Title: Development of the Next Generation of Battery Model Parameterisation Techniques

Type of award  PhD Research Studentship
Department  Mechanical Engineering
Scholarship  Minimum £15,609 p.a. (2021/22) 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  October 2022

PhD Topic Background/Description
In this PhD, the student will develop the next generation of experimental techniques used to parameterise battery models. Models are used across the battery industry to replicate the expected operational performance of their physical counterparts, yet they are fundamentally limited by the accuracy of their input parameters. These input parameters are found through ‘parameterisation’ experiments. It is becoming increasingly apparent that parameterisation experiments are not fit for purpose, they are inaccurate and time/cost expensive. Waiting months to parameterise a battery model which you do not trust is a luxury that modern engineering companies cannot afford.

The motivation for the PhD is simple to summarise. Temperature affects every aspect of battery performance, yet the existing state-of-the-art parameterisation experiments confine temperature as a poorly controlled constant. You will lead the development of methods which use temperature as a well-controlled variable, and in doing so you will add an additional dimension to the parameters which define the performance of every battery model. The battery industry is expected to triple in size before 2030. Your contributions will be critical as transport and energy storage is electrified throughout the first half of the 21st century.

You will begin with an experimental evaluation of the established battery model parameterisation techniques, before developing your own methods which focus on the use of advanced thermal control and transient thermal conditions. Alongside experimental work, you will develop your own understanding of battery model design and operation. Work will involve interaction and collaboration with a close-knit community of UK-based battery researchers, and you will have opportunities to travel to other institutions and conferences in the UK and beyond, to further your learning and ultimately present your key findings.

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](https://www.epsrc.ac.uk/skills/students/help/eligibility/).

**Basic skills and knowledge required.**
Knowledge of computer-based design software (e.g. AutoDesk) and common coding languages (e.g. Python) is welcome but not essential. No prior expertise in electrochemistry is required.

**Scholarship Details**
Stipend at the UKRI minimum stipend level (£15,609 in 2021/22). 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).

Candidates can check the eligibility criteria for the award at [https://www.epsrc.ac.uk/skills/students/help/eligibility/](https://www.epsrc.ac.uk/skills/students/help/eligibility/)

**Informal enquiries**
For informal enquiries, please email Dr Alastair Hales, [a.hales@bristol.ac.uk](mailto:a.hales@bristol.ac.uk)

For general enquiries, please email [came-pgr-admissions@bristol.ac.uk](mailto:came-pgr-admissions@bristol.ac.uk)

**Application Details**
To apply for this studentship, submit a PhD application using our [online application system](http://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 December 2021