SMART
Singapore-MIT Alliance for Research and Technology

BioSyM
BIOSYSTEMS AND MICROMECHANICS

Introductory Talks by New Researchers @ BioSyM
10 Oct 2016 – 19 Dec 2016

Deterministic lateral displacement methods for precision microfluidic separation of micro to nano-particles

Dr. Kerwin Kwek

Date: 12th December 2016, Monday

Time: 12 pm to 1 pm

Venue: Perseverance Room, Enterprise Level 5

Abstract

Precision microfluidics for bio-particle separation is of great importance for medical diagnostics. Deterministic lateral displacement (DLD) methods uses a slanted pillar array to control the separation of particles down to a resolution of 20nm. DLD is a versatile method and have shown to separate CTCs at 10ml/min and nanoparticles of sizes 50nm. However, DLD model is limited to spherical particles and are unable to predict separation of non-spherical particles like RBCs. We have developed novel "I"-shaped pillars to enable rotational separation of RBCs via increase in particle hydrodynamic radius. Additional work showed that pillar structure can significantly influence bioparticle separation. We extended our work to the nano-scale and performed complete positive separation of 190nm and 50nm polystyrene particles using large 2 micron pores. The separation at these size range show potential in isolating exosomes and viruses.

Short Biography

Kerwin joined SMART-BioSyM in November 2016 as postdoctoral associate in Jongyoon Han's Group. Completed his PhD at National University of Singapore (2014). His previous postdoctoral experience was at Singapore Institute of Neurotechnology (SINAPSE). His research interest is to develop turn-key platform technology for isolation, detection and/or analysis of cells and bio-molecules.