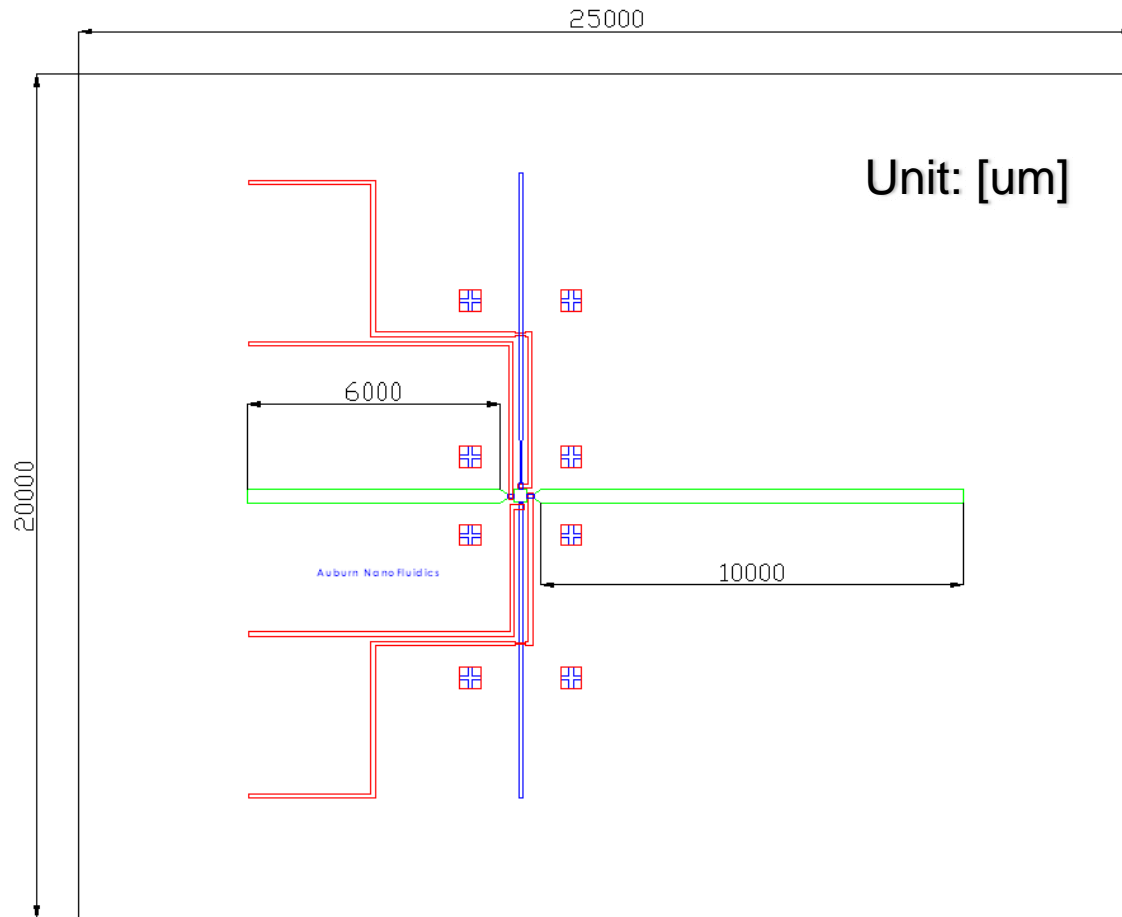


A grayscale image of a microfluidic device, showing a central square chamber with rounded corners and a small circular inlet at the bottom. The device is connected to various channels and reservoirs. The text is overlaid on this image.

