Faculty of Engineering
Summer Research Program 2022-2023

Project Title: Brain in a microparticle

Supervisor(s): Prof John Forsythe, Prof Helena Parkington, Prof Mibel Aguilar
Department: Materials Science and Engineering
Email: john.forsythe@monash.edu
Website profile of project supervisor: https://www.forsythebiomaterials.com/

Objective
The objective of this project is to engineer brain organoids that will provide insight into how neurons form synapses and networks within a 3D artificial construct. This will provide a deeper understanding of neuronal networking and a step closer to forming biohybrid electronic devices.

Project Details
We have recently developed a rapid microfluidic technique to produce stem cell laden hydrogel microparticles for the production of cartilage (Fig. 1).1 This project will extend our technology to produce microparticles containing neural cells for the purpose of investigating the neural networking ability within the microspheres. Neural firing patterns will be investigated as a function of cell density and promotion of neurons to astrocytes. The hydrogel microspheres are stackable and therefore more complex 3D neural network structures will be formed. The student will become proficient in microfluidics, neural cell culture, imaging and electrophysiology.

Prerequisites
Students must have a background in either engineering, science or medicine. All training will be provided.

Additional Information
Applicants will be required to attend an interview.

1. F Li, VX Truong, H Thissen, JE Frith, JS Forsythe, ACS Applied Materials and Interfaces 9 (10), 8589-8601 (2017)