Research Associate in Novel diagnostic tools and techniques for monitoring and control of Solid Oxide Fuel Cell Stacks
Fixed Term Contract till 30th November 2017

Job Ref: REQ16695

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Solid Oxide Fuel Cells (SOFC) are increasingly emerging as high efficiency devices for the generation electricity and heat from a wide range of fuels. Considerable progress has been made on the development of materials, cells and stacks in recent years, in both the UK and Korea. Korea has world leading expertise in the deployment and scale up of SOFC technologies. The UK has world class expertise in the underpinning science and engineering of SOFC materials and devices. Hence an important focus is now to develop new diagnostic tools and techniques that can be used to understand and control cell and stack performance in real time during operation. The Fuel Cell Group at the Department of Aero & Auto Engineering of Loughborough University have patented a novel sensory systems to undertake the temperature distribution of cells/stacks in real time and in real world applications.

The aim of this project is to further develop this methodology, explore its application to solid oxide fuel cells and stacks in laboratory trials, and work with partners in the UK and Korea to translate the innovation into practice.

This offers the prospect of developing new monitoring and control strategies based around the measurement of performance of individual cells and/or stacks as whole state of health in service, that can be embedded at low cost into the control system of a fuel cell product. The research was motivated by efforts to achieve temperature distribution maps in operating SOFCs to monitor temperature distribution while the stack is operating, a key barrier to understanding SOFC thermal degradation.

Applications are invited to join an exciting new international research project on "Novel diagnostic tools and techniques for monitoring and control of Solid Oxide Fuel Cell stacks". This is a fixed-term until 30 November 2017 and the research project programme funded by EPSRC in the UK, and KETEP in South Korea, working in collaboration with Imperial College London and the University of Lancaster in the UK, and the Korea Institute for Energy Research and POSTECH in Korea. In-situ monitoring of the temperature distribution plays a vital role to this project. The Dr Kim's group at L'boro are seeking a high quality researcher to join the team.

Job Description

Job Grade: 6

Job Purpose:
The post holder will be responsible to carry on experimental and modelling tasks for the project by utilising in-situ thermal sensory systems that have been developed at the Dr Kim's Group. The experimental tasks include modification/advancement of sensors and related DAS and software, currently using LabVIEW. The modelling tasks, currently using COMSOL, for SOFC performance analysis etc are expected to be continued.
The incumbent researcher may be responsible for characterisation of SOFC performance with various cell & operational conditions.

Job Duties

- Undertake generic research and literature reviews into in-situ thermal sensory systems toward SOFC applications.
- To deliver experienced and analytical views on SOFC performances and their characterisations, like EIS.
- To carry out experimental performance tests (accuracy, response time etc) for both the standalone sensors and the sensor attached SOFC cells/stacks.
- To carry out SOFC modelling tasks using COMSOL or other commercial packages, particularly for the system's thermal analysis.
- Develop required software for signal acquisitioning, filtering and processing in order to operate and control the sensory systems using MATLAB and/or LabVIEW.
- System integration and building new test rigs to accommodate various size/shape of SOFC cells/stacks.
- Delivery of sensor prototypes for characterisations and demonstrations for the collaborative partners in both the UK and Korean.
- To maintain detailed records of results and to report on progress verbally, in writing, and through other appropriate media.
- To assist the Principal Investigator in the preparation of agreed publications and deliverables arising from the work.
- Present research at internal and external meetings.
- Complete milestones agreed with line manager in an organized and timely fashion.
- To attend project meetings and present technical information and results using appropriate media.
- The role may have a requirement for travel to South Korea.
- To contribute to the development of dissemination, and educational material arising from the project for use within the project partners, academic community and industry as appropriate.

Other

- To be mindful of and respect the commercial sensitivities in the project
- To participate in relevant professional activities
- To comply with appropriate health and safety requirements
- To be fully conversant with the tools used throughout the project
- To engage in training programmes in the University (e.g. through Staff Development) and elsewhere as required
- Supervisory responsibility for laboratory and its equipment
- To undertake such other duties as may be reasonably requested and that are commensurate with the nature and grade of the post
- Any other duties as may be reasonable required by the line manager
- To conduct all of the above activities to the standards and timescales specified by the School of Aeronautical, Automotive, Chemical and Materials Engineering and the University.

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

Academic Principle Investigator - Dr Jung-Sik Kim

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	Knowledge and understanding of SOFCs and SOFC's performance	1,3
	Knowledge and understanding of temperature sensors	1,3
	Experienced of SOFC performance tests	1,3
	Experience in system, control, computational analysis for SOFC related research	1,3
	Experience in software development for signal control and monitoring, i.e. LabVIEW, MATLAB is preferable	1,3
	Experience in handling flammable gases, e.g. H2, CH4 etc.	1,3
Skills and abilities	An appreciation and understanding of operational requirements and constraints in SOFCs and their performance tests	1,3
	Operational skills of a SOFC test rig with various fuel types	1,3
	Ability to work independently and as part of a cross-disciplinary team	3
	Ability to communicate complex technical concepts and requirements	3
Training	Willingness to undertake training when necessary	3
Qualifications	A 2.1 or higher first degree in engineering, chemistry, mathematics, or material science	1
Other	Evidence a good working knowledge of equal opportunities and understanding of diversity in the workplace	1,3
	Willing to travel in the UK and Korea	3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in thermomechanical modelling/analysis of SOFCs	1,3
	Experience in instrumentation or conducting experiments on SOFC tests, preferably EIS	1,3
	Revising or redesigning of SOFC test rig to accommodate variable experimental conditions	1,3
	Understanding SOFCs operational conditions and their reversible cycles, i.e. SOEC	1,3
	Experience in heat treatment of ceramic materials	1,3
	Experience in doing research related to SOFC degradation	1,3
	Knowledge and understanding of thin film sensors	1,3
Skills and abilities	Strong experimental skills at high temperature environment	1,3
	Ability in performing SOFC modelling	1,3
	Ability to carry on SOFC performance tests & their characterisations	1,3
	Skills for programme coding to deal with large amount of data samples	1,3
Qualifications	An appropriate post graduate qualification in a subject related to SOFCs and SOFC's performance tests	1

Conditions of Service

The position is FULL TIME and on a FIXED TERM until 30th November 2017. Salary will be on Specialist and Supporting Academic Grade 6 £29,301 to £33,943 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/Operational and Administrative 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/

Informal Enquiries

Informal enquiries should be made to Dr Jung-Sik Kim by email at J.Kim@lboro.ac.uk or by telephone on 01509227219

Applications

Applications should be made online. The closing date for receipt of applications is **28 March 2017.**