# **Single bacterial spore detection with magnetoelastic particle sensors on a microfluidic platform**

Auburn University Detection and  
Food Safety Center  
J.W. Hong

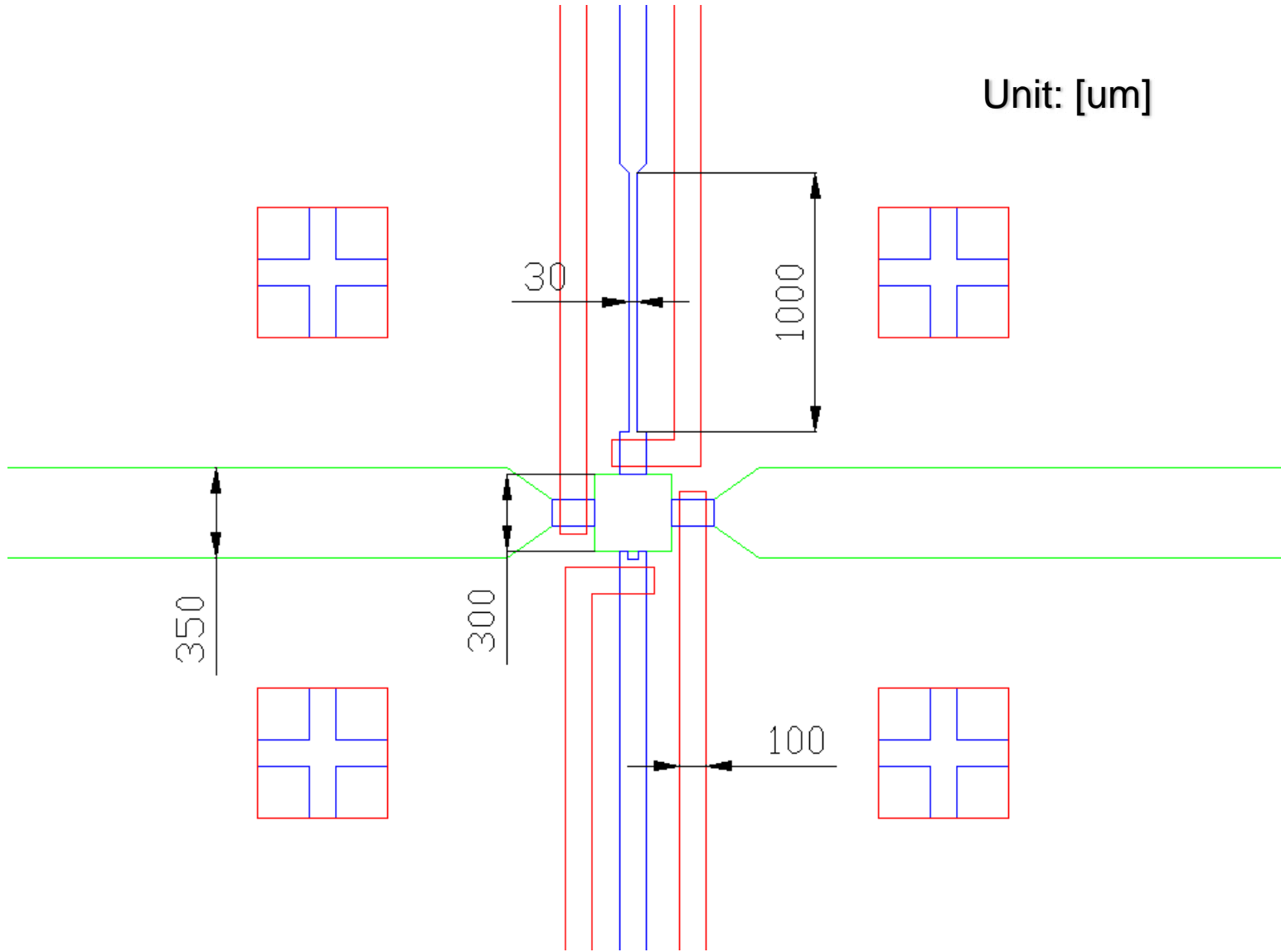
# Chip Design – Top View



- Fluidic channels for sample loading
- Fluidic channels for sensor loading
- Control channels

