

Department of Chemical Engineering

Research Associate in Computational Fluid Dynamics (CFD) and Mathematical Modelling (Fixed Term)

Job Ref: REQ240336

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

This project is part of a multi-institutional European consortium: REFINE - From solar energy to fuel: A holistic artificial photosynthesis platform to produce viable solar fuels. The project will be based at the Department of Chemical Engineering, School of Aeronautical Automotive Chemical and Materials Engineering (AACME). Following a recent £25 million refurbishment, the department houses a range of state-of-the-art laboratory facilities and a modern office environment. The research group benefits from a variety of digital technologies and high-performance computing to facilitate advanced and costly simulations.

We are looking for a motivated and passionate individual to join our multidisciplinary research group involved in several European and UK projects. We are committed to achieving equity for all those who learn and work here and are providing a diverse and inclusive working environment.

Full project details

REFINE aims at the development of novel ecofriendly artificial photosynthesis, based on hybrid inorganic-biological systems, to produce clean energy and essential chemicals from CO₂ and H₂ as the sole feedstock. The consortium involves multiple stakeholders from academia and industry across Europe aiming to develop multidisciplinary approaches combining material science, biotechnology, engineering and social sciences, which include the Centre for Materials Science and Nanotechnology (SMN, UiO), Institute for Energy Technology, Oslo University Hospital, RWTH Aachen University, University of Strathclyde, Aristotle University of Thessaloniki (AUTH), Plataforma Solar de Almería – CIEMAT, Loughborough University, and Apria Systems, S.L.

The project is led by Prof Brahim Benyahia and Prof Gianluca LiPuma

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose:

The postdoctoral research associate (PDRA) will join a large multidisciplinary research group and will focus on the development of high-fidelity fluid dynamic simulations (CFD), mathematical modelling and model-based optimisation. The objective is to: i) model the radiation absorption under fluctuating solar irradiation conditions, ii) find the optimum

thermal field across the thickness of the PV system, iii) Build a mathematical model of the liquid/solid interface in the electrolyser component, and iv) develop effective scale-up strategies for the electrolysers and relevant technologies.

The PDRA will work closely with the project stakeholders and research partners to extract and generate relevant data and build fluid dynamic simulations (CFD) and mathematical models, which will consequently help understand and optimise the design and performance of photovoltaic systems and electrolysers. The researcher will regularly communicate progress to the supervisors and project partners, write progress reports, and disseminate research outcomes in conferences and peer-reviewed journal papers.

Job Duties

Research

- To develop computational fluid dynamic simulations for photovoltaic and fermentation systems.
- To develop a modelling and simulation strategies for an electrolyser unit.
- To develop strategies for coupling computational fluid dynamic and kinetic modelling.
- To work collaboratively with the other researchers across the research centre.
- To generate, analyse, interpret and present research data.
- To work collaboratively with the research team particularly the research associate in process optimisation and control.
- To liaise with academic and industrial project partners, and coordinate activities across the research centre.

General, technical

- To perform risk assessments, develop method statements and implement safe working practices.
- To manage technical equipment and provide training to other users as required.
- To actively engage with industrial and other non-academic stakeholders to determine system requirements and identify and address potential barriers for implementation.
- To regularly report research progress to the programme management group through formal and informal reports and communications.
- To write research papers suitable for publication in high quality academic journals and for presentation at specialist scientific conferences.
- To supervise student projects in related areas.
- To attend and contribute to project meetings and engagement events.
- To assist in the development of research proposals and grant applications for follow-on project funding.
- General lab organization and coordination.

General and administrative

- To work effectively with relevant administrative, technical and academic staff in the school and across the University.
- To engage in training programmes in the University (e.g. through Staff Development) which are consistent with the RA's ongoing professional development, and the needs and aspirations of the project team and those of the School.
- To maintain confidentiality where relevant at all times and ensure that intellectual property agreements are not violated.
- To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-to-day supervision and support of other researchers.
- To support Chemical Engineering teaching delivery as required
- To carry out specific other duties as may be reasonably requested by the project leaders and that are commensurate with the nature and grade of the post.

Points To Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equity & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

Reports to Professor Brahim Benyahia, Department of Chemical Engineering.

Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

- 1 – Application
- 2 – Test/Assessment Centre/Presentation
- 3 – Interview

Essential Criteria

Area	Criteria	Stage	
Experience	Experience in computational fluid dynamics tools, e.g. Ansys, COMSOL	1,3	
	Experience in mathematical modelling and model-based optimisation	1,3	
	Relevant experience in conducting original research that can be, or has been published in high quality journals	1,3	
	Relevant experience in an academic research environment or equivalent industrial experience	1,3	
	Record of high quality publications or other forms of research outputs.	1,3	
	Experience of presenting research findings at all levels, adapted to specific audience needs, ranging from academic experts to general public	1,3	
Skills and abilities	Ability to coordinate project activities, manage project tasks, prioritise and meet deadlines	1,3	
	Ability to work independently and also as part of a team	1,3	
	Excellent written and oral communication skills	1,3	
	Excellent interpersonal, and organisational skills	1,3	
	Ability to network with other academics and engage with project stakeholders	1,3	
	Ability to write project reports and make technical presentations to industrial and academic research groups	1,3	
	Skills in finding information in the scientific literature and proposing original ideas	1,3	
	Knowledge, awareness and practice of relevant Health & Safety issues	1,3	
	Willingness to assist in preparation for meetings	1,3	
	Training	A willingness to undertake further training as appropriate and to adopt new procedures as and when required	1,3
	Qualifications	PhD (or near completion) in Chemical Engineering, Physics, Applied Mathematics, Computer Science, or related fields.	1
	Other	Commitment to observing the University's Equal Opportunities policy at all times.	1,3
Willingness to Travel		1,3	

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in supervising junior members (e.g. PhD, MSc or final year project students)	1,3
	Writing research proposals for funding from internal/external sources	1,3
	Experience in process design and scale up	1,3
	Mathematical modelling and data fitting	1,3
	Experience with Python	1,3
	Local and global optimisation methods	1,3
Skills and abilities	Willingness to work collaboratively with project partners in different locations	1,3
	Authoring original work in the highest quality refereed academic journals or in patent literature	1,3
	Time management and multitasking	1,3

Conditions of Service

The position is FULL TIME and FIXED TERM up to 31st October 2027. Salary will be on Specialist and Supporting Academic Research, Grade 6, Salary Band £33,966 - £44,263 per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's Terms and Conditions of Employment for STAFF GRADES 6 AND ABOVE, details of which can be found [here](#).

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found [here](#).

The University offers a wide range of employee benefits which can be found [here](#).

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: <http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html>)

In addition, the University is supportive, wherever possible, of flexible working arrangements. We also strive to create a culture that supports equity and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see <http://www.lboro.ac.uk/services/hr/athena-swan/>