Title: Battery Characterisation for the Development of an Electric Vehicle Circular Economy

Type of award PhD Research Studentship

Department Mechanical Engineering,

Scholarship Minimum £16,062 p.a. subject to confirmation of award

Duration 3.5 years

Eligibility Home (UK) and EU citizens who have confirmation of UK settlement or pre-settlement status under the EU Settlement Scheme.

Start Date 1 October 2022

PhD Topic Background/Description

What is next for an electric vehicle battery, once degraded and no longer fit for purpose? Disposal? This directly contradicts the ethos of a circular economy. Recycling? This exerts enormous pressure on battery recycling and intensifies energy consumption across battery lifetime.

Electric vehicles require high-performance batteries. Batteries deteriorate with use as they reach the end of their ‘first-life’, meaning they are no longer suitable for electric vehicle powertrains. However, they are still useful in other applications, such as stationary energy storage to work alongside wind farms or solar panels. Redeployment of batteries in ‘second-life applications’ will reduce strain on recycling processes and reduce the lifetime carbon footprint of batteries.

In this PhD, you will develop methods to optimise the redeployment of degraded batteries in second-life applications. You will implement state-of-the-art analytical techniques to evaluate datasets from real-world electric vehicles and build a thorough understanding of battery degradation mechanisms. You will lead experiments to investigate how first-life usage characteristics (e.g. climate, fast-charging, driving style) affect the battery’s performance in its second-life. You will answer questions such as: “For an electric vehicle battery used primarily during winter, should a second-life application be in warm or cool climates?”

Your work will contribute to developing second-life battery characterisation techniques which are sorely lacking in our research field today. The rate at which electric vehicle batteries reach the end of their first-life will increase exponentially for the next decade, as such your contribution will be timely. Expect to work with leading academic and private sector organisations in the UK and global battery industry, and to collaborate closely with members of the Faraday Institution.
Further Particulars

Candidate Requirements
Applicants must hold/achieve a minimum of a master’s degree (or international equivalent) in a science, mathematics, or engineering discipline. Applicants without a master’s qualification may be considered on an exceptional basis, provided they hold a first-class undergraduate degree. Please note, acceptance will also depend on evidence of readiness to pursue a research degree.

If English is not your first language, you need to meet this profile level:
Profile E
Further information about English language requirements and profile levels.

Basic skills and knowledge required.
No prior expertise in electrochemistry is required. A willingness to develop experimental techniques is essential and prior knowledge of a common coding language such as Matlab or Python is desirable.

Scholarship Details
Stipend at the UKRI minimum stipend level (£16,062 in 2022/23). The scholarship will also cover the amount of tuition fees associated with UK-based students. Funding is subject to eligibility status and confirmation of award.

Open to UK students who have been ordinarily resident in the UK for at least 3 years prior to the start date of their programme. Also open to EU applicants who have no restrictions on how long they can stay in the UK and have been ordinarily resident in the UK for at least 3 years prior to the start of the studentship (with some further constraint regarding residence for education).

Informal enquiries
For informal enquiries, please email Dr Alastair Hales, a.hales@bristol.ac.uk

For general enquiries, please email came-pgr-admissions@bristol.ac.uk

Application Details
To apply for this studentship, submit a PhD application using our online application system [www.bristol.ac.uk/pg-howtoapply]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Mechanical Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor Dr Alastair Hales.

Closing date for application: 5 September 2022