

ICB PhD public presentations**MICROFLUIDIC PLATFORMS FOR
SINGLE-CELL MANIPULATION
AND ANALYSIS****Mahmut Kamil Aslan**

ICB / deMello group

Supervisor: Prof. Dr. Andrew deMello

Co-examiners: Prof. Dr. Jing Wang and
Dr. Stavros Stavrakis**14/07/2022, 10.00 am, on Zoom****Meeting ID: 627 3908 6000**

Project Summary: Microfluidic platforms have become powerful tools in single-cell manipulation and analysis. Herein, we first developed a valve-based microfluidic system to understand the decision-making process of cells by tracking their lineage over generations at the single-cell level. The system can trap single cells inside "growth" chambers, isolate "sister" cells after division and extract them for downstream transcriptome analysis. Moreover, we present a high-throughput real-time fluorescence cytometer comprising a microfluidic device and a complementary metal-oxide-semiconductor (CMOS) image sensor-based detection system. This platform allows real-time quantification of the fluorescent species (such as particles and cells) at a throughput of up to 500,000 events per second. We also combined this detection platform with a valve-based microfluidic system to achieve a high-throughput fluorescence-activated cell sorting for the enrichment of rare cells. Finally, we demonstrated a smartphone-based portable imaging flow cytometer integrating a smartphone with simple optics and a microfluidic device.

CV. Kamil received his B.Sc. degree from Bilkent University, Ankara, Turkey, and M.Sc. degree from Middle East Technical University, Ankara, Turkey, both in Electrical and Electronics Engineering Department. He joined the deMello group in 2018 as a PhD student.