

Fully Funded Faraday Undergraduate Summer Experience (FUSE) Internship Program: A Techno-Economic Analysis of Polyanion vs Oxide Cathode Materials for Lithium-Ion Batteries

Project Description and Goals

In the automotive industry, lithium-ion batteries will enable the transition from internal combustion engines (ICEs) to zero-emission fully-electric vehicles (BEVs). However, today the battery pack in a BEV accounts for over a third of the total cost, making an BEV typically more expensive than an ICE. To successfully transition to cleaner vehicles, cost parity must be reached. It is the cathode that constitutes the biggest mass and cost component of a lithium-ion battery pack, as well as being a performance bottleneck. As the demand for batteries grows, so does public pressure for cathode manufacturers to move away from using raw materials such as cobalt that are associated with human rights or environmental violations. Modelling the cost and performance trade-offs between stable polyanionic species and less stable but higher capacity counterparts is key to guiding the industry's approach to materials development.

This project will provide techno-economic analysis related to current market leading materials along with potential future cathode technologies, guiding the way for advances in cathode materials development. In this project you will:

- Contribute to research of significance to both academic researchers and industrialists
- Develop your knowledge of battery research through joining the FUSE cohort and attending masterclasses and training
- Become a member of the Faraday Institution FutureCat project on next generation cathode materials, enabling you to join meetings discussing cutting edge research

This is a fantastic opportunity for anyone with a keen interest in battery research and development, to learn advanced techno-economic analysis approaches in order to develop a deeper understanding of the challenges in the field.

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

Supervisory Team

Dr Samuel Booth (FutureCat Project Leader, Research Associate)
Chemical & Biological Engineering, University of Sheffield ([link](#))

Megan Wilson (Senior Research Analyst)
Exawatt, Sheffield ([link](#))

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 university's location. The internship is a full-time role for 8 weeks beginning in early June. The funding is provided by [The Faraday Institution](#).



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NEXT GENERATION LI-ION CATHODE MATERIALS

Opportunities

During the term of the project, you'll also be able to attend Faraday Masterclasses, and FUSE cohort events focusing on a variety of topics to further develop your understanding of career opportunities in battery research. At the end of the programme, you'll be invited to participate in a Faraday Institution event to share a poster on your work with UK battery researchers and industry partners. Prizes will be awarded.

The proposed start date is **1st June** with a potential end date mid-August, but there is flexibility and the exact dates can be agreed with the supervisory team.

Next steps

If you have any queries contact Dr Sam Booth at futurecat@sheffield.ac.uk

Complete this form by Tuesday 4th May: <https://www.surveymonkey.co.uk/r/Techno-Economic> or use the QR code below.

For Project information please go to <https://futurecat.ac.uk>



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