

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Brain in a microparticle

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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.

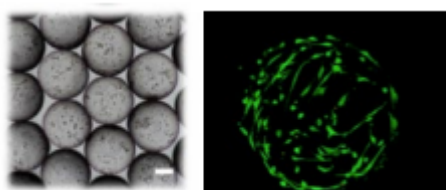


Fig. 1 MSCs encapsulated with gelatin microparticles.

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)