

DC6 – Job Vacancy

Position Description	
Reference	DC6
Title of the project	Biodiversity mining for the discovery of new soluble methane monooxygenases (sMMO) for light alkanes oxidation.
Recruiting Institution	CNRS (Lille, France)
PhD jointly awarded by	University of Lille (France) and University of Basque Country (Spain)
Additional secondment	Genoscope (CEA, France)
Expected Start Date (estimated)	01-10-2023
Job Offer Description	
Keywords	Soluble methane monooxygenases (sMMO), biodiversity mining, enzymology, continuous flow, reactor, methane, methanol
Project Description	<p>The Doctoral Candidate will be hosted mainly at the Unit of Catalysis and Solid-state Chemistry (UCCS, Lille, France) and will be enrolled in the PhD school of the University of Lille, supervised by Dr. E. HEUSON. Part of the activity will be carried out during secondment periods, mainly at the Genoscope (CEA, Paris, France) under the supervision of Prof. V. DE BERARDINIS to create the bank of promising sMMO to overexpress, as well as at University of Basque Country (Bilbao, Spain) under the supervision of Prof. I. AGUIRREZABAL, to test the enzymes efficacy for continuous methane oxidation.</p> <p>The project aims at selecting, producing, and testing new soluble methane monooxygenases (sMMO) from biodiversity using high-throughput approaches. The enzymes will be selected using recently developed bioinformatics tools to explore the biodiversity available in protein databases. The enzyme screening will be performed on the REALCAT platform, using liquid handlers and HT analytical equipment. Once the best candidates will be selected, they will manually fully be characterized (kinetic parameters, stability, substrate scope, etc.) and the relationship between their 3 sub-units will be qualified and quantified. Finally, the best enzymes for biocatalysis will be immobilized into porous supports and applied to methane oxidation in capillaries in continuous flow.</p>
Objectives	<p>Science:</p> <ol style="list-style-type: none"> 1. Search new sMMOs in the biodiversity (protein databases) to produce a library of enzymes with different properties and methane activation. 2. Screen their ability to convert light chain alkanes into the corresponding alcohols using high-throughput experiment techniques. 3. Study the catalytic role and the interactions of their 3 sub-units. 4. Characterize the enzymes in terms of kinetic parameters, solvent tolerance and stability for using in synthesis. 5. Immobilize the best candidates on porous materials (capillaries), and evaluate their performances in continuous flow. <p>Training:</p> <ol style="list-style-type: none"> 1. Bioinformatics applied to the selection of enzymes in protein databases. 2. Molecular biology techniques for recombinant enzyme production in prokaryotic systems. 3. Robot programming and high-throughput enzyme screening development



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	<p>4. Kinetic enzymology for the evaluation of the catalytic performance of an enzyme.</p> <p>5. Basic techniques for immobilizing enzymes on solid supports to improve their stability.</p> <p>6. Use of immobilized enzymes in continuous flow. Additional technical and transferrable skills training network-wide.</p>
Expected Results	<ul style="list-style-type: none"> • Achieve the production of a new bank of >100 new sMMO. • From the screening of this bank against light C₁-C₄ alkanes it is expected to find at least 5 new enzymes efficient for the oxidation of these substrates. • Full characterized of these enzymes and their respective activity will be compared other catalysts in the DEMO project. • Development of one continuous flow enzyme process in capillaries.
PhD Supervisors	<p>Main supervisor: Dr. Egon HEUSON (Centrale Lille - CNRS, France)</p> <p>Co-supervisor: Prof. Iker AGUIRREZABAL (Universidad del Pais Vasco, Spain)</p> <p>Prof. Véronique DE BERARDINIS (Génoscope, France)</p>
Vacancy requirements	
Qualifications	<p>Eligible candidates must hold or be in the process of gaining a second level degree (Master's Degree level or equal qualification) which gives access to Ph.D. studies, including Material Sciences, Biochemistry, Biotechnology, Biocatalysis, Chemical Engineering, Material Sciences or a related discipline.</p>
Requirements	<p>The candidate must be eligible for enrolment in the PhD program at the date of the recruitment.</p> <p>Additional information on specific requirements and eligibility criteria of the PhD School of University of Lille can be found at the following link: https://edsmre.univ-lille.fr/rejoindre-led/candidature</p>
Languages	<p>Successful candidates must have a high level of proficiency in written and spoken English, which will be assessed with the motivation letter and the interview, respectively. Basic knowledge of French and/or Spanish is desirable.</p>
Skills	<p>The ideal candidate possesses:</p> <ul style="list-style-type: none"> • a strong background in enzymology, biochemistry, or biotechnologies; • propension to bioinformatics and continuous flow chemistry; • ability to adapt into multi-disciplinary work environments; • good team-working and communication skills. <p>Knowledge of enzyme immobilization and liquid handler programming is also an asset.</p>
Experience	<p>Documented research experience in the field of enzymology and biotechnologies, with an emphasis on biocatalysis, will be considered as a plus at the selection stage.</p>
Job Details	
Salary	<p>Salary follows the rules in Marie Skłodowska-Curie Actions Work Programme.</p> <p>Gross salary per month: 3957.6 € + 600 € mobility allowance</p>
Other benefits	<p>Other benefits: Gross family allowance: 495 € per month - if applicable*</p> <p>*The family allowance will also be made available to researchers whose parental status changes during their project.</p>
Duration	36 months
Type of contract	Full time



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Place of work	CNRS (Lille, France, 21 months) Genoscope (Paris, France, 6 months) Universidad del Pais Vasco (Spain, 9 months)
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