Modelling and understanding battery performance due to changes in the manufacturing processes
PhD

**Funding:** Funded for UK/EU candidates for 3 years  
**Supervisors:** Dr Dhammika Widanalage and Dr Emma Kendrick  
**Start Date:** 1st October 2018

**Project overview**

This is a challenging and unique PhD opportunity for a student with a good mathematical background interested in applying the knowledge to a rapidly growing area: battery manufacturing. This growth is driven by the need for transport electrification and UK is strengthening this capability through initiatives such as the [Faraday Institution](https://www.faraday.ac.uk) and [UK Battery Industrialisation Centre](https://www.batteryindustrialisationcentre.com).

Mathematical modelling of batteries is critical, for the success of such initiatives, as they allow advanced energy storage systems to be designed. The modelling approaches are however varied, as batteries are multi-scale and multi-physics devices. In order to predict system level performance therefore requires validated models and reliable parameters, but the model parameters are intrinsically related to the battery materials, which in turn are related to the manufacturing processes involved. How these manufacturing processes affect and relate to the model parameters is not well understood and is an open research problem, which this PhD will address. The research will therefore allow influencing of the manufacturing processes to improve system level performance rather than influencing when at an individual cell stage.

By joining [WMG](https://www.wmg.ac.uk), you will be well situated to verify and couple the modelling research with experimentation as WMG has access to excellent facilities for battery development and cell manufacturing. The research complements the Faraday Challenge activity and you will have the opportunity to work and interact with other PhD students working on the Faraday Challenge.

A background and skill set in the following are desired, upon which you will build, to carry out the PhD research successfully: mathematical modelling of dynamical systems (ODE and PDEs), identifiability of model parameters, optimisation, battery characterisation, manufacturing methods and performing experiments to validate model predictions.

**Eligibility and desired qualities**

We are actively seeking an enthusiastic individual to join the team at WMG, Warwick with the following entry requirements and expectations:

- A 1st or 2.1 undergraduate (BEng, MEng) and/or postgraduate masters’ qualification (MSc) in a science and technology field: Engineering, Mathematics, Computer Science or Physics
- An understanding and experience in modelling battery energy storage systems
- Validate modelling theories by manufacturing batteries and performing experimentation
- A passion and enthusiasm to challenge the state of the art in an exciting new technology application space.

**Funding:**

Due to funding regulations this project is open to UK/EU students only.
This position provides an attractive tax-free stipend of £14,553 per annum for 3 years.

To be eligible for this project, the successful applicant should have indefinite leave to remain in the UK and have been ordinarily resident here for 3 years prior to the project start-date, apart from occasional or temporary absences. Additional information about this is available on the EPSRC website.

**Application Process:**
Informal enquiries can be addressed to Dr Dhammika Widanalage and Dr Emma Kendrick in the first instance.

Please ensure you meet the minimum requirements before filling in the online form. The information supplied will then be sent for review to assess your suitability and interviews will be conducted. As part of the application, please supply your CV, grades and qualifications (achieved and/or expected), and a project plan and/or personal statement on why you think you should be considered for this position to Dr Dhammika Widanalage. Written references do not need to be supplied but may be sought after shortlisting with your permission. The awardee will however be required to supply satisfactory references at the acceptance stage.

**To apply:**
If you would like to be considered for this position or have any questions please complete our online enquiry form.