

**ICB seminar series 2015/16**

chairman: Prof. Dr. Rudi Gunawan

## **MICROFLUIDICS WITH SUB-NANOLITER VOLUMES IN THE "OPEN SPACE": FROM PATTERNING TO PATHOLOGY**

**Dr. Govind Kaigala**

IBM Research, Zurich

**ETH Hönggerberg, 18/11/2015**

**HCI J 3, 17.00 h**

The Seminar will be followed by an Apéro



**Abstract.** In contrast to standard microfluidics, which are typically closed, we developed a scanning, non-contact microfluidic technology that can shape sub-nanoliter volumes of liquids in the "open space" over surfaces. This technology utilizes a microfluidic probe (MFP) having microfabricated structures for localizing a liquid of interest on a surface using hydrodynamic flow confinement. The MFP permits patterning surfaces with proteins in an additive and subtractive manner, forming gradients of proteins on surfaces, and interacting with cells on surfaces. With flow confinement operating at volumes smaller than 1 nanoliter, a few cells can be targeted in a human tissue section for the specific staining of disease markers. Flow confinement and efficient use of chemicals can be further optimized using a new concept called "hierarchical" hydrodynamic flow confinement. I will show how the MFP and new concepts pertaining to tissue microprocessing may contribute to the analysis of critical samples in the context of pathology and cell biology.

**Speaker highlights.** Dr. Govind Kaigala is a Research Staff Member at the Research Laboratory of IBM in Zurich. He joined IBM in May 2010 and is a member of the Advanced Micro Integration group with the focus area on Precision Diagnostics. Prior to joining IBM, Dr. Kaigala was a postdoctoral fellow at the microfluidics laboratory in Mechanical Engineering and Urology at Stanford University. He received his Ph.D and M.Eng from the University of Alberta, Canada. He has authored and co-authored 30 publications in leading journals, 50 conference papers, and about 15 patents. In addition to IBM, his work is supported by the European Research Council (ERC), the European Union, SystemsX.ch - Swiss National Science Foundation. Dr. Kaigala is the recipient of several IBM awards, including the Research Division Accomplishment Award in 2014, the Horizon Alumni Award from the University of Alberta, and he is a Senior Member of IEEE.