



## OFFRE D'ALLOCATION DE THESE RECRUITMENT OF PHD CANDIDATE

ÉCOLE DOCTORALE SCIENCES EXACTES ET LEURS  
APPLICATIONS - ED 211 / NATURAL SCIENCES DOCTORAL SCHOOL

Avenue de l'université BP 1155 64 013 PAU Cedex – France

### SUJET DE THESE / PHD PROJECT

#### TITRE / TITLE (TENTATIVE)

Discovery of new marine transglutaminase for biosynthesis of protein-based biomaterials

#### DESCRIPTION

Enzymatic biosynthesis provides an efficient, green, and sustainable approach to produce new molecules. Transglutaminase is an enzyme that catalyzes the formation of covalent isopeptide bond between the  $\gamma$ -carboxamide side-chain group of glutamine and primary amines. Thus, the transglutaminase catalyzed intra- or inter-molecular crosslinking can be utilized to generate new protein-based materials with improved functionalities that could be potentially used in pharmaceuticals, biomedicine, foods, textiles, and material engineering. Our research group has successfully discovered novel extremophilic transglutaminase from marine resources. Moreover, there is currently a great interest to develop enzymes including transglutaminase to be active and stable in non-aqueous phase, which could expand and strengthen their application in various industries that involve a high use of organic solvents.

In this PhD project, solvent-tolerant transglutaminase will be discovered using versatile approaches including enzymological screening, omics & bioinformatics, directed evolution, and protein engineering. Structure – function relationship and the catalysis mechanism of the new transglutaminase will be elucidated. It will also be utilized either by itself or combined with other catalysts to synthesize protein-based smart materials in non-aqueous phase with improved functionalities to enable them to be useful in drug delivery, wound healing, tissue engineering, etc. The overall objective of the PhD thesis is to discover transglutaminase for non-aqueous phase, understand how the structure impact its functions, and utilize it in the synthesis of multifunctional protein-based biomaterials.

This project is supported by the program of Junior Chair E2S UPPA MANTAzyme - Biochemistry and Enzymology that aims at discovering robust marine enzymes for biological synthesis of biomolecules or biomaterials. The Junior Chair E2S UPPA MANTAzyme is financed by the second Programme d'Investissements d'Avenir (PIA 2) with the project Energy Environment Solutions (E2S UPPA) and the Communauté d'Agglomération du Pays Basque (CAPB).

The project will be conducted at Université de Pau et des Pays de l'Adour / University of Pau and the Adour Region, with the applications of cutting-edge technologies and state-of-the-art equipment and tools. The PhD candidate will work closely with Dr. Yi Zhang, Assistant Professor and Junior Chair of the newly established MANTAzyme team, and Dr. Susana Fernandes, Associate Professor and Senior Chair of MANTA that is focusing on the development of marine bio-inspired and ecofriendly biomaterials for biomedical, pharmaceutical, and cosmetic applications. The PhD candidate will also collaborate with professors at Toulouse Biotechnology Institute where has strong research basis in biocatalysis and enzyme engineering. Our research team is multidisciplinary focusing on biocatalysis, enzymology, marine biopolymers, sustainability, bio-inspired materials, and blue biotechnology. The PhD candidate will engage in a creative, dynamic, diverse, and international research environment, and will also have

opportunity to gain experience in teaching assistantship and supervision in projects of junior students.

## CONDITIONS D'EXERCICE / CONDITIONS OF PROJECT

### Laboratoires / Host Institute :

IPREM (Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux) that is a UMR CNRS/UPPA (5254) : CNRS (The French National Centre for Scientific Research), Université de Pau et des Pays de l'Adour (UPPA), Pau, France

IPREM, UPPA is a world-famous research institute in Analytical chemistry, Physics and Theoretical, Physico-chemistry of Materials, Chemistry and Microbiology of the Environment. It provides an interdisciplinary research media with a team of diverse scientists. Read more about IPREM at link: <https://iprem.univ-pau.fr/fr/index.html>.

### Collaboration Institute :

Enzymatic Catalysis and Molecular Engineering Research Center, Toulouse Biotechnology Institute, Toulouse, France.

### Directeurs de thèse / Thesis Supervisors : Dr. Yi Zhang & Dr. Susana Fernandes

Dr. Zhang is Assistant Professor and Junior Chair in Biochemistry and Enzymology at IPREM, UPPA, France. She is also Visiting Research Associate at McGill University, Canada.

Dr. Fernandes is Associate Professor and Chair in Marine Bio-inspired Biomaterials at IPREM, UPPA, France, as well as Guest Researcher and project coordinator at Angstrom Laboratory, Uppsala University, Sweden.

**Lieu / Location :** Pau, France

**Date début / Start Date :** October/November, 2021

**Durée / Duration :** 3 years

**Employeur / Employer :** UPPA

**Salaire mensuel brut / Gross monthly salary:** 1878 €, including 32 h of teaching activities per year (doctoral contract with E2S UPPA)

## COMPÉTENCES REQUISES / REQUIRED SKILLS

The candidate should have a Master's degree with background in enzymology, (applied) biochemistry, molecular biology, biotechnology, synthetic biology, protein/genetic engineering, biosynthesis, or other related disciplines. The candidate will be assessed based on research experience and skills, scientific rigour, communications skills in English and/or French.

## CONSTITUTION DU DOSSIER DE CANDIDATURE / APPLICATION FILE

The application file must include:

- A cover letter describing motivation, research interests, and how this PhD project relates with applicant's previous experience and career goals (maximum 2 pages)
- Detailed CV
- Copy of original diplomas and grades/rankings (with translations into English or French if the original documents were issued in other languages)

- A writing sample of proposal on discovery of solvent-tolerant enzymes (maximum 1 page)
- Contact information (name, email, institution) of 3 referees

Submit the application in one pdf file to: [yi.zhang@univ-pau.fr](mailto:yi.zhang@univ-pau.fr), Dr. Yi Zhang, Assistant Professor, IPREM, UPPA, Pau, France.

### **DATE LIMITE DE DEPOT DU DOSSIER / APPLICATION SUBMISSION DEADLINE**

September 5, 2021

### **CRITERES D'EVALUATION DE LA CANDIDATURE / APPLICATION EVALUATION CRITERIA**

A jury committee comprised of supervisors and collaborating professors will evaluate the applicant's file. Promising candidates will be asked to attend a remote interview/audition. The selection criteria include:

- Motivation, scientific maturity, and curiosity.
- Knowledge and experience in related areas.
- Performance in Master program.
- Mastery level of English and/or French languages.

### **CONTACTS**

If you have any questions about this recruitment, please contact [yi.zhang@univ-pau.fr](mailto:yi.zhang@univ-pau.fr) or [susana.fernandes@univ-pau.fr](mailto:susana.fernandes@univ-pau.fr)