



## PhD Studentship in Hierarchical carbon-fibre reinforced polymer (CFRP) composites utilising graphene nanoflakes

Applications are invited for a funded PhD studentship tenable in the Faculty of Computing & Engineering at the Jordanstown Campus. Please note that a faculty reorganisation is underway at Ulster and this studentship will be based within the new structure in the Faculty of Computing, Engineering and the Built Environment.

### Project Summary:

Carbon fibre reinforced polymer (CFRP) composites have gained great importance as lightweight materials in many applications in space, aerospace, automotive and renewable energies. However, the weak out of plane mechanical properties of CFRPs may lead to failures such as delamination or matrix cracking. Another shortcoming is related to the loss of electrical conductivity of the fibre, when surrounded by the resin matrix.

The project aims to improve the properties of current CFRPs and impart multifunctionality by growing graphene nanoflakes (GNFs) on the surface of carbon fibres to make composite materials with hierarchical interface structures. The presence of graphene nanoflakes (*Shang et al. Adv. Funct. Mater.* 18 (2008) 3506; DOI: 10.1002/adfm.200800951) at the fibre surface is likely to enhance the fibre/matrix interfacial strength, thus improve the delamination resistance. The specific objectives of the project are:

- (i) Investigate the growth of graphene nanoflakes, using plasma enhanced chemical vapour deposition, and the effect of GNF growth on carbon fibre strength.
- (ii) Understand the wetting behaviour of the GNF with the polymer matrix.
- (iii) Examine the electrical properties of the composite material.

This project is a collaboration between Ulster University and Queen's University of Belfast. The research student will receive training and will use state-of-the-art facilities in the Engineering Research Institute (ERI) and Northern Ireland Advanced Composites and Engineering Centre in Belfast (NIACE). S/he will work as part of a larger project research team of established researchers and PhD students working in advanced materials and composites engineering at Ulster and QUB. The project is supported by the Air Force Office of Scientific Research (AFOSR). The candidate applying for this PhD project should have interest in aspects related to nanomaterials (e.g. properties, characterization, synthesis etc.) as well as polymer composites (fabrication/processing and mechanical/electrical characterization). Applications are encouraged from graduates with a Materials Science, Electrical, Mechanical Engineering, Chemistry or Physics background.

### Entrance Requirements:

Candidates should have ordinary EU residence and should hold a first or upper second class honours degree in Engineering, Physical Sciences, or a cognate area. Applications will be considered on a competitive basis with regard to the candidate's qualifications, skills experience and interests. Successful candidates will enrol on 1st October 2017, on a full-time programme of research studies leading to the award of the degree of Doctor of Philosophy.

The studentship will comprise fees together with an annual stipend of £14,553 and will be awarded for a period of up to three years subject to satisfactory progress.

If you wish to discuss your proposal or receive advice on this project please contact:

**Professor Pagona Papakonstantinou**, [p.papakonstantinou@ulster.ac.uk](mailto:p.papakonstantinou@ulster.ac.uk) ;  
<https://www.ulster.ac.uk/staff/p-papakonstantinou>

### Procedure

For more information on applying go to [ulster.ac.uk/research](http://ulster.ac.uk/research). Apply online: [ulster.ac.uk/applyonline](http://ulster.ac.uk/applyonline)

**The closing date for receipt of completed applications is 2<sup>nd</sup> July 2017**

**Interviews will be held shortly after.**