

## QUB - Mechanical and Aerospace Engineering PhD Project 2020-2021

<b>Title:</b> <b>Novel biomimetic and biodegradable elastomers and elastomer nanocomposites for soft tissue reconstruction</b>	
<b>Project description:</b>  Soft tissues are highly deformable tissues such as cartilage, ligaments, muscles, nerves, adipose and blood vessels. They are essential constituents of the human body, enabling the body's functions. However, the majority of existing biomaterials cannot replicate the structure and properties of native soft tissues, limiting the effectiveness of soft tissue repair and reconstruction strategies.  This project aims to manufacture novel sustainable, biocompatible and biodegradable elastomer and elastomer nanocomposite scaffolds with similar morphologies and mechanical properties to those of load-bearing soft tissues, controllable swelling and biodegradation behaviour, as well as intrinsic bioactivity for the regeneration of soft tissues that have suffered losses or defects due to diseases or injuries. A series of new elastomer and elastomer nanocomposite scaffolds will be prepared, with their structure, mechanical properties, swelling behaviour and biodegradation kinetics characterised. The scaffolds that mimic the morphologies and mechanical properties of targeted soft tissues, and have an appropriate biodegradation rate will be selected for subsequent <i>in vitro</i> studies. In collaboration with tissue engineers, appropriate cells will be seeded into the chosen scaffolds and cultured for different periods of time, which will be evaluated in detail. Control samples will be prepared and investigated in parallel to help understand the tissue regenerative behaviour of the new biomaterials.	
<b>Key skills required for the post:</b> <ul style="list-style-type: none"> <li>• Have or about to obtain a relevant engineering or science degree (minimum 2:1 or equivalent)</li> <li>• Strong interests in materials or multidisciplinary research</li> </ul>	
<b>Key transferable skills that will be developed during the PhD:</b> <ul style="list-style-type: none"> <li>• Experimental skills in materials preparation, processing and characterisation, cell biology and tissue engineering</li> <li>• Interdisciplinary research skills</li> <li>• Problem-solving and analytical skills</li> <li>• Team-working skills</li> <li>• Project management skills</li> <li>• Technical writing and presentation skills</li> </ul>	
<b>Lead supervisor:</b>	Prof Biqiong Chen Email: <a href="mailto:b.chen@qub.ac.uk">b.chen@qub.ac.uk</a> Tel: 028 9097 4116
<b>Guaranteed stipend:</b>	The PhD scholarship will cover the student's full tuition fees at the home rate and a stipend (£15,285 for 2020-2021). Due to funding conditions, only UK nationals are eligible for a full scholarship.
<b>Conditional top-up available:</b>	Subjected to availability, £3,000 per year for student with 1 <sup>st</sup> class honours degree and exceptional performance at interview.
<b>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.</b>	

***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.***