Project title: Energy dense supercapacitors using novel electrode materials

Project ID (optional):

Accept all year-round applications

Funding information: If you are a home (UK) student please contact the academic below to discuss possible funding options. Unfortunately, at this time we do not have funding for international applicants but would be happy to consider applications from international candidates who have secured their own sponsorship or are self-funded.

Project description:

Overview

Lithium-ion batteries (LIBs) are predominantly used in applications where the energy demand is high. While LIBs offer high energy densities, they suffer from issues such as high cost, limited cycle life, thermal runaway, and extensive use of mineral resources. Supercapacitors have emerged as energy storage solutions for high power applications such as starting car engines and kinetic energy recovery systems. Supercapacitors can be made cost-effective, offer high cycle life, are safer than LIBs, and do not rely on the heavy use of minerals. However, supercapacitors currently available in the market are made of activated carbon electrodes and offer lower energy densities than LIBs, limiting their use for high-energy applications like electric vehicles (EVs).

This project aims to develop supercapacitors with high energy density by using a new family of materials called “MXenes” which offer about ten times higher energy storage performance than activated carbon. This project generates the technical understanding needed to develop supercapacitors that are efficient, cost-effective, and reliable, making them attractive for a range of applications such as EVs. This is expected to decrease the environmental impact of using fossil fuels and reduce carbon footprint, helping to achieve the UK’s Net Zero target by 2050.

During your PhD journey, you will gain practical skills needed to drive forward innovation in designing the next-generation energy storage systems using novel materials. We invite you to apply for this exciting PhD programme.

Eligibility Criteria

You must have, or expect to gain, a minimum 2:1 Honours degree or international equivalent in a subject relevant to the PhD project (chemical, materials, or electrical engineering). Enthusiasm for research, the ability to think and work independently, excellent analytical skills and strong communication skills are also essential.

Applicants whose first language is not English require an IELTS score of 6.5 overall with a minimum of 5.5 in all sub-skills. International applicants may require an ATAS ([Academic Technology Approval Scheme](https://www.gov.uk/guidance/academic-technology-approval-scheme)) clearance certificate prior to obtaining their visa and to study on this programme.

Application enquiries:

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