



# Synchronicity Microfluidics

CD Based Microfluidics for Bio-reading

# How do CD Microfluidics work?

- ▶ Microfluidic CD platforms are utilized to perform different biological processes and chemical analyses.
- ▶ In general, a microfluidic CD implements the centrifugal force that is created by the spinning of the platform to pump liquid through the microfluidic network of chambers and channels. There are a wide range of active and passive valving methods were proposed and tested on various microfluidic platforms.
- ▶ Most valves are complex to design and involve lengthy fabrication processes. The easy to fabricate air and liquid check valves for centrifugal microfluidic platforms such as Terminal Check Valve (TCV) and Bridge Check Valve (BCV).
- ▶ liquid swapping is capable by integrating both types of valves and chips with thermo-pneumatic (TP) pumping on a CD.

# How has the valving and flow worked?

- ▶ The valves are shown to accurately control flow direction which makes them an excellent choice for a variety of complex microfluidic processes. The results also indicate that these valves require low pressure.
- ▶ The results confirm the ability to adjust the required actuation pressure by changing the valve chip size. This process has also worked with enzyme linked immunosorbent assays (ELISA).
- ▶ The result shows that the TCV and BCV valving chips enhance the operating range of the processes that can be performed on the microfluidic CD.

# Dual Directional Flow

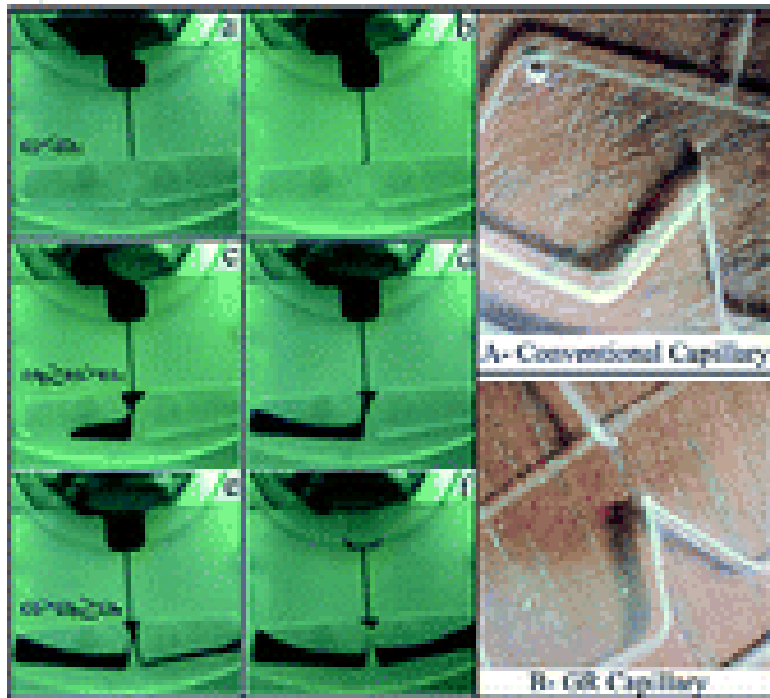
- ▶ Flow directionality, valving and liquid routing in centrifugal microfluidics (Lab-on-CD) are typically controlled by applying centrifugal and Coriolis forces and have been shown to work successfully.
- ▶ Determining and switching the flow direction at a 3 way-junction is a common fluidic operation important for implementing several chemical and clinical assays for Lab-on-CDs.
- ▶ The distinctive feature that makes this approach different from other types of passive capillary valves is the strong control of liquid movement, which is achieved by employing two adjustable sequential burst valves called a primary valve and a secondary burst valve.
- ▶ This method can be used to route samples and reagents at given flow rates to a selection of receiving reservoirs, which are determined by the spinning frequency of the disc.

# Dual Directional Flow (cont.)

- ▶ The technique also allows for the switching of the flow direction instantaneously from the direction along the disc rotation to the opposite direction by increasing the rotational speed of the disc rather than relying on the Coriolis force, which would require reversing the spin direction.
- ▶ These methods have been validated for a wide range of capillary sizes and for various liquids.

# Some Visual Samples

a) Flow switch



b) Liquid distribution

