



QUEEN'S UNIVERSITY BELFAST

*Title of studentship	Exploring the influence of silica-based fillers on drug release from silicone elastomer implants
Value / what is covered?	Fully funded 100% of UK/EU tuition fees paid and an annual stipend for UK residents only (living expenses), currently at £14,777
Awarding body	DFE
Number of studentships	1
*Summary descriptive text / Example of research project	<p>Silicone elastomers are a unique class of inorganic polymer that have a long history of use in medical devices and implantable drug delivery systems. Dr. Boyd and Prof. Malcolm at Queen's University Belfast have world-renowned expertise in developing silicone elastomer systems for sustained and controlled release of drug substances. This project will focus on developing new knowledge and expertise in certain fundamental aspects of such silicone elastomer drug delivery systems.</p> <p>Most silicone elastomer drug delivery systems are prepared by mixing the drug with two reactive silicone components, and then injecting the mixture into a heated mold to produce the desired product. The chemical bonds in the silicone elastomer do not usually have sufficient strength to impart a high level of mechanical strength to the elastomer. For this reason, reinforcement of the silicone elastomer is often achieved by incorporating a powdered silica filler, which forms strong physical bonds with silicone polymer chains.</p> <p>Silica fillers for use in silicone elastomers generally fall into two categories – hydrophilic fillers (which contain the normal silanol groups on the surface of the particles) and hydrophobic fillers (in which the silanol groups have been reacted with a hydrophobic organosilicon compound).</p> <p>While a lot is already known about selection and use of silica fillers in silicone elastomers for use in industrial and medical device applications, much less is known about how these fillers can influence the release of incorporated drug substances.</p> <p>In this project, the aim is to comprehensively assess the impact on the mechanical properties and drug release characteristics of incorporating different types and concentrations of silica-based fillers into addition-cure silicone elastomers. This topic has not been researched previously, and will likely reveal new insights and strategies for modulating drug release from silicone elastomers.</p>

*Supervisor(s)	Dr. Peter Boyd & Prof. Karl Malcolm
*Eligibility / residence Status	UK/EU only
Country	Northern Ireland
*Start date and duration	1 October 2019 Funding covers a three-year full-time PhD.
*Faculty	MHLS
*Research centre / School	Pharmacy
Subject area	Drug delivery; pharmaceutical formulation; controlled release; silicone elastomers
Candidate requirements / Key skills required for the post	Applicants should have a 1st or 2.1 honours degree (or equivalent) in a relevant subject. Relevant subjects include Pharmacy, Molecular Biology, Pharmaceutical Sciences, Biochemistry, Biological/Biomedical Sciences, Chemistry, Engineering, or a closely related discipline. Students who have a 2.2 honours degree and a Master's degree may also be considered, but the School reserves the right to shortlist for interview only those applicants who have demonstrated high academic attainment to date.
*Deadline for applications	
*How to apply / contacts	Postgraduate Research applicants for Pharmacy who are interested in applying for a fully funded DFE studentship must have applied to Queen's, via the Direct Applications Portal, and submitted all required supporting documents by the closing date, which will be announced later in the Academic year. https://dap.qub.ac.uk/portal/user/u_login.php
Relevant links / more information	http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/PostgraduatePositions/ http://www.qub.ac.uk/schools/SchoolofPharmacy/Research/
Keywords for search filters	Pharmaceutics; drug delivery; vaginal rings; nanoparticles; formulation; HIV prevention; antiretrovirals
Training provided through the research project	The project will provide hands-on training for the student in the following techniques: <ul style="list-style-type: none"> • drug formulation methods • preparation and characterisation of silicone elastomers • injection molding processes for manufacture of silicone elastomer devices • drug quantification using high performance liquid chromatography (HPLC)

	<ul style="list-style-type: none"> • in vitro drug release testing • thermal analysis methods • methods for mechanical testing of polymers <p>As an integral part of the project, the student will further develop the following key skills:</p> <ul style="list-style-type: none"> • planning and organising: designing and planning of experiments • numeracy and statistical skills • teamwork: working confidently as part of a large research team
Expected impact activities	The project will likely reveal new insights and strategies for incorporating drugs into and release of drugs from silicone elastomers.