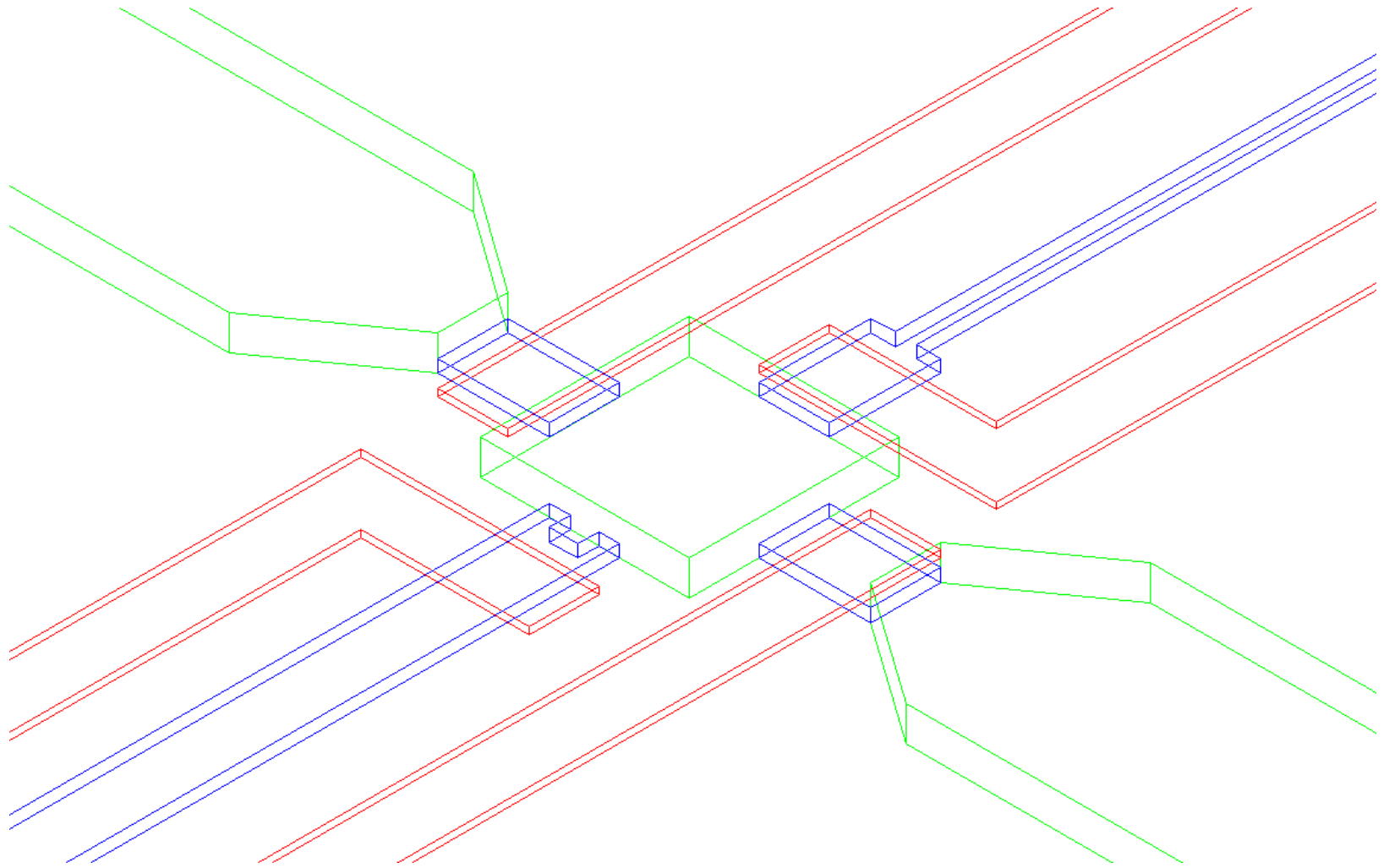
# Top View (Enlarged)

Unit: [um]





