Applications are invited for the following a PhD studentship for the following project:

3D printing of fibrous electroconductive biomaterials with controlled architectures for peripheral nerve repair

The position will be based with the Buckley Lab within the Advanced Materials and Bioengineering Research Centre (AMBER) centre. Prof. Buckley leads a multidisciplinary research group in the School of Engineering at Trinity College Dublin. The goal of the Buckley lab is to develop novel biomaterial and cell-based strategies to regenerate or repair damaged tissues to restore function using minimally invasive strategies (MIS). **Webpage:** https://www.tcd.ie/biomedicalengineering/regenerative/buckleylab/

Summary of project

Peripheral nerve injury remains a major clinical problem. Autografts are the current 'gold standard' but are hampered by limited availability of donor tissue with poor prognosis for functional recovery at both the donor and recipient sites. As a result, new approaches are currently being investigated to develop artificial nerve grafts which mimic the properties of autologous grafts. Additive manufacturing (AM) techniques such as 3D bioprinting (3DBP) offers exciting new opportunities and horizons to engineer nerve guidance conduits (NGCs) that more closely match the composition and structure of native nerve tissue. These approaches facilitate precise control over the external and internal microarchitecture geometry. In the context of developing engineered nerve tissue AM offers the added ability to incorporate drug delivery systems with tailorable spatial and temporal release profiles of individual drugs. Similarly, following peripheral nerve injury, the transfer of electrical signals across a damaged nerve is inhibited, resulting in degeneration of the distal nerve segment. Printing offers the potential to create specific geometries with defined micropatterns as well as incorporating electroconductive biomaterials to provide direct electrical activation to enhance tissue repair, enhance cell function and alignment. Applying electrical stimuli may enhance the regeneration as it is known that inhibition of electrical signalling can impede normal tissue function. Using bioinks derived from native nerve as a biomaterial platform developed in the Buckley lab for peripheral nerve tissue regeneration, this project proposes to enhance regenerative capacity of NGCs through the incorporation of electroconductive materials from partner labs in AMBER (e.g. graphene, silver nanowires, polypyrrole). Such a conductive biomaterial could thus provide direct electrical activation of isolated regions while also providing a scaffolding template to enhance the tissue repair process. Following optimisation of the fabrication/printing process, in vitro biocompatibility of the biofabricated NGCs and the response of cells to electrical stimuli will be assessed using in vitro methods prior to pre-clinical assessment.

For more information please contact Prof. Conor Buckley conor.buckley@tcd.ie

The ideal applicant will have a master's degree in biomedical engineering, biomaterials, tissue engineering, materials science or a related discipline. Previous experience in 3D printing, hydrogels, tissue engineering, cell culture, gene expression, biochemical analysis, mechanical testing, histology techniques would be advantageous but not essential. Excellent written and oral communication skills are essential.

How to apply: CVs with the names and addresses of three referees should be submitted via email to Prof. Conor Buckley conor.buckley@tcd.ie with the subject heading "AMBER Nerve PhD Project". Positions will remain opened until filled but preferred start date is *September 2020*. Only short-listed applications will be acknowledged.

This position is funded by AMBER, SFI Research Centre for Advanced Materials and BioEngineering Research & CRANN Institute. The AMBER research centre, as a community of researchers, welcomes its responsibility to provide equal opportunities for all. We are actively seeking diversity in our research teams and particularly encourage applications from underrepresented groups.