Industry scale-up and process optimisation of antimicrobial nanosurface for medical devices

School:

Chemical Engineering

Supervisory Team:

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Research Area:

Advanced Materials and Process Optimisation

Description of field of research:

Whilst medical devices such as hip and knee joint replacements are transformative for people with chronic diseases, 1% - 2% of implanted devices become infected, including approximately 30,000 of the 2 million hip and knee joint replacements that are implanted each year. These implant infections represent an enormous burden on national health budgets and are associated with significant morbidity and mortality for the patient. Corin has developed an antimicrobial nanosurface that shows significant potential to dramatically reduce the incidence of implant infection.

The main outcome of the project is focussed on: Investigation into how varying process operating parameters (process inputs includes raw material selection, pre and post treatment steps and surface coating) in combination may affect the resulting oxidised layer on the substrate surface (process outputs – the physical dimensions, mechanical properties and surface chemistry of processed substrate surfaces). Thus, theoretical relationships between the various post-treatment process/es and operating parameters as the process is scaled, should be derived.

Research Environment

This project will be carried out in laboratories at UNSW and in the offices of Corin Australia at Pymble. The Taste of Research Scholar will work under the direct supervision of James Morel (post graduate), Dr Sarah Grundy, A/Professor Jason Scott, Professor Rose Amal and Dr Toby Brown (Corin). A great opportunity to work on an independent project but also be part of an industry and university research (PARTCAT) team. This project provides unique opportunity with a blend of industry based research as well as traditional university research environment.

Expected Outcomes

Successful completion of the project will lead to better understanding of operation conditions which can be scaled up, thus providing a vital step along the pathway to implementing this process in a medical device manufacturing process. Student will gain experience in material engineering, reaction engineering and simulation, a

medical implant design and manufacturing environment and co-authorship of any scientific paper that emerge from the research.

Reference Material/Links

This project will suit a student with strong interest in material engineering, reaction engineering simulation and equipment / plant design. Read more about the technology for antimicrobial surfaces via this link: https://www.imcrc.org/2018/07/03/globalorthopaedic/