# 3D View (Enlarged)



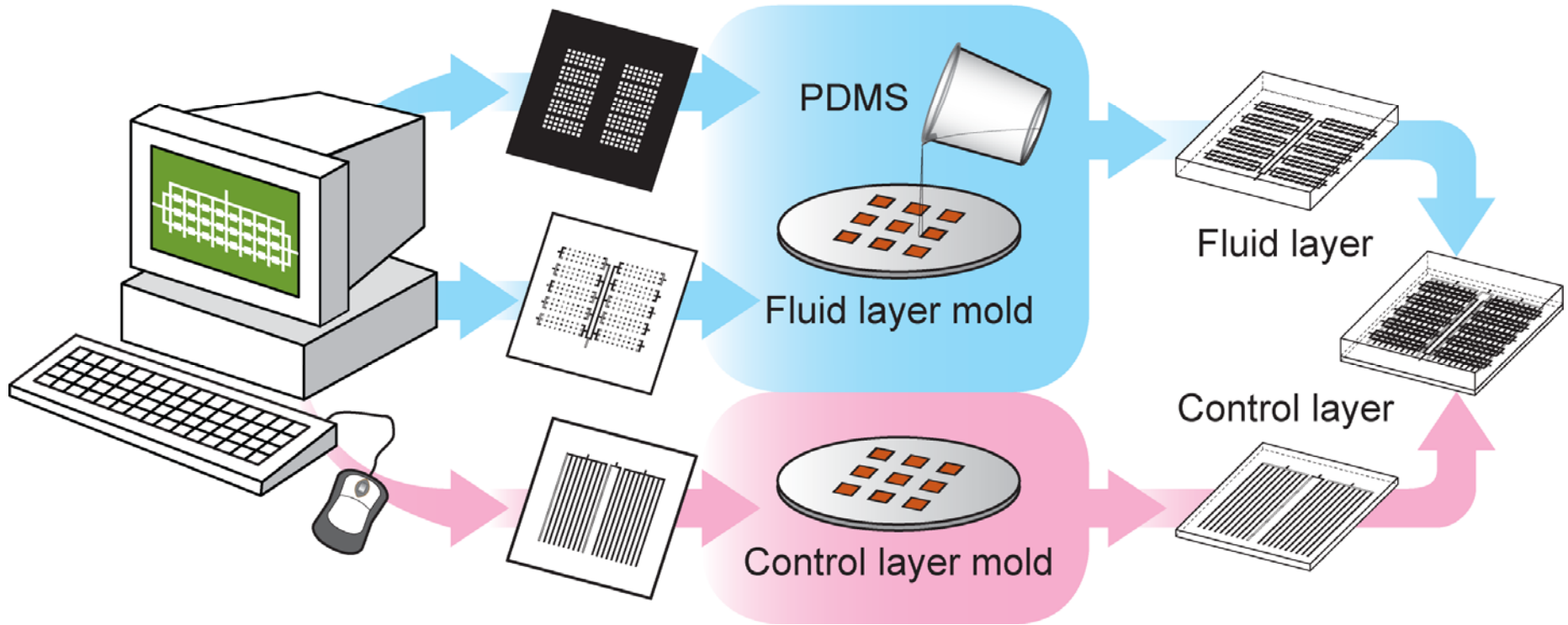
# Multilayer Soft Lithography

CAD program

Mask making

