The Development of Graphene and 2D material based Super-Capacitors and their Applicability for Battery Hybrid Power Systems

PhD

Funding: £17,553 for 4 years
Supervisor: Dr Emma Kendrick
Supporting company: Thales UK
Start Date: As soon as possible

Project overview

The University of Warwick and Thales UK are seeking a top class candidate to undertake a case studentship at WMG, University of Warwick. You will be based at The University of Warwick, with a work placement at Thales Research and Technology in Palaiseau near Paris, France and have unrivalled access to some of the best teaching and industrial expertise in the world. This opportunity also provides a substantial tax free stipend equivalent to many graduate jobs.

A constant challenge for products across the Thales group is volume, weight and power. Numerous Thales products require smaller, lighter energy storage solutions, which must have higher energy density and power to meet the power demands of the system. Supercapacitors offer good solutions for these high power requirements, and this technology is applicable to many applications such as masts in particular but also the technology is likely to be equally applicable to the Space, Land and Air Systems and Ground Transportation Systems domains.

Research by Thales Research and Technology (TRT) in Palaiseau, France, has shown that novel graphene electrodes can vastly enhance the energy density of capacitors. TRT has a leadership in the field of depositing carbon nanomaterials for different applications such as sensors, supercapacitors and memories devices. This PhD will exploit the new facilities, for pre-industrial fabrication of electrodes with nanomaterials, at Thales Research and Technology site in Palaiseau, and combine with WMG’s expertise in electrode and cell prototype manufacturing.

The aim of this PhD is to perform research based upon the initial studies at TRT, and to investigate manufacturing, process technologies and the resulting electrochemical performances of prototype supercapacitors. The effect of production processes on the performance of devices will be assessed. The effect on performance of different capacitor form factors and packaging will also be investigated. A series of supercapacitors, containing graphene and other 2D materials, will be built and tested to assess their suitability for use in a potential maritime mission systems product.

Applicability:
This PhD aims to address three areas;

- Understanding of the effects of production processes on various supercapacitor form factors
- Industrialization of graphene and other 2D material supercapacitors
- Understanding of applicability of supercapacitors to hybrid capacitor/battery energy storage systems

Qualifications:
Candidates should have a minimum of an upper second (2.1) honours degree (or equivalent) in chemistry, chemical engineering, or physics.
Attributes:
- High levels of innovative thought and lateral thinking
- Excellent analytical and reporting skills
- Excellent communication skills
- Strong computer skills and the ability to learn new software quickly
- Self-motivated, capable of working with minimal guidance and supervision, and within a team.
- Enthusiasm for the subject

Funding:
Due to funding regulations this project is open to UK/EU students only.

This position provides an attractive tax free stipend for 4 years with a £3,000 industrial top up, totalling £17,553.

To be eligible for this project the successful applicant should have indefinite leave to remain in the UK and have been ordinarily resident here for 3 years prior to the project start-date, apart from occasional or temporary absences. Additional information about this is available on the EPSRC website.

To apply
If you would like to be considered for this position or have any questions please complete our online enquiry form.