QUB - Mechanical and Aerospace Engineering
PhD Project Description

Title: 3D printed polymer nanocomposites

Theme: Composite materials and structures, advanced manufacturing and processes, bio-engineering

Project description:

Additive manufacturing (3D printing) is one of several new technological breakthroughs that are expected to lead the factories of the future, where conventional equipment will be replaced by smart, flexible and customized systems. In order for additive manufacturing technologies to truly evolve and attain their full potential the range of usable polymers needs to be significantly expanded and the properties of plastic materials need to be substantially improved. This can be achieved through the use of nanofillers which can lead to better materials with improved lifespan. However, like with any polymer nanocomposites the polymer-nanofiller interface and loading, dispersion, distribution and orientation of the nanofiller inside the polymer matrix are crucial factors that control the properties of the final material. Only by accounting for all the previously mentioned factors through structure-property relationships materials with superior properties can be manufactured.

Aims and Objectives:

The current project aims to develop new polymer nanocomposites and to evaluate their properties according to printing directionality. This will offer a better understanding of the role that the nanofillers play and provide a reliable view of the failure mechanism. Polymer nanocomposite materials will be developed using different polymer matrices and/or fillers at various loadings. The structure and properties of the developed materials will be evaluated and structure-property relationships will be investigated.

Key skills required for the post:

- A minimum degree of 2:1 (or equivalent) in Mechanical Engineering, Materials Science, Chemistry or another relevant discipline.
- Strong interests in Materials Science and Engineering in particular Polymeric Materials, Processing and Characterization.

Key transferable skills that will be developed during the PhD:

- Experimental skills in materials synthesis, processing and characterisation
- Skills in applying new materials in various industrial sectors
- Project management, problem solving and communication skills

Lead supervisor:	Dr Oana Istrate (o.istrate@qub.ac.uk)
Other supervisor(s):	Prof Biqiong Chen (b.chen@qub.ac.uk)
Funding mechanism:	A full PhD studentship may be available for a successful UK applicant. Interested international candidates are also encouraged to make enquiries.
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 academic year 2019/20).
Conditional top-up available:	Subjected to availability, £3,000 p.a. for student with 1st class honours and exceptional performance at interview.

PhD students in the School 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.