

|  |  |
| --- | --- |
| **\*Title of studentship** | Biomaterial coatings with lubricious, slippery coatings for improved urinary catheter performance |
| **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 **£15,285** |
| **Awarding body** |  |
| **Number of studentships** | 1 |
| **\*Summary descriptive text / Example of research project**  | Intermittent urinary catheterisation is commonly used to address chronic urinary retention in patients suffering from conditions such as spinal cord injury, stroke, and multiple sclerosis. The majority of intermittent catheters are designed as single-use lubricated devices and as such can be associated with a high cumulative cost – the UK's National Health Service (NHS) spends >£88 million annually on intermittent catheters. However, in many countries outside of the UK, such as USA as many as 83% of patients reuse a single intermittent catheter up to 20 times before disposal, mainly due to the lack of access to affordable healthcare, social aspects, or environmental reasons.Reuse of intermittent catheters can increase the risk of urethral trauma as hydrated catheter coatings quickly dry out leaving 'tacky' poorly lubricated polymeric surfaces which cause friction across urethral epithelium during repeated insertion and withdrawal leading to patient discomfort, tissue damage and scarring with chronic use. Additionally, the repeated, non-sterile use of these catheters may increase a user's risk of developing a catheter-associated urinary tract infection. As such there is a need for enhanced coatings for intermittent catheters to address these issues and provide a safer reusable intermittent catheter design.This project will develop methods to improve the surface lubricity of intermittent catheters using technologies based on ionic liquid-incorporated coatings. Specifically, the project aims to:• Synthesis and characterise novel ionic liquids with lubricating and/or antimicrobial properties• Incorporation of the ionic liquids to form intermittent catheter coatings• Assessment of the coatings to produce highly lubricious coatings and their ability to resist bacterial biofilm developmentThis project is based on recent findings from our lab that has shown the ability to produce superhydrophilic surfaces using ionic liquids that also shown enhanced resistance against clinically relevant bacteria such as Staphylococcus aureus and Pseudomonas aeruginosa. This project will provide extensive experience in ionic liquid chemistry, materials science, and microbiology. |
| **\*Supervisor(s)** |  Dr. Matthew Wylie, Professor Colin McCoy |
| **\*Eligibility / residence Status** | Self-funded project |
| **Country** | Northern Ireland |
| **\*Start date and duration**  | 1 October 2022 |
| **\*Faculty** | MHLS |
| **\*Research centre / School** | Pharmacy |
| **Subject area** | Pharmacy, Biomaterials, Coatings, Materials Science |
| **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, 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** | September 2022 |
| **\*How to apply / contacts** | Postgraduate Research applicants must have applied to Queen’s, via the Direct Applications Portal.<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** | Biomaterials, urinary catheters, ionic liquids, infection, device coatings |
| **Training provided through the research project** | The candidate will benefit from broad training in materials science, organic chemistry, microscopic techniques (SEM, AFM, fluorescence microscopy), and surface fouling assay techniques e.g. microbiology, tissue culture, and protein adsorption studies. Presentation, writing and interpersonal skills will be developed. The student will also have access to a wide range of training opportunities provided by the university's graduate school programme. |
| **Expected impact activities** | Our research has attracted interest from several leading medical device companies with several ongoing industrial collaborations related to this project. This project will further this research and it is envisaged findings from the project may lead to further opportunities to engage with our industrial partners.Overall, the project will develop and optimise a lubricious coating technology for intermittent urinary catheters which can reduce insertional friction and trauma compared to current marketed products and provide the first steps towards commercial and clinical translation. |