PhD position (H/F) at the interface between chemistry and biology in Marseille

Offer description. A PhD (expected starting date: autumn 2025) is available at the "Institut des Sciences Moléculaires de Marseille" (iSm2, UMR 7313) within the frame of a France 2030 PEPR-funded project.

Project. The project is centered on the study of a copper containing metalloenzyme involved in recalcitrant biomass valorization. Conversion of biomass into biobased chemicals is an important strategy for the future. In particular, the use of non-edible parts of plants from agricultural or forestry residues (lignocellulosic biomass) for the production of "advanced" biofuels or chemicals, is highly desirable to avoid competition with food or water supplies. However, lignocellulose (mainly composed of cellulose, hemicellulose and lignin) valorization is still a challenge and its natural resistance to deconstruction is largely responsible for the high conversion costs.

In this context, Lytic Polysaccharide Monooxygenases (LPMO) have emerged as a class of enzyme of high interest for improved polysaccharide valorization. LPMO are copper-containing enzymes which catalyze the hydroxylation of a strong C-H bond at the glycosidic linkage of the polysaccharide further leading to chain cleavage. The active site contains a mononuclear copper ion ligated by two histidines in an unusual "histidine-brace" motif. Several fundamental questions on the structure-function relationships of LPMOs remain to be addressed. The project will aim at getting information on the influence of key environmental parameters, mutagenesis, substrate interaction, redox partners etc. on the properties of the enzyme. This work will be performed within the framework of a PEPR project (PuLCO; ANR-24-PEBB-0009) which involves 5 research groups gathering interdisciplinary expertise. The PhD candidate will join the BiosCiences group at iSm2 (Institut des Sciences Moléculaires de Marseille, France). This group has a strong expertise in the study of metalloenzymes and the development of bioinspired models. He/She will evolve in a multidisciplinary environment (chemistry / biology / biophysics) and will gain experience in a range of techniques used in this project at the interface of chemistry and biology.

The candidate will be involved in the following tasks:
-Production of recombinant LPMOs and variants
-Characterization of the copper active sites using physico-chemical techniques
-Mechanistic and functional investigations
-Protein electrochemistry and spectroelectrochemistry

Keywords: *bioinorganic chemistry, copper, biomass, polysaccharides, redox, mechanism*

Candidate's profile. Highly motivated candidates (master degree or equivalent with excellent academic records) with a background in chemistry and / or biochemistry and / or biophysics are strongly encouraged to apply. Previous laboratory experience in protein chemistry, metalloenzyme or coordination complexes, electrochemistry, or any other field that could benefit the project would be valuable but is not mandatory
Applications have to be submitted **exclusively** online *via* the CNRS job portal (https://emploi.cnrs.fr/Offres/Doctorant/UMR7313-ARISIM-006/Default.aspx?lang=EN)
The application should contain: A CV including details on records and research experiences and a motivation letter. *In one of the files, please include the name of two references*

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