

DC13 – Job Vacancy

Position Description	
Reference	DC13
Title of the project	Screening, engineering and development of peroxygenases as catalysts for alkane oxidation to alcohols
Recruiting Institution	Johnson Matthey (United Kingdom)
PhD jointly awarded by	Centre National de la Recherche Scientifique through University of Lille (France) and University of Basque Country (Spain)
Additional secondment	University of Basque Country (Spain)
Expected Start Date (estimated)	01-02-2024
Job Offer Description	
Keywords	Oxygenation, oxidation, peroxygenases, alkane, alcohol
Project Description	<p>Research. DEMO will integrate Machine Learning (ML), organic chemistry, modelling, high-throughput engineering and in-situ spectroscopy to discover enzyme-mimicking Metal-Organic Frameworks (MOFs):</p> <ul style="list-style-type: none"> - Virtual High-Throughput Screening (VHTS) to generate a dataset with active species: ML, enzyme sequencing and MOF design to learn the fundamental requirements for alkane, specifically methane, activation into alcohols. - Test the dataset value: screen large and diverse samples via experimental high-throughput engineering and modelling. - Understand testing outputs: combine advanced in-situ and operando spectroscopy, poisoning kinetics and modelling to elucidate the role and to improve each active component both during synthesis and catalysis. - Optimize synthetic materials towards biological analogues: explore new capillary solvation using gas-molecules.
Objectives	<ol style="list-style-type: none"> 1) Select peroxygenases (POGs) for alkane-to-alcohol (focusing first on C₂-C₄ alkanes). 2) Develop new biocatalysts towards an industrially relevant substrate via computation based on structural modelling and protein sequence analysis. Gene assembly to clone DNA encoding enzymes (and to generate mutant enzyme libraries), bacterial and yeast transformation and gene expression. 3) To produce and characterise biocatalyst in terms of kinetics parameters, substrates specificity, storing conditions (lyophilisate, suspension, etc.). 4) To develop reaction conditions using soluble and/or immobilised POGs. 5) To immobilise POGs in DEMO's MOFs at preliminary larger scale to improve stability / recyclability.
Expected Results	<ol style="list-style-type: none"> 1) Development of a panel of peroxygenase enzymes. 2) Characterisation of the most active enzymes towards C₃-C₄ alkanes. 3) Production and immobilisation of active peroxygenases. 4) Establishment of reaction conditions for C₃-C₄ alkane oxidation by peroxygenases, to be later translated into CH₄. Immobilisation of POGs in MOFs to increase their recyclability.
PhD Supervisors	Carmen Aranda and Annette Alcasabas (Johnson Matthey) Pedro Luis Arias (University of Basque Country, Spain) Didier Lecoutourier (University of Lille, France)
Vacancy requirements	
Qualifications	MSc in Chemistry, Biochemistry, Biocatalysis, Molecular Microbiology or related scientific field



DEMO



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Requirements	<p>Eligibility criteria: We welcome applications from candidates of any nationality completing the following criteria:</p> <p>Candidates must not have resided or carried out their main activity (work, studies, etc.) in the country of the first recruiting organisation for more than 12 months in the 3 years immediately prior to their recruitment. Date of recruitment means the first day of the employment of the researcher for the purposes of the action (i.e. the starting date indicated in the employment contract/equivalent direct contract).</p> <p>Candidates may be required to provide documentation proving their eligibility for recruitment, i.e. to provide supporting documentation proving your place(s) of residence or work during the previous 3 years.</p>
Languages	Fluent in English
Skills	<ul style="list-style-type: none"> - Excellent communication skills both written and verbal - Excellent organization skills with the ability to multi-task efficiently - Excellent time and project management skills - Highly motivated, goal-orientated and drives for results - Collaborative and contributes to team success - Demonstrates responsibility for own work
Experience	<ul style="list-style-type: none"> - Excellent knowledge and hands on experience of small-scale biotransformation and enzyme characterization - Experience with <i>E. coli</i> expression vectors and induction systems - Experience with other microbial expression systems such as <i>Pichia pastoris</i> and/ or strain engineering (desirable) - Working knowledge and experience of bacterial molecular biology techniques such as plasmid cloning, glycerol stock creation and (q)PCR. - Experience with protein characterization (gel electrophoresis, specific activity tests) - Broad experience with enzyme assay development
Job Details	
Salary	<p>Salary follows the rules in Marie Skłodowska-Curie Actions Work Programme.</p> <p>Gross salary per month: 4654.6 € + 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
Place of work	<p>Johnson Matthey (Cambridge, United Kingdom, 18 months)</p> <p>CNRS (France, 12 months)</p> <p>University of Basque Country (6 months)</p>