Doctoral research scholarship in bioelectrocatalysis/ physical chemistry

Fabrication of bioelectrocatalytic thin films by layer-by-layer assembly of redox biopolymers and metalloenzymes - FABIOLA

The goal of electrocatalysis is to accelerate the rate of chemical reactions taking place on the surface of an electrode. Redox enzymes catalyse many of the reactions involved in the energetics of life, and they do so with exquisite efficiency and selectivity. Hence, enzymatic bioelectrocatalysis is an attractive field of research.

FABIOLA is a collaborative project in the field of bioelectrocatalysis for energy applications between the Laboratory of Chemistry and Biology of Metals (https://www.cbm-lab.fr/en/Pages/BioCE/Materials.aspx) and the Department of Molecular Chemistry (https://dcm.univ-grenoble-alpes.fr/research/i2bm-team) of the University Grenoble Alpes, in south-east France.

The major challenges in bioelectrocatalysis are to establish electrical communication between the enzyme and the electrode surface, to achieve high surface coverage, and the long-term stability of the electrocatalytic film. The PhD candidate will investigate a novel approach to the wiring and long-term stabilization of redox enzymes to the surface of an electrode, i.e. the **fabrication of bioelectrocatalytic films of nanometric thickness by layer-by-layer (LbL) assembly of a redox biopolymer and an hydrogenase or formate dehydrogenase on a conductive surface**, followed by their covalent cross-linking by an orthogonal electro-click reaction.

In particular, he/she will carry out chemical syntheses and related molecular and electrochemical characterizations; perform LbL experiments and characterize the obtained films; and realize electrocatalytic experiments with the help of his/her supervisors and collaborators. In addition, the student will analyse the physico-chemical data obtained in the various experiments, organize the obtained results in a laboratory notebook and in electronic form, and present them at group and laboratory meetings. Besides writing a doctoral thesis, the candidate will contribute to the preparation of the manuscript of scientific publications and present his/her project at local and national conferences, in order to engage with the wider scientific community.

Supervisors: Dr Luca ALBERTIN and Dr Liliane GUÉRENTE

Duration of contract: 36 months

Salary: 1550 € /month (taxable; net of social security contributions)

Keywords: Electrochemistry, bioelectrocatalysis, surface functionalization, layer-by-layer, biomacromolecules, bioconjugate chemistry, self-assembly, supramolecular, energy conversion.

Essential skills & qualifications: the ideal candidate graduated with an MSc in Chemistry or Physical Chemistry, is naturally curious and meticulous, possess a taste for careful experimental work and data analysis, and is ready to join a multidisciplinary team project. Previous experience in biopolymer chemistry, electrochemistry or LbL assemblies would be a plus.

All enquiries shall be addressed to Dr Luca ALBERTIN (luca.albertin@cea.fr. Ph. +33 (0)4 38 78 91 18) and Dr Liliane GUÉRENTE (liliane.guerente@univ-grenoble-alpes.fr. Ph. +33 (0)4 56 52 08 14).

The deadline for application is the 23rd of March 2022.

Applications should include a motivation letter, a C.V. and the name and contact details of two persons acquainted with the academic or research proficiency of the candidate.