

PhD position Towards Self-Assembly-Induced Covalent-Organic Frameworks COF

CONTEXT - SCIENTIFIC FRAMEWORK

EnSuTe aims at bringing Green Hydrogen Generation from bio-inspired research to a higher technology readiness level (TRL1 to TRL4) addressing issues such as the sustainability of the materials used, the design of the devices available and the consumed energy of the electrolyser, that current existing technology presents. Moreover, in a holistic approach, EnSuTe will gather together the technological research with a social dimension to tackle legal, economic and social topics to make GH 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 materials combined via self-assembly of the elementary building blocks, to promote and enhance properties of the living entities' "devices" allowing one to favour their development and then Life diversity in one way or another.

MISSION - MAIN ACTIVITIES:

In this PhD project you will work on functional molecules & polymers as COF precursors and building blocks. You will work on the organic synthesis and characterization of organic molecules and macromolecular designs, their co-self-assembly in solution, and the modelling of their reactivity and assembly to form hierarchically structured COFs.

POSITION AND ASSIGNMENTS

The position has its focus on the synthesis and optimization of COF catalysts and their dimension, shape and morphology controls.

The successful candidate will contribute to the following tasks:

- Functional molecules & polymers as COF building blocks
- Self-Assembly-Induced COF (SAIC), a new concept inspired by polymerization process called PISA (Polymerization-Induced Self Assembly)
- Reactivity modelling of COFs based on their morphologies

The position includes research and teaching duties (32h/year). The position will also include international travel to conferences and meetings with partners/collaborators.

WORKING CONDITIONS

The chosen candidate will be working with an inter-disciplinary supervisory team (IPREM (France)/MPG (Germany)) and benefit from a world-class programme.

Hosting laboratories:

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 physical-chemistry, analytical chemistry and synthesis of functional/bio-inspired materials, in relation to conversion and electrochemical/chemical storage of renewable energies.

Max Planck Institute for Solid State Research in Stuttgart, Germany, is a hub for the synthesis and characterization of solids with a focus on quantum and energy materials. MPI-FKF provides world-class facilities dedicated to solid state synthesis, wet chemical synthesis, nanofabrication and materials characterization at the highest level. To this end, the institute boasts an impressive cluster of characterization facilities for seamless analysis of solids on the atomic and nanoscale.

EnSuite research team – Thesis supervisors: The challenges presented at **EnSuite** are great, but the potential rewards are enormous. To work in this project, we will make use of advanced experimental techniques and knowledge of **Prof. Bettina Lotsch** (co-supervisor) (MPI-FKF, Nanochemistry department, Stuttgart, Germany) and **Prof. Laurent Billon** (supervisor) (Bio-inspired materials group: functionality & self-assembly at Université de Pau et des Pays de l'Adour/Energy & Environment solutions UPPA/E2S, France).

Localisation addresses:

IPREM, Université de Pau et des Pays de l'Adour, Pau, Nouvelle-Aquitaine, France

Max Planck Institute for Solid State Research, Stuttgart, Germany (2 long stays)

Starting period: Early 2021.

Duration of the contract: three years under UPPA contract with 2 research stays with 6 months each at MPI-FKF.

Gross salary range: 1 870 € / month (which includes extra gratification for teaching duties in UPPA – 32h per year)

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>

APPLICANT'S PROFILE

Priority will be given to candidates holding a master's degree in Chemistry as major, in the field of organic or polymer synthesis. A strong interest in material science, materials characterization, as well as advanced organic and polymeric synthetic skills is desired. The candidate should be interested in the catalytic and electrochemical characterization of functional materials and their application for photo(electro)catalytic hydrogen evolution.

Extensive experience in experimental research in molecular and supramolecular chemistry, structure-property relationships, catalytic and electrochemical characterization of functional materials is desirable.

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

The applicant must be proficient in spoken and written English. French knowledge would be desirable, but is not 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 with mobility between Stuttgart and Pau.

Excellent communication skills and willingness to work in collaborative projects with multiple partners are desired. Furthermore, the candidate should be familiar with environmental, health and safety (EHS) requirements.

APPLICATION – EVALUATION CRITERIA

Application file assessment: Selection committee


Candidates will first be selected based on their application file.

Those selected after this first step, will then be interviewed, by teleconference/skype by the selection committee.

Application files will be evaluated based on the following criteria:

- Grades and ranking during your Master's degree, steadiness in your academic background
- Appropriate education and work/research in related fields.
- English language proficiency
- Candidate's ability to present her/his work and results
- Candidate's motivation, knowledge, scientific maturity, and curiosity.
- Emphasis will also be placed on personal skills.
- Work experience similar to an internship in a laboratory – or likewise; previously achieved research work (reports, publications).

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



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IPREM UMR 5254
UPPA/CNRS
Technopole Hélioparc
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64053 PAU CEDEX 09

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

Application will include: *(in a single pdf file)*

- CV
- Cover letter
- Master's degree grade transcripts and ranking
- 2 Reference letters
- Contact details of at least two people, from you work environment, who can be contacted for further reference

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 "ENSUITE - COF doctoral application" to the following addresses:

laurent.billon@univ-pau.fr

laia.francesch@univ-pau.fr

For more details, please visit our websites: <http://e2s-uppa.eu/en/index.html>

The closing date for receipt of applications is **December 15th 2020**, 17:00 Paris Time (CET or GMT+1)