

The interplay between copper current collector reactivity and lithium dendrite growth on graphite anodes

Project Description

Lithium-ion batteries (LIBs) are considered as the most promising candidates to enable electromobility with a reasonable driving range at an affordable cost, largely due to their high energy density and long lifetimes. Graphite is the most common anode material in commercial LIBs.

The deposition of lithium metal dendrite on graphite anodes is a severe aging mechanism and one of the main safety concerns in LIBs. It was widely demonstrated that lithium dendrite growth on graphite is governed by charging rate, temperature and end-of-charge voltage. Moreover, the electrochemical stability of copper current collectors is known to affect battery degradation. However, better understanding of the interplay between copper current collector reactivity, graphite anode passivation and lithium metal deposition is needed.

The project will consist of a literature review, analysis of an experimental data that will be provided by the supervisor and a battery design exercise.

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-ion battery electrochemistry, electrochemical experimental techniques (chronopotentiometry, cyclic voltammetry and impedance spectroscopy) and data analysis. The desired outcomes of the project are a poster summarizing the data analysis and a tool that will be used to estimate the effect of battery materials optimization on cell performance.

As part of The Faraday Institution's 2020 intern cohort you will enter an end-of-project poster competition – the winners of which will be invited to present their poster at the Faraday Institution Conference in November 2020.

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 your two page CV and a no more than one page cover letter to sm2383@cam.ac.uk by 8 June.

For project information, please visit <https://faraday.ac.uk/research/lithium-ion/extending-battery-life/>