UNIVERSITY OF SURREY

Job Title:	Research Fellow A

Responsible to:	Prof. Jin Xuan

Responsible for:	Not applicable

Job Summary and Purpose:
To undertake research in accordance with the specified research project(s) under the supervision of Prof. Jin Xuan

Main Responsibilities/Activities
To undertake a range of research activities within a specified research area, assuming responsibility for specific areas of projects and making use of new research techniques and methods in consultation with the research award holder or supervisor. This may include fieldwork, interviews, laboratory experimentation, critical evaluation and interpretation, computer-based data analysis and evaluation or library research.   Using initiative and creativity to identify areas for research, develop new research methods and extend the research portfolio. Analysing and interpreting results of own research. Write up results and prepare papers for submission to appropriate journals, conferences, and other outputs as required and/or appropriate. Attend relevant meetings and conferences for the purpose of disseminating research results on personal development. The post holder may also contribute to writing bids for research grants and contribute to collaborative decision-making with colleagues in research areas.   Continually update knowledge, develop skills, and translate knowledge of advances in the area into research activity.   To plan and manage own research activity in collaboration with others. To carry out administrative tasks associated with specified research funding, for example, risk assessment of research activities, organisation of project meetings and documentation. Implementation of procedures required to ensure accurate and timely formal reporting and financial control.   To contribute to teaching in the Faculty by carrying out student supervision and/or demonstrating within the post holder's area of expertise and under the direct guidance of a member of departmental academic staff, as appropriate.   The post holder may occasionally be required to supervise more junior research staff.

Person Specification
The post holder must have:
A doctoral degree in a relevant discipline (although individuals who have almost completed a doctoral degree may be appointed). Consideration may also be given to individuals who do not hold a doctoral degree but have required skills based on a number of years of experience in specified / relevant fields.
The post holder will have authority over some aspects of project work and must be capable of providing academic judgement, offering original and creative thoughts and be able to interpret and analyse results.

Relationships and Contacts
Direct responsibility to the principal investigator or academic supervisor. The post holder may be asked to serve on a relevant Faculty committee. There may be additional reporting and liaison responsibilities to external funding bodies or sponsors. The post holder may work on original research tasks with colleagues in other institutions.

Special Requirements
To be available to participate in fieldwork as required by the specified research project

All staff are expected to:

- Positively support equality of opportunity and equity of treatment to colleagues and students in accordance with the University of Surrey Equal Opportunities policy.

- Help maintain a safe working environment by:

  - Attending training in Health and Safety requirements as necessary, both on appointment and as changes in duties and techniques demand

  - Following local codes of safe working practices and the University of Surrey Health and Safety Policy

- Undertake such other duties within the scope of the post as may be requested by your Manager.

Addendum to Role Profile

Job Title:	Research Fellow (1A)

Job Summary and Purpose:

This information sheet should be read in conjunction with the accompanying generic Research RA1A Role Profile and will be used for shortlisting processes. More specifically, the post holder will be expected to:

Become a research team member in the School of Chemistry and Chemical Engineering, to work on an EPSRC-funded project on the Digital Circular Electrochemical Economy (grant number EP/V042432/1) which aims to accelerate the transition of the chemical industry to net zero carbon through circular approaches and electrification of processes. The project is led by Imperial College London, in collaboration with Surrey, Loughborough University and Heriot-Watt University. The focus for this research post is the development of digital twins with online self-optimisation functionality for electrochemical processes to achieve sustainable production of chemicals from renewable feedstocks such as captured CO_2. Details of the project could be found from the link: https://gow.epsrc.ukri.org/NGBOViewGrant.aspx?GrantRef=EP/V042432/1

The team requires a dedicated researcher to develop both physics-based and data-driven models for the electrochemical process, and to apply advanced AI/machine learning techniques to achieve self-optimisation using the models as kernels, and preserving the underlying physico-chemical constraints. The generated digital twin will be designed to adaptively optimise in response to varying operating conditions and wider sensitivities (such as energy pricing) in a virtual industrial environment.

Main Responsibilities/Activities

The candidate will:

- Develop and conduct physics-based and data-driven simulations of electrochemical processes for CO_2 conversion and utilisation, and apply advanced AI/ML techniques to achieve self-optimisation.

- Work closely with Prof. Valerie Pinfield (Co-I of the work package) at Loughborough University to conduct experiments for model validation.

- Perform critical analysis of the results and report to consortium regular updates.

- Perform extensive literature review to keep up-to-date with the research progress in the field

- Write scientific papers for publication.

- Be fully engaged with all consortium activities as required by the grant conditions and consortium agreement. This will involve scientific exchanges, meetings and outreach within the UK, and travel outside the UK (conferences, courses, meetings).

- Assist in the production of intellectual property and/or high-impact papers for the benefit of both team members and the University of Surrey;

- Assist with the supervision of students in the group (postgraduate, undergraduate, and overseas visitors).

Person Specification

The post holder must have:

Essential

- A PhD in Engineering, Physical Sciences, Computer Science, Mathematics or other related disciplines.
- Research experience in model development and simulation preferably for chemical processes.
- Experience of coding and programming preferably for science and engineering applications.
- Understanding of the techniques and application of machine learning (or optimisation) methods in engineering and the physical sciences.
- A demonstrable ability to undertake research, contribute original ideas, critically analyse information/data and to draw evidence-based conclusions.
- Relevant experience in an academic research environment or equivalent industrial experience.
- Ability to coordinate project activities, manage project tasks, prioritise and meet deadlines.
- Ability to work independently and also as part of a team.
- Experience of presenting research findings at all levels, adapted to specific audience needs, ranging from academic experts to general public.
- Excellent written and oral communication skills, demonsrated by writing project reports, peer-reviewed publications and making presentations to academic and industrial research groups.
- Skills in finding information in the scientific literature and proposing original ideas.

Desirable

- Coding skills in Python and Matlab, preferably including experience in open-source languages and platforms such as Python.
- Expertise in machine learning techniques for reduced order modelling, optimisation, physics-informed data-driven modelling and digital twins.
- Experience in modelling electrochemical processes, e.g., water electrolysis.
- Knowledge on electrochemical CO_2 reduction processes, including principles, challenges and advanced modelling.
- A whole system view on the wider energy and chemical sectors, and their decarbonisation roadmaps.
- Experience in supervising junior members (e.g. PhD students).
- Writing research proposals for funding from internal/external sources.
- Willingness to work collaboratively with project partners in different organisations and locations.

Relationships and Contacts

The post holder will be supervised by Prof. Jin Xuan and will be expected to work with the other internal/external team members, e.g., Dr. Lei Xing at the University of Surrey and Prof. Valerie Pinfield at Loughborough University, and the project consortium members and collaborators on the DCEE project.