

# Microfluidic Chip Characterization System (MCC)

a novel system for quality control of microfluidic cartridges and chips

## WHAT DOES MCC DO?

- Detects invisible manufacturing faults of microfluidic chips before the products reach the customer.
- Provides versatile **quantitative data**
  - on behaviour of various liquids
  - in variety of microchannel structures
  - under pressure or electrokinetically driven flow
- Records all the measured parameters and images for further analysis

## WHERE TO USE MCC?

- To perform quality control / functionality control of microfluidic chips and cartridges
- To facilitate design of new transparent microfluidic cartridges and chips
  - Lab-on-chip
  - $\mu$ TAS
  - Bio-chips
  - Point-of-care immunoassays
- To develop and verify various analytical, numerical and data-based liquid flow models in mini and microchannels

## MCC MEASURES:

- Dynamic contact angles of front and rear menisci
- Flow rate
- Displacement and location of liquid plugs
- Pressure drop
- Liquid mixing (under development)
- Analysis of air bubbles in liquid flow (under development)

MCC also visualizes the flow profile

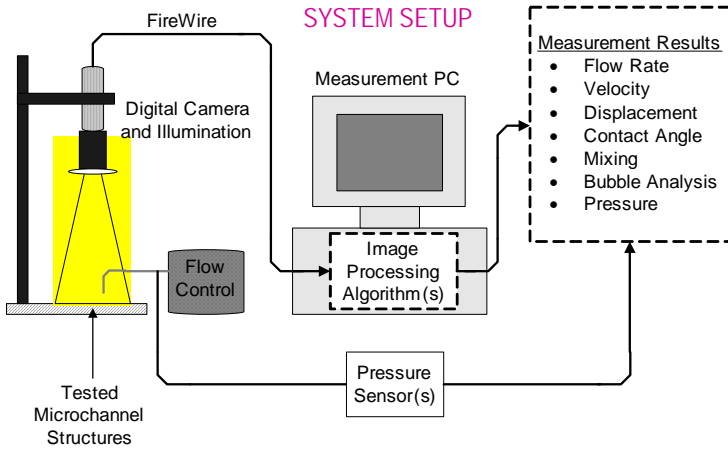


## BENEFITS

Provides quantitative data to

- Compare
  - Behavior of various samples and reagents in a cartridge (such as whole blood, serum, plasma, saliva, food and beverage samples, process samples, environment and waste water samples)
  - Fabrication methods (injection molding, hot embossing, laser machining,...)
- Optimize
  - Microfluidic processes for various cartridges and chips
  - Channel geometries and layouts (such as dimensions and shapes, channel enlargements and restrictions)
  - Cartridge material
  - Channel coatings

Visualizes flow profiles

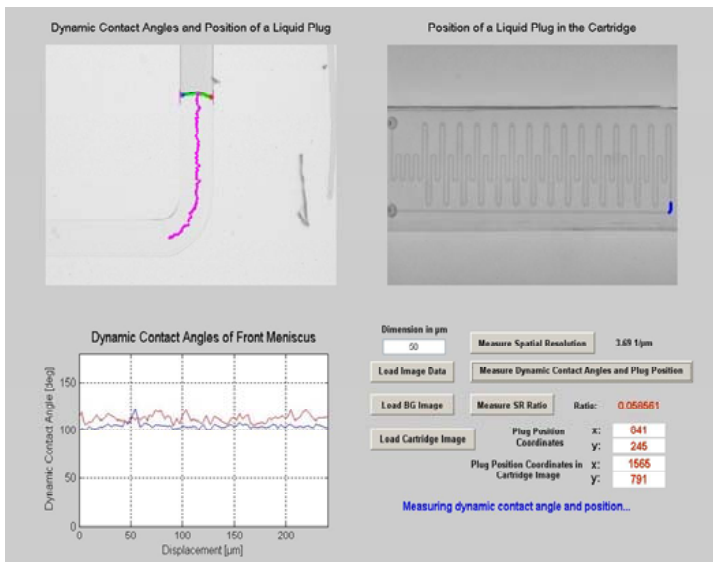


### EXAMPLE 1:

- Liquid plug flow in a microchannel having a rectangular cross-section of 2 mm x 300  $\mu\text{m}$
- Microchannel fabricated on MABS, sealed using an adhesive tape
- A change in front meniscus indicates a fabrication defect

### EXAMPLE 2:

- Liquid plug flow in a microchannel of 50  $\mu\text{m}$  x 50  $\mu\text{m}$



### MEASUREMENT ERROR ESTIMATION

Flow velocity 0.7 %  
 Displacement 0.7 %  
 Dynamic contact angle 1 %  
 Pressure 0.1...0.5 %

### FLOW CONTROL

Pressure controlled

- -200 ... +1000 mbar
- -60... + 350 mbar
- -30... + 140 mbar

Flow rate controlled

