

## Research and Teaching Associate position

### From homogeneous artificial metallo-enzymes to functional building blocks for hierarchically porous Water Oxidation electrodes

#### CONTEXT

**EnSulTe** aims at bringing Green Hydrogen Generation from bio-inspired research to a higher technology readiness level (TRL1 to TRL4) addressing issues as the sustainability of the materials used, the design of the devices available and the consumed energy of the electrolyzer, that current existing technology presents. Moreover, in a holistic approach, EnSulTe will gather together the technological research with a social dimension to tackle legal, economic and social topics to make GHG and use a real, sustainable energy solution for isolated and solidarity territories. These first studies in isolated communities will give a sight of the potential implementation in larger and complex territories.

Bio-inspiration will be the project's guideline. At the technical level, integrating such concepts implies to take profit of the thousand-years-old evolution report of the animal and plant kingdom with their environment, around 3 inseparable major pillars: (1) chemical composition to lead to features, (2) molecular or macromolecular structure to create elementary building blocks, and finally (3) hierarchical architecture of materials combined to the processes of the elementary building blocks self-assembly, to promote and enhance properties of the living entities "devices" allowing in a way or in other one to favour their development and then Life diversity.

In this project the recruited candidate will work on functionalization/heterogenization of water oxidation catalysts (WOC) as well as their robust grafting onto building blocks or anchoring at the surface of patterned electrodes directly. The synthesis of building blocks, artificial metallo-enzyme, required to elaborate a conductive porous electrode, stable under oxidative condition and able to bind the catalyst will be done. Macromolecules will present functional groups to anchor the molecular catalysts and nanoparticles and also be able to self-assemble to create a mesoporous and/or honeycomb films.

#### POSITION AND ASSIGNMENTS

The position has its focus on the optimization of water oxidation catalysts.

The successful candidate will contribute to the following tasks:

- Functionalization of homogeneous molecular catalysts to artificial metallo-enzyme
- Catalyst heterogenization
- Development of structured Electrodes

The position includes research and teaching duties (64h/year). The position will also include international travel to conferences and meetings with partners/collaborators.

**Collège STEE**  
**IPREM UMR 5254**  
**UPPA/CNRS**  
Technopole Hélioparc  
2 avenue du Président Pierre Angot  
64053 PAU CEDEX 09

<https://www.univ-pau.fr>



## WORKING CONDITIONS

The chosen candidate will be working with an inter-disciplinary supervisory team and benefit from a world-class programme. He will supervise the daily work of the PhD dedicated on WOC molecular catalysts synthesis/electro-characterization and functionalization to develop efficient WOC with high stability and efficiency.

**Hosting laboratory :** IPREM, UMR CNRS 5254, Université de Pau et des Pays de l'Adour

IPREM is a joint Research Unit CNRS/UPPA (UMR 5254) in France. IPREM has an extensive and highly competitive research program that comprises the development of fundamental knowledge in physicochemistry, analytical chemistry and microbiology, in relation to applications concerning the structure of the living, the management of the environment and the functional properties of different classes of materials.

Furthermore, short stays at ICIQ (Tarragona, Spain) will be done.

**EnSuite research team:** The challenges presented at **EnSuite** are great, but the potential rewards are enormous. tackle this challenge, we will make use of advanced experimental techniques and knowledge of **Prof. Laurent Billon** (Bio-inspired materials group: functionality & self-assembly at Université de Pau et des Pays de l'Adour/Energy & Environment solutions UPPA/E2S, France) in collaboration with **Prof. Toni Llobet** (ICIQ, Tarragona, Spain).

**Localisation address:** IPREM, Université de Pau et des Pays de l'Adour, Pau, Nouvelle-Aquitaine, France

**Starting period:** July 2021 or as otherwise agreed.

**Duration of the contract:** 24 months (+ 18 months)

**Gross salary range:** 2960 €/month (which includes extra gratification for teaching duties – 64h)

**Funding:** This position is funded by the project E2S UPPA (Energy Environment Solutions) which has a core scientific domain focused on Environment and Energy to meet challenges related to the energy transition, geo-resources, aquatic habitats and the environmental effects of natural and anthropogenic changes.  
<https://e2s-uppa.eu/en/index.html>



## REQUIREMENTS

Priority will be given to candidates holding a PhD degree in Chemistry, with a strong interest in material science and advanced organic and polymeric synthetic skills are suited.

Extensive experience in experimental research in molecular and supramolecular chemistry, structure-properties association, catalytic and electrochemical characterization of functional materials. An experience in the development of electrodes will be suitable.

The ranking will also accord weight to the candidates assessed competence in ability to interact effectively in a multi-disciplinary research environment.

The applicant must be proficient in spoken and written English. French knowledge would be desirable, but non mandatory.

## ADDITIONAL QUALIFICATIONS

The chosen candidate should have self-motivation and the ability to achieve goals independently as well as to contribute effectively to the team. He/she should have a strong motivation to pursue a carrier in a cross-disciplinary cutting-edge domain.

Excellent communication skills and willingness to work in collaborative projects with multiple partners as well as a first experience in management of small teams will be desired. Furthermore, the candidate should be familiar with environmental, health and safety (EHS) requirements.

## SELECTION PROCESS

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

Application files will be evaluated based on the following criteria:

- Appropriate education and work/research in related fields.
- Candidate's motivation, knowledge, scientific maturity and curiosity.
- Emphasis will also be placed on personal skills.
- Candidate's ability to present her/his work and results

Selections will be made regardless of gender, nationality, religion, ethnicity and cultural background.



IPREM  
Institut des sciences analytiques  
et de physico-chimie  
pour l'environnement et les matériaux



### APPLY FOR THIS JOB

Send your application (CV, motivation letter, 2 reference together with copy of the candidate's PhD thesis diploma) with the title "EnSulTE application" to the following addresses:

[laurent.billon@univ-pau.fr](mailto:laurent.billon@univ-pau.fr)

[laia.francesch@univ-pau.fr](mailto:laia.francesch@univ-pau.fr)

The closing date for receipt of applications is **January 3<sup>rd</sup> 2021**, 17:00 Paris Time (CET or GMT+1)



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