Mold making  
&  
PDMS casting

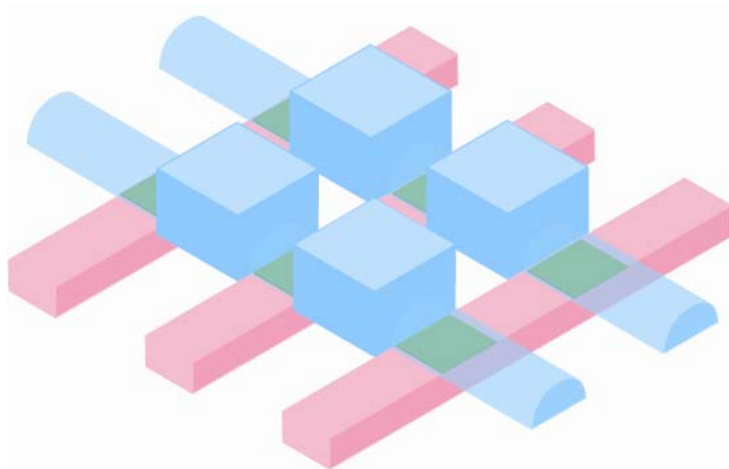
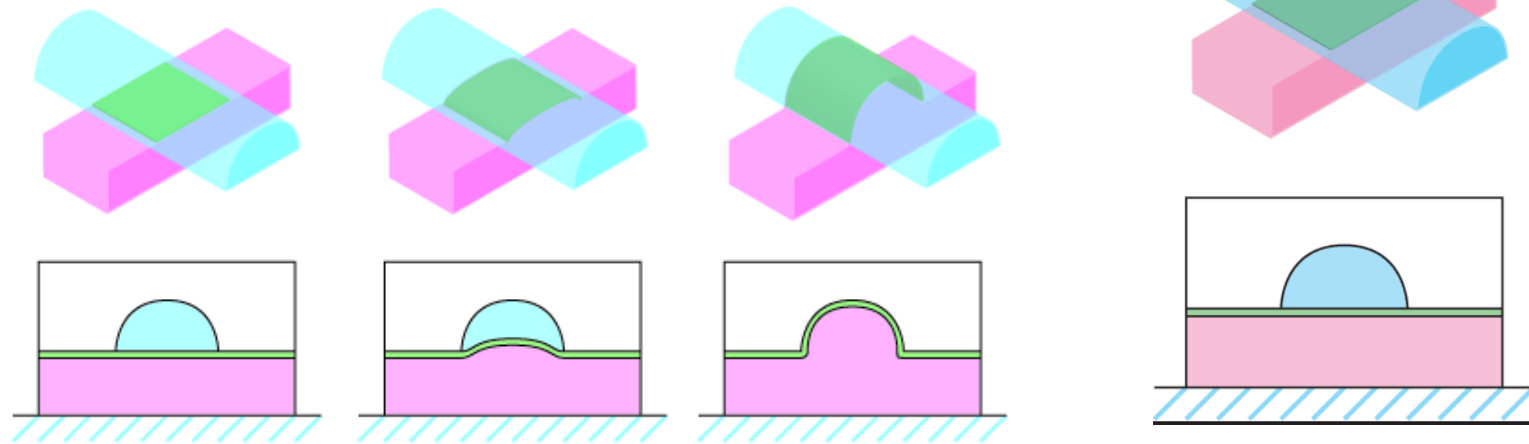
Alignment & Cure



