PhD Studentship in Characterisation of Advanced Batteries

Vacancy Information

The Department of Chemical Engineering at University College London (UCL) is seeking a graduate student to work on advanced battery characterisation. The project will be centred on improving understanding of the fundamental performance and degradation of these devices by using and developing new diagnostic tools. This understanding will be used to optimise the design of materials and devices for enhanced performance, durability and safety.

The project is in collaboration with the National Physical Laboratory (NPL) and will also benefit from unique access to this world leading facility.

Person Specification

The candidate will have or be expected to obtain a first degree in chemical engineering, chemistry, materials science, physics or an associated discipline. The ability to work in an interdisciplinary environment using experimental and modelling research tools is expected. Effective written and verbal communication, good time-management and the ability to work in a team are essential.

Eligibility

Please note that due to funding restrictions the post is open to UK/EU citizens only. Further details about the studentship are available at the bottom of this page.

The successful applicant must hold (or soon be expecting to obtain) a 1st, 2:1 (and/or M.Sc.) in a relevant scientific or engineering discipline (e.g. chemical engineering, chemistry, physics, materials) and be a UK or EU citizen.

The closing date for applications by email is 31st May, however the position will be filled as soon as a suitable candidate is found. Please apply through the Prism Portal: https://www.prism.ucl.ac.uk/#/?!?project=222

Primary Ph.D. supervision will be performed by Dr. Paul Shearing and Prof. Dan Brett at UCL and Dr. Gareth Hinds at NPL.

About the Electrochemical Innovation Lab

The Electrochemical Innovation Lab (EIL) is an internationally leading hub for research in electrochemical science and engineering. The EIL’s approach is to embody scientific, engineering and commercial thinking in the research phase. In this way the EIL identifies commercial opportunities early, considers the engineering and commercial implications of the science and builds research programmes to accelerate the science into commercial products.

The EIL is very well equipped with a range of fabrication, test and analysis equipment, providing one of the best research environments for electrochemical technology development in the world.

www.ucl.ac.uk/electrochemical-innovation-lab

About NPL

The National Physical Laboratory (NPL) is the UK’s National Measurement Institute, and is a world-leading centre of excellence in developing and applying the most accurate measurement standards, science and technology available.
NPL’s multi-disciplinary Electrochemistry team undertakes ground-breaking research in measurement and modelling of electrochemical processes. For example, the development of innovative in-situ measurement techniques and modelling tools for electrochemical energy conversion and storage devices such as Li-ion batteries is facilitating design optimisation and improved efficiency and durability.

Closing Date: 31st May or when the position is filled

MAIN PURPOSE
Li-ion batteries have revolutionised modern life, and will continue to shape the way we live, from advanced batteries for automotive applications, to off grid micro-generation systems to power our homes. In the coming years, the demanding applications proposed for advanced batteries span mW to MW applications, with various requirements to operate under extremes of temperature and pressure. Recent high profile failure events highlight the requirement for improved understanding of failure through enhanced test procedures for increasingly energy dense materials. This safety qualification will help to reduce the incidence of mission critical failure, and costly recalls.

In this project, we will build upon our extensive experimental work in electrochemical, thermal and X-ray characterisation of advanced batteries, and develop and demonstrate new acoustic diagnostic tools. This multi-modal diagnostic and characterisation approach will offer the most comprehensive view of battery degradation and failure to date.

The development of safe, low cost, high durability energy storage is one of the great research challenges of the 21st Century, and this combined package of novel metrology tools is expected to contribute to the development of new standards for battery safety qualification, which can be applied internationally for a range of battery applications and chemistries.

DUTIES AND RESPONSIBILITIES
• To carry out experimental research in the field of battery characterisation
• To develop and apply new experimental research methods to characterise battery degradation and failure
• To collaborate with a within a large research team
• To spend time at NPL as the requirements of the project dictate.
• To travel and visit collaborators as necessary.
To prepare and present research findings to colleagues for review and collaboration purposes.

To contribute to the drafting and submission of articles to appropriate peer reviewed journals and progress reports as required.

To contribute to the overall activities of the research team and department as required.

The successful candidate will carry out any other duties as are within the scope, spirit and purpose of the post as requested by the line manager or Head of Department/Division.

The successful candidate will actively follow UCL policies including Equal Opportunities and Race Equality policies.

The successful candidate will maintain an awareness and observation of Fire and Health & Safety Regulations.

PERSON SPECIFICATION

Knowledge and Qualifications

**ESSENTIAL:**
- Have or be expected to obtain a first degree in chemical engineering, chemistry, materials science, physics or associated discipline.

**DESIRABLE:**
- Knowledge of electrochemical devices including fuel cells and batteries
- Knowledge of materials characterisation and imaging techniques

Skills

**ESSENTIAL:**
- Proficiency in conducting scientific experiments.
- Ability to analyse, develop and solve open-ended research problems.
- Ability to manage time and work to deadlines.
- Effective written and verbal communication skills (in English).

**DESIRABLE:**
- Ability to present complex information effectively to a range of audiences.
- Willingness to work at interdisciplinary boundaries.
- Ability to interact with technical staff efficiently in order to achieve objectives.

Experience

**ESSENTIAL:**
- Prior experimental research experience.

**DESIRABLE:**
- Experimental experience in fuel cells, batteries or other electrochemical technology.
Experience of imaging techniques

**Personal Qualities**

**ESSENTIAL:**
- Commitment to the highest quality research.
- Ability to take initiative, and make independent contributions to research.
- Commitment to UCL’s policy of equal opportunities.
- Ability to interact with others in a friendly and constructive way.
- Commitment to health & safety and the well-being of the research team.