Integrated electronics and sensors in lithium ion batteries
PhD

Funding: EPSRC funded for 3.5 years (UK student)
Supervisors: Dr Rohit Bhagat
Start Date: As soon as possible

Project overview
An exciting opportunity to work as part of our Electrochemical Engineering research group at WMG, University of Warwick, for the duration of your PhD.

This PhD is associated with the Energy Research Accelerator (ERA) is a cross-disciplinary energy innovation hub which brings together capital assets, data and intellectual leadership to foster collaboration between academia and business to accelerate the development of solutions to the global energy challenge. It will provide new buildings and cutting-edge demonstrators, develop highly skilled people and jobs, as well as new products and services to ultimately transform the UK’s energy sector. Building on existing programmes and academic expertise across the partnership, universities within ERA have committed over £2m for doctoral students as a critical part of the ERA skills agenda. Delivered through Innovate UK, the government has committed an initial capital investment of £60m, and ERA has secured private sector co-investment of £120m. ERA’s initial priorities of Geo-Energy Systems, Integrated Energy Systems and Thermal Energy will help deliver the new technologies and behaviours that will open the avenues for its future development and demonstrate the transformative effect ERA can have across the energy spectrum.

Through the Midlands Energy Consortium (MEC), Midlands’ universities have already worked closely to deliver essential research and postgraduate skills – clustering energy research and development to deliver technologies capable of enabling the UK’s transition to a low-carbon economy. ERA is the next step along that journey to become a major hub for energy talent. ERA is a key programme within Midlands Innovation – a consortium of research intensive universities which has the overall aim of harnessing the Midlands’ combined research excellence and industry expertise to play a critical role in tackling some of the biggest challenges facing the UK.

Project Overview:

Lithium batteries are seeing increasing utilisation in our everyday lives. Furthermore, lithium batteries are playing a key role in vehicle electrification. These commercial batteries are manufactured to a high specification making the cell to cell variation very small. These cells are then assembled in automotive battery packs. The understanding of these battery packs is immature and so to improve understanding we developed ‘smart’ commercial lithium batteries by integrating sensors (stain, thermocouple, optical fibres and reference electrodes). These smart cells once integrated into battery packs give real time information allowing an unparalleled understanding. Furthermore, they may be used to investigate fast charging protocols and ageing.

We seek a talented individual to join our Group and work on instrumentation of commercial cells. The applicant will be expected to become familiar with integrating sensors into live lithium cells. Furthermore, the applicant must be able to contribute to some of the following objectives:-

Objectives:
• Look to integrate new types of sensors into lithium batteries.
• Design and develop PCBs with several sensing and communication functions.
• Determine the best way to fast charge a particular commercial lithium cell.
• Develop wired and wireless communication methods with the sensors inside cells.

Requirements:
Candidates should have a strong interest in electronics with lots of hands on experience in job or as a personal hobby. Also a minimum of an upper second (2.1) honours degree (or equivalent) in a relevant discipline. Experience of lithium batteries is desirable but not required.

For funding requirements the applicant should be eligible as a UK student. A stipend of £14,296 will be paid per annum for 3.5 years.

Recruitment to the project is subject to available funding for the project at the time of recruitment.

To apply
To apply please complete our online enquiry form and upload your CV.