

Faculty of Engineering

Summer Research Program 2023-2024

Project Title: Automating sample applications in a microfluidic device using a 3D-printed gating mechanism

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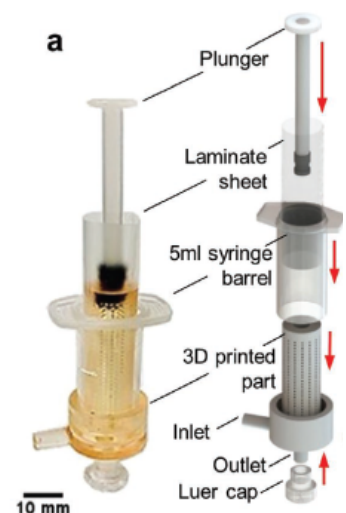
Website profile of project supervisor: <https://www.amblab.com/>

Objective

To design, 3D print, and validate an automated mechanism that streamlines the use of our patented microfluidic device, enhancing its efficiency and user-friendliness for commercialisation.

Project Details

We have developed and patented a 3D microfluidic device for the selection of motile microswimmers via a 3D network of 600 parallel microchannels. This highly parallelised selection approach efficiently isolates a substantial volume ($\sim 500 \mu\text{L}$) and a large number (1,750,000) of high-quality motile cells in just 15 minutes, making it suitable for sperm selection applications in assisted reproduction. While the fabrication method for the device is simple and scalable, its current usage involves a relatively manual process. A laminate sheet must first be inserted to block the microchannels while drawing up the sample. This laminate sheet is then removed as the device is incubated for 10-20 minutes. Finally, motile cells are collected from the collection chamber by reinserting the laminate sheet and pushing down the plunger. To make the device more user-friendly for clinical applications, this project aims to design, 3D print, and validate an automated mechanism for the timely insertion and removal of the laminate sheet, based on plunger movement.



Prerequisites

A background in engineering design, 3D printing, or fluid mechanics, along with an interest in experimentation and entrepreneurship activities, is encouraged.

Additional Information

Please contact Dr. Reza Nosrati (Reza.Nosrati@monash.edu) for more information.