

ESR 8: Proton-conducting membranes based on polymeric triphenyl methane dyes

ESR 9: Perovskite Semiconductor Nanocrystals for Multi-Junction Solar Cells

ESR 10: Functional Enzymatic/Catalytic CO2/H+ Reduction Electrochemical Devices.

ESR 11: Functional electrodes for water oxidation and CO2/H+ reduction by evaporative coatings of nano-composites

ESR 12: Assembly of New Fluorinated Proton Conducting Membrane coupled with catalyst-immobilized Porous Polymer Electrode for CO_2Reduction

ESR 13: Low-cost Integration of efficient robust and inexpensive nanoparticles catalysts in full membrane electrode assembly and electrolysers

ESR14: Integrating Multi-Junction Cells, Membranes and Molecular Catalysts into Devices

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_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).

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.

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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)