

Offer for a Thesis Allowance

Subject: Synthesis of Photo-electrocatalysts for CO₂ conversion

From October 13, 2020 to November 13, 2020

The **InterMat** group at IPREM (University of Pau, France) is offering a PhD position in the field of the photo-electrochemical **conversion of CO₂**. The position is to be filled by January 2021.

The conversion of CO₂ into valuable feedstocks such as Carbon monoxide, Methane, ethylene, has sparked an ever-increasing interest among research groups in academia. The InterMat group at IPREM aims to approach CO₂ conversion from 4 different perspectives:

- 1 . developing new inorganic and organic photocatalysts based on metal oxides and polymeric materials
- 2 . study the photo-electrocatalytic processes at the interface between the catalyst, electrolyte and CO₂
- 3 . develop innovative gas diffusion electrodes (GDEs) as an alternative to carbon fiber-based GDEs.
- 4 . Taking advantage of our extensive experience in photovoltaics to couple CO₂ reduction catalytic systems to solar energy generation.

The primary motivation for the project is well defined: InterMat will provide the knowledge to achieve higher efficiencies through the understanding of the interfacial charge transfer mechanisms in operando conditions. The challenges are great, but the potential rewards are enormous. Much effort on the basic research science must be carried out to succeed on the great challenge of increasing the photo-electrocatalysis efficiency and stability in this new type of solar driven photo-electrocatalysts to make them competitive for CO₂ conversion. To tackle this challenge, we will make use of advanced experimental techniques previously developed in Prof. Emilio Palomares' group as part of an ERC project (PolyDot) and the knowledge of Prof. Laurent Billon (Bio-inspired materials group: functionality & self-assembly at the Université of Pau/E2S, France).

The IPREM and the ICIQ are both worldwide renowned research institutes with modern chemistry laboratories. The facilities at IPREM and ICIQ include some of the most advanced characterisation techniques such as: GCMS, XPS, SEM, XRD, ICP-MS, Transient absorption spectroscopy, and all routine organic chemistry characterisation techniques.

Main Responsibilities

The project has its focus on the synthesis and characterization of photo-electrocatalysts for CO₂ conversion.

The successful candidate will contribute to the following tasks:

- * Synthesis of molecular materials for active electrocatalytic reduction of CO₂
- * Development of a photo-electrocatalytic devices working in operando conditions for solar-driven chemistry
- * Measurement and analysis of C1 and C2 products derived from the electrocatalytic reduction of CO₂

The chosen candidate will complete a PhD with an inter-disciplinary supervisory team and benefit from a world-class training programme.

The PhD will be completed at IPREM (UPPA CNRS UMR 5254 –E2S, Pau, France) with short stays at ICIQ (Tarragona, Spain).

Hosting laboratory:

The Institute of Analytical Sciences and Physico-Chemistry for Environment and Materials (**IPREM**) is a Joint Research Unit CNRS / UPPA (UMR 5254).

Laboratory expertise:

IPREM's research work focuses on the development of instrumentation and analytical methods for trace analysis, speciation (detection, identification and quantification of chemical forms of metals and metalloids) and isotopic analysis in environmental and biological media

Localisation: Université de Pau et des Pays de l'Adour ; Technopole Helioparc, 2 av. Président P. Angot, 64000, Pau, France

PhD Director: Laurent Billion

PhD Co-Director: Emilio Palomares

PhD coordinator: Aurélien Viterisi

Starting date: January 1st, 2021 (or as agreed otherwise)

Length: 3 years

Employer: Université de Pau et des Pays de l'Adour (UPPA), doctoral school ED 211 Doctoral School of Exact Sciences and their Applications

Gross monthly salary: 1878 €, including 32h of teaching activities, each year (UPPA doctoral contract, according to E2S UPPA project)

Required skills and competences - Who can apply ?

Qualifications

- * Master's degree in Chemistry, Material Sciences, or related disciplines
- * Strong interest in material science and advanced inorganic/organic and polymeric synthetic skills
- * Interested in the catalytic and electrochemical characterization of the functional materials
- * 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 proficiency in English (both written and oral)
- * Self-motivation and the ability to achieve goals independently as well as to contribute effectively to the team
- * Willing to travel within the EU
- * Familiar with environmental, health and safety (EHS) requirements

Recruitment conditions

Any appointment will be conditional upon satisfactory references, the fulfilment of the 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 or cultural background.

Application - Evaluation criteria

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.

Application files will be evaluated based on the following criteria:

- * Candidate's motivation, scientific maturity and curiosity
- * Academic results : grades and ranking in M1 and M2 (or engineering school) ; steadiness in the academic background
- * English language proficiency
- * Oral and written communication skills
- * Candidate's ability to present her/his work and results
- * Professional experience (e.g. Work experience similar to an internship in a laboratory – or likewise, any previously achieved research work, reports, publications ...)

Application file composition

Application must be written **in English** (all documents included) and sent to the following email address:

aurelien.viterisi@univ-pau.fr

with the title “ “InterMat doctoral application”, and the following documents attached (altogether, **in a single pdf file**):

- * CV (max 2 pages) including the publication list when applicable
- * Cover letter detailing the candidate's motivations (max 2 pages)
- * Copy of your Master diploma (or equivalent)
- * Copy of your Master transcripts (marks and ranking)
- * 2 letters of recommendation
- * Contact details (Name and e-mail addresses) of 2 referees (including the Master thesis supervisor)



***Submission deadline : November 13th,
2020 - 17:00 ParisTime (CET or GMT+1)***