QUB - Mechanical and Aerospace Engineering
PhD Project Description

Title:

Smart and sustainable polymer nanocomposites for healthcare, engineering or energy applications

Theme:

Composite Materials and Structures
Bio-engineering
Advanced Manufacturing and Processing

Project description:

Polymer nanocomposites have attracted substantial interests from both academia and industry over the last two decades because the addition of a small amount of nanoparticles (typically <10 wt.%) may not only enhance the properties of polymer matrices but introduce new interesting functionality. They can be used in a wide variety of applications including healthcare, aerospace engineering, automotive engineering, energy, electronics, coating and packaging. Meanwhile, there is a pressing need for smart and sustainable materials which help enable the development of next-generation smart technologies and products whilst also tackling the global challenge associated with the limited natural resources such as crude oil.

Aims and objectives:

This PhD project aims to create novel smart and sustainable polymer nanocomposites for healthcare, engineering or energy applications. The choice of applications will depend on the candidate's interests and knowledge. Regarding the healthcare stream, the project will create novel biomimetic multifunctional elastomers and elastomer nanocomposites for soft tissue engineering, wound healing and drug delivery. Regarding the engineering stream, new smart polymers and polymer nanocomposites will be manufactured for use in aircraft, cars, etc. Regarding the energy stream, novel smart, stretchable and functional polymers and nanocomposites will be prepared, which will subsequently be used to manufacture smart and stretchable electronics and energy devices. All the streams will include the use of raw materials from sustainable resources to manufacture novel smart and multifunctional polymers and nanocomposites, followed by their characterisation using a range of techniques. The performance of these new materials in the chosen applications will also be evaluated, with relevant fundamental science investigated. Where necessary, appropriate collaboration will be put in place to assist with application exploration.

Key skills required for the post:

- Strong interest in polymers and advanced materials
- Have or about to obtain a relevant Engineering or Science degree (minimum 2:1 or equivalent)

Key transferable skills that will be developed during the PhD:

- Experimental skills in material preparation, processing and characterisation
- Skills in applying new materials in various industrial sectors
- Project management skills
- Problem-solving skills
- Team-working skills
- Technical writing and presentation skills

Lead supervisor:	Professor Biqiong Chen Email: b.chen@qub.ac.uk Tel: 028 9097 4116
Funding mechanism:	A full PhD scholarship may be available for a successful UK applicant. Interested international candidates are also encouraged to make enquires.
Application closing date:	Until suitable candidate appointed.
Guaranteed stipend:	The scholarship will cover PhD tuition fees at the home rate and a stipend (£15,009 p.a. for the 2019/20 academic year).
Conditional top-up available:	Subjected to availability, £3,000 per year for student with 1st class honours degree and exceptional performance at interview.

PhD students in the School may have the opportunity to apply to be demonstrators on undergraduate modules. Compensation for this can amount to in excess of £2,400 per year.

Queens University Belfast is a diverse and international institution which is strongly committed to equality and diversity, and to selection on merit. Currently women are under-represented in research positions in the School and accordingly applications from women are particularly welcome.