

Department of Biomedical Sciences  
presents a seminar

# “The emerging role of inertial microfluidics in high-throughput cell sorting”

Dr. Majid E. Warkiani  
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The University of New South Wales



**Date : 21 February 2017**

**Time: 11am to 12:30pm**

**Venue: Room 2-130, 1/F, Block 2, To Yuen Building**

## Abstract

Cell sorting is critical for many applications ranging from stem cell research to cancer therapy. Isolation and fractionation of cells using microfluidic platforms have been flourishing areas of development in recent years. The need for efficient and high-throughput cell enrichment, which is an essential preparatory step in many chemical and biological assays, has led to the recent development of numerous microscale separation techniques. Size-based passive particle filtration using inertial microfluidics have recently received great attention as a promising approach for particle focusing, filtration and fractionation due to its robustness and high rates of operation. The main advantage of inertial-based microfluidics approaches is that continues-flow separation without clogging can be realized using relatively large microchannels with relatively high resolution. In this seminar, I will describe our recent efforts in development of ultra-high throughput microfluidics systems for separation of rare cells (e.g., circulating tumour cells (CTCs), malaria parasites and fetal cells) from blood for diagnostic and therapeutic applications. Further, I will show that how inertial microfluidics enables efficient sorting of Mesenchymal stem cells (MSCs) as a function of cell diameter, and show that this enables selection and sorting of osteoprogenitor cells from marrow for applications such as bone regeneration. I will also present some of our recent efforts for commercialization of these microfluidic systems in biotechnology and bioprocessing industries. Eventually, I will discuss how simple micro-engineered tools (i.e., fabricated using 3D printing and MEMS techniques) can be combined with fluid mechanics concepts in order to develop functional devices for both basic and applied research.

## About the Speaker

Dr. Majid E. Warkiani is an Assistant Professor in the School of Mechanical Engineering at UNSW. He is also a group leader at the Australian Centre for NanoMedicine (ACN) and a visiting scientist at the Garvan Institute for Biomedical Research. He is also holding a visiting professorship position at the Edith Cowan University. He received his PhD in Mechanical Engineering from Nanyang Technological University (NTU, Singapore), and undertook postdoctoral training at Massachusetts Institute of Technology (MIT, Boston, USA). Dr Warkiani's current research activities focus on three key areas i) **Microfluidics** ii) **Bio-MEMS** and iii) **Rapid prototyping** involving the design and development of new platforms for rare cell sorting (e.g., circulating tumor cells, fetal cells & stem cells), single cell analysis, and drug testing.

**All are welcome !**

Enquiry:

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