UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Machine Learning-Driven Corrosion Modelling in Bio-feedstock Refining, Faculty of Engineering and Physical Sciences

Salary: Grade 7 (£41,064 – £48,822 p.a.)

Reporting to: Professor Richard Barker

Reference: EPSME1206

Closing date: Wednesday 27 May 2026

Fixed term (for up to 34 months with a potential extension for a further 12 months pending industry approval - to complete specific time limited work)

Location: Leeds main campus

We are open to discussing flexible working arrangements

Research Fellow in Machine Learning-Driven Corrosion Modelling in Bio-feedstock Refining,
Institute of Functional Surfaces,
School of Mechanical Engineering.

Do you have a strong technical background in Corrosion, Machine Learning and Numerical Modelling? Are you interested in working with industry to develop Machine Learning methodologies and protocols needed to support the uptake of renewable bio-feedstocks as alternatives to petroleum-based feedstocks in the production of fuel?

Overview of the Role

There are strong economic, environmental, regulatory and geopolitical drivers to replace petroleum-based feedstocks with renewable, bio-based feedstocks in the production of fuel. However, bio-feedstocks have significantly different chemistries than crude oil that may accelerate the corrosion of refinery infrastructure, requiring the development of new knowledge, experimental and theoretical methods to corrosion management. Sponsored by bp and working with an internationally leading team from Imperial College, London (ICL), University College, London (UCL) and the University of Illinois, Urbana-Champaign (UIUC), this project aims to create the fundamental understanding and reliable corrosion prediction tools needed to accelerate the uptake of bio-feedstocks.

This project, based at the University of Leeds, will focus on the development of a range of Machine Learning, AI and optimisation tools and methodologies for bio-feedstock corrosion management, that can accommodate new chemistries and material combinations and predict material performance (corrosion rates, lifespan, operating limits) in refinery operations. This will require frequent interactions with bp and with experimentalists at UIUC, to develop adaptive experimental sampling methods, and with colleagues at ICL and UCL, to implement Physics-informed Machine Learning methods within an overall system modelling software tool.

Main duties and responsibilities

- Using industry knowledge and datasets to create an initial Machine Learning tool for corrosion prediction/assessment via the exploration of multiple Machine Learning and AI methods for data reduction, corrosion prediction and sensitivity analysis;
- Identifying gaps in the datasets to prioritise where new data should be generated and work with UIUC to develop and adaptive sampling methodology to maximise the efficiency of data collection efforts;
- Carrying out multi-fidelity Machine Learning analyses which model discrepancies between experimental and field data and create a methodology for scaling up from laboratory to refinery conditions;
- Implementing a system-level corrosion modelling and optimisation tool, incorporating Physics-informed Machine Learning models developed at ICL and UCL and data generated at UIUC;
- Working with bp to use the tool to create bio-feedstock processing operability diagrams;
- Carefully documenting the methods and results obtained;
- Independently writing reports and delivering presentations to key stakeholders;
- Working within and applying the standard operating procedures, health and safety regulations and quality assurance procedures of the School, Faculty and University;
- Contributing to the training of other researchers, where appropriate.
- Generating and pursuing independent and original research ideas in the appropriate subject area;
- Developing research objectives and proposals and contributing to setting the direction of the research project and team including preparing proposals for funding in collaboration with colleagues;
- Evaluating methods and techniques used and results obtained by other researchers, and to relate such evaluations appropriately to your own research;
- Making a significant contribution to the dissemination of research results by publication in leading peer-reviewed journals and by presentation at national and international meetings;
- Working independently and as part of a larger team of researchers, both internally and externally, to develop new research links and collaborations and engage in knowledge transfer activities where appropriate;

- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate;
- Contributing to the training of both undergraduate and postgraduate students, including assisting with the supervision of projects in areas relevant to the project.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

Qualifications and skills

Essential

- A PhD (or have submitted your thesis before taking up the role) with experience of applying Machine Learning within a science and/or engineering context;
- Strong computer programming skills;
- Experience of developing Machine Learning models of physical systems;
- Knowledge of Physics-Informed Machine Learning methods;
- Good time management and planning skills, with the ability to meet tight deadlines and manage competing demands effectively without close support;
- A developing track record of peer-reviewed publications in international journals;
- Excellent communication skills both written and verbal, and the ability to communicate your research at national and international conferences;
- A proven ability to work well both independently and in a team;
- A strong commitment to your own continuous professional development.

Desirable

- Knowledge of corrosion and corrosion modelling;
- Experience of working on industry-funded projects;
- Knowledge and experience of using Physics-Informed Neural Networks;
- Strong Python programming skills;
- Experience of pursuing external funding to support research.

How to apply

You can apply for this role online; more guidance can be found on our How to Apply information page. Applications should be submitted by **23:59** (UK time) on the advertised closing date.

Contact information

To explore the post further or for any queries you may have, please contact:

Prof Richard Barker, Professor in Corrosion Science and Engineering
Tel: +44 (0)113 343 2206
Email: R.J.Barker@leeds.ac.uk

Faculty and School Information
Further information is available on the research and teaching activities of the Faculty of Engineering & Physical Sciences, and the School of Mechanical Engineering.

Working at Leeds
We are a campus-based community and regular interaction with campus is an expectation of all roles in line with academic and service needs and the requirements of the role. We are also open to discussing flexible working arrangements. To find out more about the benefits of working at the University and what it is like to live and work in the Leeds area visit our Working at Leeds information page.

A diverse workforce
As an international research-intensive university, we welcome students and staff from all walks of life and from across the world. We foster an inclusive environment where all can flourish and prosper, and we are proud of our strong commitment to student education. Within the Faculty of Engineering and Physical Sciences we are dedicated to diversifying our community and we welcome the unique contributions that individuals can bring, and particularly encourage applications from, but not limited to Black, Asian and ethnically diverse people; people who identify as LGBT+; and people with disabilities. Candidates will always be selected based on merit and ability.

The Faculty of Engineering and Physical Sciences are proud to have been awarded the Athena SWAN Silver Award from the Equality Challenge Unit, the national body that promotes equality in the higher education sector. Our equality and inclusion webpage provides more information.

Information for disabled candidates
Information for disabled candidates, impairments or health conditions, including requesting alternative formats, can be found under the 'Accessibility' heading on our How to Apply information page or by getting in touch by emailing HR via hr@leeds.ac.uk.

Criminal Record Information
Rehabilitation of Offenders Act 1974
A criminal record check is not required for this position. However, all applicants will be required to declare if they have any 'unspent' criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our Criminal Records information page.

Salary Requirements of the Skilled Worker Visa Route
Please note that this post may be suitable for sponsorship under the Skilled Worker visa route but first-time applicants might need to qualify for salary concessions. For more information, please visit the Government's Skilled Worker visa page.

For research and academic posts, we will consider eligibility under the Global Talent visa. For more information, please visit the Government's page, Apply for the Global Talent visa.