

## Research Associate DEcarbonisation of Low TemperAture Process Heat Industry, DELTA PHI

Job Ref: REQ210547

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

### School/Department summary

Loughborough University (CREST) in collaboration with University partners from Warwick University, Birmingham University, Ulster University, Durham University and London South Bank University have been awarded funding from the EPSRC to undertake a program of fundamental and applied research to develop a suite of technologies and approaches that will provide key components to decarbonise low temperature industrial process heat over a ten-year timeframe. Addressing industry demands, key developments will include coatings for improved heat exchanger performance, advanced materials for energy storage, thermal transformers, high temperature heat pumps and thermochemical heat transport. New temporal modelling approaches will predict how these technologies can be effectively integrated to utilise heat across a multi-vectoral energy system and a transactive modelling platform will be evaluated to address the complexity of how heat can be reutilised economically within the system. This will lead to feasibility studies for systems in several industrial facilities.

The three main areas of research to be performed at CREST relate to enhanced heat recovery, Pinch technology including thermal storage and transport and Integrating low temperature industrial process heat into local energy systems.

The major activities include:

- Materials review,
- Coating production and characterisation,
- Designing and undertaking combined PIV/LIF (Particle Image Velocimetry/Laser-Induced Fluorescence) experiments to characterise enhancements in heat transfer and modifications in boundary layers,
- Designing and undertaking PCM (Phase Change Material) solidification/melting experiments using produced superhydrophobic heat transfer surfaces,
- Mobile thermal storage system design and modelling,
- Simulation of potential mobile thermal storage system applications, and
- Investigation of how low temperature industrial process heat can be integrated into local energy systems.

### Job Description

**Job Grade:** Research Grade 6

## **Job Purpose**

The Research Associate will be involved in i) performing a literature review, ii) producing and characterising thin film coatings, iii) design of experiments, iv) performance of PIV/LIF experiments to assess enhancements in heat transfer and boundary layer modification, v) PCM solidification/melting experiments using coated heat exchange surfaces, vi) mobile storage system design and modelling including simulation of potential applications and vii) investigation of optimum ways in which low temperature industrial process heat can be integrated into local energy systems.

## **Job Duties**

To be responsible for undertaking the main research activities as follows:

- Identifying, screening, production and characterisation of candidate thin film coatings.
- Design and undertake small scale experiments using PIV/LIF to determine the effective performance achieved by different thin film coatings in both increasing heat transfer and modifying boundary layers.
- Design and undertake experiments to determine modification of PCM solidification/melting processes resulting from different thin film coatings on heat exchange surfaces in small scale thermal storage systems.
- Analyse results and develop appropriate models for experimentally observed behaviour.
- Develop designs for mobile thermal energy storage systems using PCMs and TCMs (Thermochemical Materials) and develop models to predict thermal performance.
- Assess potential applications for mobile thermal energy storage systems and predict likely cost effectiveness and payback periods.
- Undertake a review of potential applications for developed systems in one or more industrial sites.
- Investigate optimum ways in which low temperature industrial process heat can be integrated into local energy systems.
- To assist in the dissemination of results arising out of the project.
- To assist in organisation of project workshop meetings.
- To travel to collaborators' locations within the UK and report on the progress of the project.
- To provide feedback to the project team on progress and assist in preparing interim and final project reports.
- To work as a committed member of the project and university team.
- To make presentations to industry and academia.
- To publish the outcomes of research in international journals and conferences.
- To assist in tutorials and laboratory sessions for students if needed.

## **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 Equality & 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 Philip Eames.

## Person Specification

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	Background in Mechanical/Chemical Engineering, or Science related to thermal engineering	1, 3
	Experience of successfully designing and undertaking a complex programme of experimental work	1, 3
	Practical experience of working with thermal energy systems	1, 3
	Practical experience of relevant experimental analysis techniques	1, 3
	Experience of developing and successfully using detailed simulation models	1, 3
	Experience of developing simple simulation models	1, 3
	Experience of having produced technical reports and / or guidance materials on engineering or science topics	1, 3
	A journal and conference publication record commensurate with current career path and stage	1, 3
	Skills and abilities	Knowledge of heat transfer and fluid mechanics
Knowledge of experimental techniques associated with heat transfer studies		1, 3
Ability to design and manage the construction of experimental rigs		1, 3
Ability to successfully undertake an extensive laboratory test campaign		1, 3
Excellent written and oral communication, and IT skills		1, 3
Self-motivated with ability to meet deadlines		1, 3
Ability to work independently and as part of a team, interacting with different academic and industrial partners		1, 3
Excellent interpersonal, and organisational skills		1, 3
Training	Demonstrate evidence of having undertaken further training	1, 3
Qualifications	Relevant PhD in an Engineering discipline preferably related to thermal engineering (or equivalent experience)	1, 3

### Desirable Criteria

Area	Criteria	Stage
Experience	Current or recent relevant work experience at post-doctoral level in an academic or industrial environment	1, 3
	Experience of modelling thermal energy storage systems	1, 3

	Practical experience of working with thermal energy storage systems including phase change and thermochemical energy storage materials	1, 3
	Experience of developing complex models for heat transfer and fluid flow	1, 3
	Experience of modelling thermal energy systems	1, 3
	Experience of using PIV/LIF	1, 3
	Experience of producing thin film coatings	
	Experience of authoring original work for academic journal papers, conference papers or technical reports for industry	1, 3
Skills and abilities	Ability to assist in teaching of undergraduate or postgraduate students	1, 3
	Working knowledge of a range of software packages and excellent ability in a programming language	1, 3
	Previous experience of successfully undertaking a detailed experimental test campaign and data analysis	1, 3
	Previous experience of model validation and performance of a parametric analysis	1, 3
	Previous experience of producing reports	1, 3
Qualifications	A good honour's degree in Engineering, Physics, Chemistry or Materials Science, or other suitable subject	1, 3

### Conditions of Service

The position is **full time** and **fixed term** until 30 September 2023. Salary will be on Research Grade 6 pay scale, £30,942 to £38,017 per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Academic and Related staff, 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 are available at <http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html>.

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 equality 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/>

### Applications

The closing date for receipt of applications is 29 July 2021.