

## Department of Mechanical and Biomedical Engineering

### Seminar Series

# **May the capillary force be with you: Empowering bioassays, tissue engineering, and rapid diagnostic tests**

## **Prof. David Juncker**

Professor

Biomedical Engineering

PI, McGill University and Genome Quebec Innovation Centre, Canada

Date	January 8, 2018 (Monday)
Time	11:00am
Venue	Room Y5-302, 5/F, Yeung Kin Man Academic Building

### **Abstract**

Capillary phenomena are an inevitable manifestation of microfluidics, and it is sometimes undesirable, and likewise, capillary microfluidics are sometimes called “passive” while their functionality may be perceived as being limited. In this presentation, capillary phenomena will be discussed as an enabling force for liquid transfer for a variety of technologies and applications, and for advanced liquid handling operations traditionally associated with systems using peripheral equipment. The first topic will be on the multiplex analysis of proteins and on the antibody colocalization microarray that affords cross-reactivity free multiplexed immunoassays. Next, 3D printed monolithic pin-heads for spotting high viscosity solutions will be introduced, and the use for cell microarrays co-culture discussed. Capillare circuits, named in analogy to electronic circuits, can realize complex fluidic functions using simple capillary elements. Microfabricated and 3D printed capillare circuits with application to rapid point-of-care diagnostics will be discussed in the context of measles vaccination tests and urinary tract infection. New advances, called domino microfluidics will also be discussed. Finally, while keeping with the concept of simplicity, but extending beyond the universe of capillary forces, microfabricated filters and the use for the isolation of CTC and CTC clusters from cancer patients will be presented.

## About the Speaker

**David Juncker** stayed as a visiting scientist at the National Metrology Institute of Japan in Tsukuba from 1997-98. He conducted his PhD research at the IBM Zurich Research Laboratory from 1999-2002. He then pursued his studies as a Post-doc first at IBM Zurich until 2004, and then one year at the Swiss Federal Institute of Technology in Zurich (ETH). David started as an assistant professor in the Biomedical Engineering Department of McGill University in 2005, in 2011 he was promoted to associate professor with tenure, and in 2016 he was promoted to full professor. David's current interests are in the miniaturization and integration in biology and medicine, which includes the engineering and utilization of novel micro and nanotechnologies for manipulating, stimulating and studying oligonucleotides, proteins, cells, and tissues. The emerging field of nanobiotechnology, in a broad sense, is the most exciting to David, and is also key to tackle some of the major challenges in biology and medicine, for example identifying novel biomarkers for early disease diagnosis and developing low-cost point-of-care diagnostics.

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***All are Welcome!***