Modelling Li-S Batteries

Project Description

Rechargeable Li-ion batteries are most commonly used to power the modern-day electronics. Theoretically, Li-S batteries could provide much higher gravimetric energy density and potential alternatives to Li-ion batteries for applications where weight is critical; however, the large-scale commercialisation is hindered by the technological advancements. Current modelling studies of Li-S systems are largely limed to 1D models, and there are very few examples of image-based modelling in the literature. Under this project, we would look to build the foundation of continuum modelling of Li-S batteries, based on X-ray computed tomography (CT) imaging data sets. This would develop a strong cross-functional battery modelling skills applicable to both traditional Li-ion and next generation batteries. Also, we aim to enhance students' knowledge about the novel characterisation techniques such as X-ray CT and introduce them to image-based modelling techniques. Finally, the knowledge gained through this project could be disseminated via posters, blogs and/or in the form of newsletters.

Due to the ongoing COVID-19 situation, the entire project will be running remotely, unless the existing restrictions are removed.

Project Goals

In conducting the project, you will gain a wider knowledge of the lithium-sulfur battery and gain an introduction to the use of finite element analysis and COMSOL software. You will be supported by leading academics to perform one-dimensional modelling of the charge and discharge cycle of Li-S batteries. Following this, you will apply this knowledge to an image-based model using real-world battery structures that you will obtain through the segmentation of X-ray tomography data.

Eligibility

In order to partake in the project you must be:

- A full-time registered undergraduate student at a UK university
- Undertake the internship within the years of undergraduate study (i.e. not be currently in your final year)

Funding

A salary of £9.30/hour across the UK or £10.75/hour in London will be provided. This will be determined by the working address of the appointee not the universities location. The internship is a full-time role for 8 weeks beginning in early July. The funding is provided by The Faraday Institution.

Deadline

Please send you CV and a brief cover letter to rhodri.jervis@ucl.ac.uk by June 1st

For project information, please visit www.listar.ac.uk