

## Research Associate in Sustainable Metallurgy

Job Ref: REQ240640

**As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.**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

*The Artificial Intelligence X-ray Imaging for Sustainable Metal Manufacturing project is an ambitious collaborative EPSRC-funded project, combining multi-modal x-ray imaging and artificial intelligence with underpinning microstructural understanding to advance the science for sustainable alloys and enhance metal recyclability. Combining research expertise at Loughborough University, the University of Oxford and STFC, the project aims to bring about positive environmental, economic, and societal benefits and will play an important part in accelerating the progression towards net-zero in the UK and globally.*

### Job Description

**Job Grade:** Specialist and Supporting Academic Grade 6

### Job Purpose

To conduct research in the area of sustainable metallurgy, specifically to research the effect of impurities on the nucleation and growth of intermetallic particles and non-metallic inclusions in commercially important alloys, and how to use additions (both refiners and modifiers) to manipulate their morphology. This will involve the use of a range of advanced characterisation techniques, including electron microscopy and x-ray techniques (both on the laboratory scale and at central facilities), AI-based analysis methodologies for data analysis and the use of molecular dynamics (MD) simulations to estimate the 'modifying' effect of minor additions on intermetallic compound's (IMC) growth by assessing their influence on the solid/liquid interfacial free energy. This will form part of a wider research effort to develop a new, innovative X-ray imaging technique, named Artificial Intelligence X-ray Imaging (AIXI), that combines both hardware advances and artificial intelligence (AI) to investigate the complex dynamics of microstructural evolution during metal solidification.

### Job Duties

- To use existing techniques and develop new methodologies and analysis procedures (including the use of machine learning) to characterise various aspects of microstructure.
- To generate understanding of how additions and impurities control the nucleation and growth of solid phases in metal alloys.
- To explore the use of these additions to increase tolerance of impurities from, e.g., low-grade scrap aluminium and steel feedstock.
- To conduct appropriate computer simulations of intermetallic compounds and their interfaces.
- To conduct research of academic rigour and high scientific standard, of a level suitable for publishing in high-quality journals, consistent with the Schools' and Research Lab's quality and ambition.

- 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.
- Be responsible for conducting the day to day running of the project.
- To keep all other investigators and collaborators, including those located at other institutions, regularly apprised of the progress of the work, including recommendations for next steps.
- To work as part of a multi-disciplinary, multi-location team that addresses different aspects of the wider project aims.
- Travel to external partners and collaborators, attend meetings and make presentations, when required.
- To attend and contribute to conferences.
- To contribute to project promotion and public engagement events.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.
- Engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.
- Undertake other duties as may be reasonably requested 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 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 Dr Simon Hogg, Principal Investigator and Dr Jamieson Christie, Co-Investigator, Department of Materials.

## 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 characterisation and quantification of microstructure in complex metals alloys, both in 2D and 3D using tomography techniques	1,2,3
	Use of advanced analysis and visualisation methodologies to generate quantitative data	1,2,3
	Conducting research of academic rigour and high scientific standard	1,2,3
	Authoring original work for academic journal papers, conference papers or technical reports	1
	Experience presenting to a variety of audiences, from technical and expert to general practitioners	1,2,3
Skills and abilities	Ability to work accurately and precisely and to record information gathered	2,3
	Excellent written and oral communication skills	1,2,3
	Self-motivated with ability to meet deadlines	3
	Excellent interpersonal, and organisational skills	3
	Working knowledge of 3D visualisation and analysis software packages	1,2,3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1,2,3
	Knowledge of relevant Health & Safety issues	1,3
Qualifications	PhD in a metallurgical-based subject	1,3
	Good First Degree in Materials Science, Physics, Mathematics, Computer Science or Engineering (1 <sup>st</sup> or 2.1 equivalent)	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	3
	Willing and able to travel independently and accommodate occasional variable working patterns (for example when attending beam time at central facilities).	3

### Desirable Criteria

Area	Criteria	Stage
Experience	Knowledge and experience in using classical molecular dynamics simulations to understand the connections between the structure and property of materials	1,2,3
	Working in a high-quality academic research environment	1,2,3

	Experience of teaching and / or supervision of students in relevant areas	1,3
Skills and abilities	Experience working at the simulation/experimentation interface	1,2,3

## Conditions of Service

The position is full time and fixed term for 42 months. Salary will be on Specialist and Supporting Academic Grade 6, £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 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/>