Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

TRINITY CENTRE FOR BIOENGINEERING SEMINAR SERIES 2019

OPTIMISING MEDICAL DEVICE SOFT TISSUE INTEGRATION THROUGH MECHANICAL INTERACTION AND SURFACE TOPOGRAPHICAL METHODS

Speaker: **Eoin O'Cearbhaill, Lecturer and Assistant Professor in Biomedical Engineering, UCD School of Mechanical & Materials Engineering and Principal Investigator of Trinity Centre for Bioengineering**

When: **4pm on Friday 11th of January 2019**

Where: **Stanley Quek Hall, Trinity Biomedical Sciences Institute**

The interface between host and implant is a key predictor of device performance. When seeking to attach or integrate medical devices with host soft tissue, current methods of fixation and integration can lead to suboptimal results. There is a reliance on (1) chemical-based adhesives, which require tissue-specific reactive chemistry and subsequent risk of an inflammatory response, or (2) mechanical methods of fixation (sutures or staples) which can induce significant local tissue damage and associated increased risk of infection.
Here, we present examples of novel interfacing geometries optimised for tissue adhesion and integration respectively. Firstly, microneedle technologies under development in the UCD Medical Device Design Group are described, including a novel two component angled-microneedle patch design, which achieves robust and reversible mechanical adhesion to skin (4-5 times the mechanical adhesive strength of cyanoacrylate). This creates a stable platform for 'click-on' drug delivery and biosignal sensing applications, where sensors can be subsequently removed with near-zero force through the reverse mechanical action or designed to bioresorb. Secondly, utilising a novel additive manufacturing approach, we produce soft flexible silicone-based implants with a unique surface topography designed to minimise fibrosis and control the wound-healing response. These geometrical conformations create platforms for optimal tissue fixation and integration for a broad range of medical devices.

Dr. O'Cearbhaill, a Lecturer in Biomedical Engineering in the School of Mechanical & Materials Engineering, University College Dublin, is a Marie Skłodowska-Curie Fellow, a Principal Investigator in the Trinity Centre for Bioengineering and a Funded Investigator in CÚRAM, SFI Centre for Research in Medical Devices, I-FORM, SFI Advanced Manufacturing Research Centre and AMBER, SFI Advanced Materials & Bioengineering Research Centre. Dr. O'Cearbhaill is a biomedical engineer focused on the development of medical devices, with a particular emphasis on platform technologies, offering smart ways of delivering next-generation diagnostics and therapeutics through minimally invasive approaches.