# Microfluidic Devices for Direct Separation and Analysis of Cells

**Date:** 5 January 2011, Wednesday
**Time:** 3.00pm - 4.00pm
**Venue:** NUS Lecture Theatre 31, S16, Level 3, Science Drive 1

**RSVP to carol@smart.mit.edu by Monday, 3 January 2011.**

Speaker:
Rohit Karnik


*Abstract:*

Multiple sample-processing steps present a challenge for development of low - complexity microfluidic devices. In this talk, I will discuss new approaches that have the potential to directly separate, enrich, or analyze cells with minimal or no sample processing requirements. We show that asymmetric receptor patterns that permit transient cell-surface molecular interactions can be used to direct the trajectories of cells flowing through microfluidic devices, without capturing the cells. This effect mimics cell rolling, a physiological phenomenon that plays a critical role in cell homing in the vasculature. Similarly, we demonstrate a simple microfluidic circuit for self - sorting of soft particles and cells based on the hydrodynamic resistance induced by the cells in microfluidic channels. These approaches allow the design of devices for continuous-flow, label-free separation of cells based on surface receptor expression, size, and deformability. Such devices may be useful for blood counts, diagnosis of sepsis and malaria, isolation of circulating cells, and other applications.


*Biography:*

Rohit Karnik is a d'Arbeloff Assistant Professor of Mechanical Engineering at the Massachusetts Institute of Technology. He holds a bachelor's degree from the Indian Institute of Technology, Bombay, where he was a recipient of the Institute Silver Medal. He obtained his PhD under the guidance of Prof. Arun Majumdar from the University of California at Berkeley in 2006, where he studied transport in nanofluidic systems and developed devices for nanofluidic flow control, biosensing, and patterning. He was a postdoctoral associate in the laboratory of Prof. Robert Langer at MIT from 2006 to 2007. He joined the Department of Mechanical Engineering at MIT as Assistant Professor in Fall 2007, where his research is focused on microfluidic and nanofluidic transport and devices for applications in separations, sensing, and analysis.

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