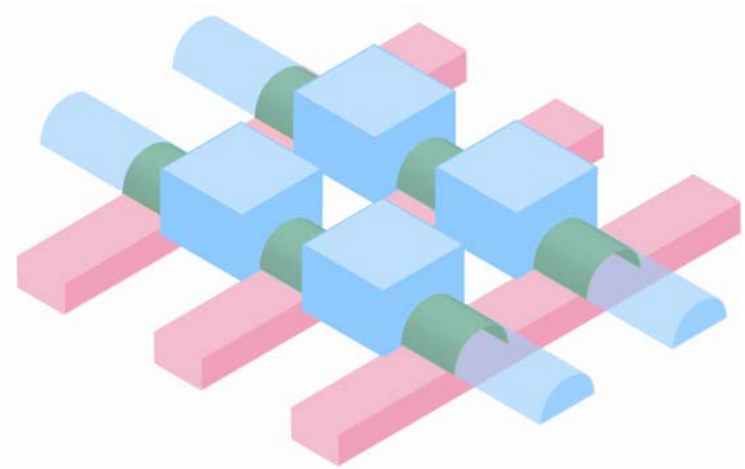
# Pneumatic Controlled Valves

Push-up valve

- Control channel
- Fluidic channel
- PDMS membrane
- Glass slide

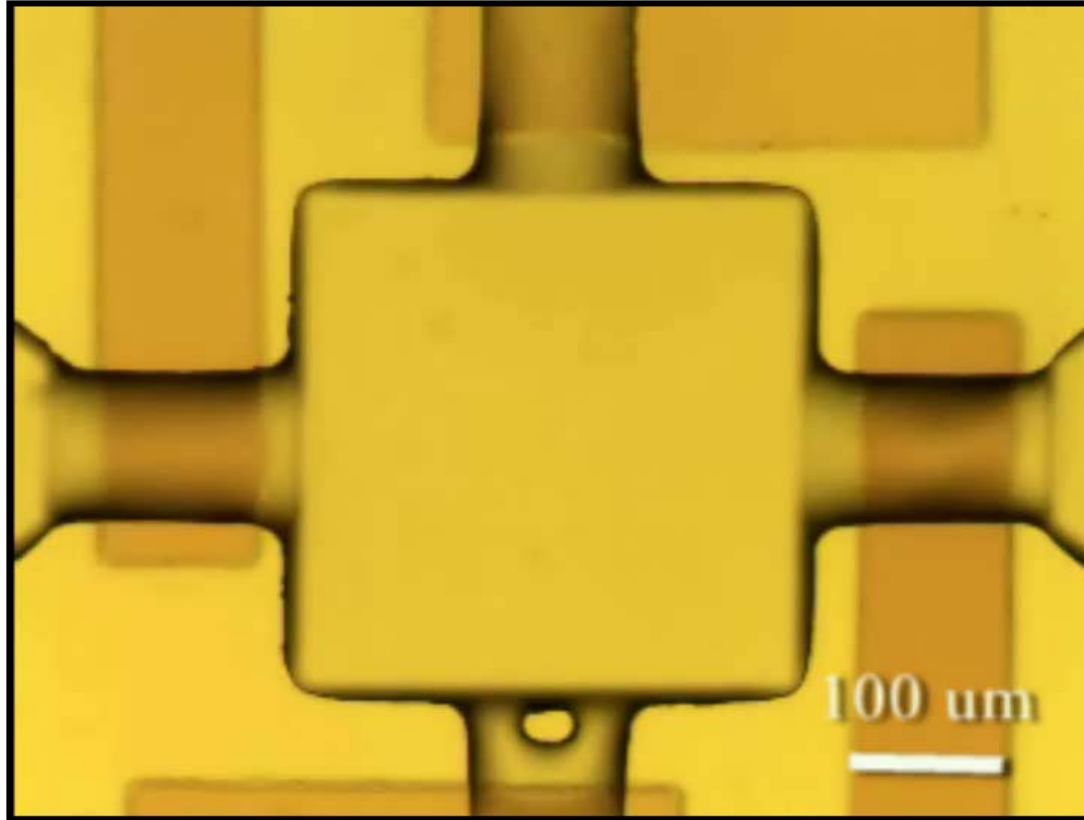


Before valve actuation



After valve actuation

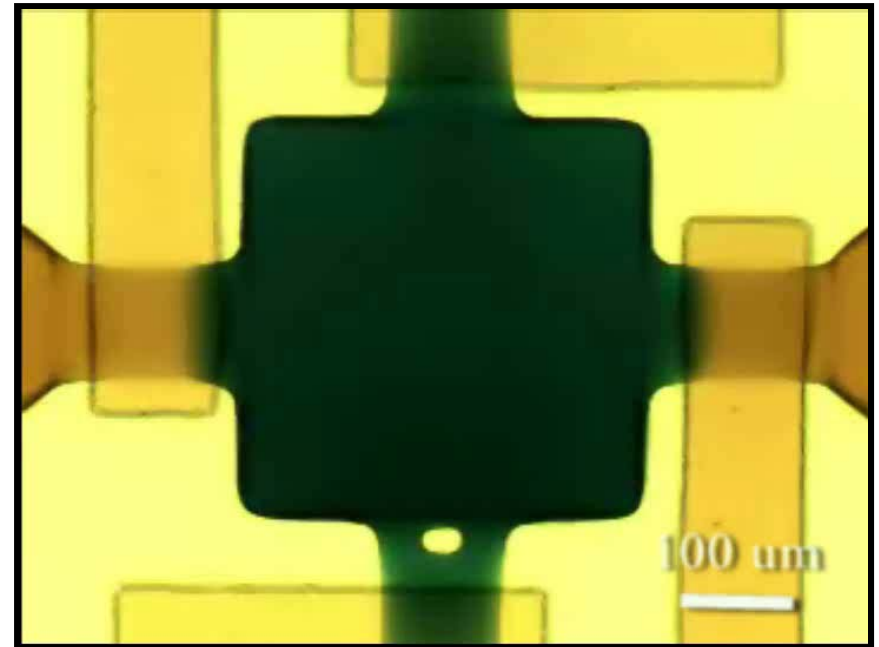
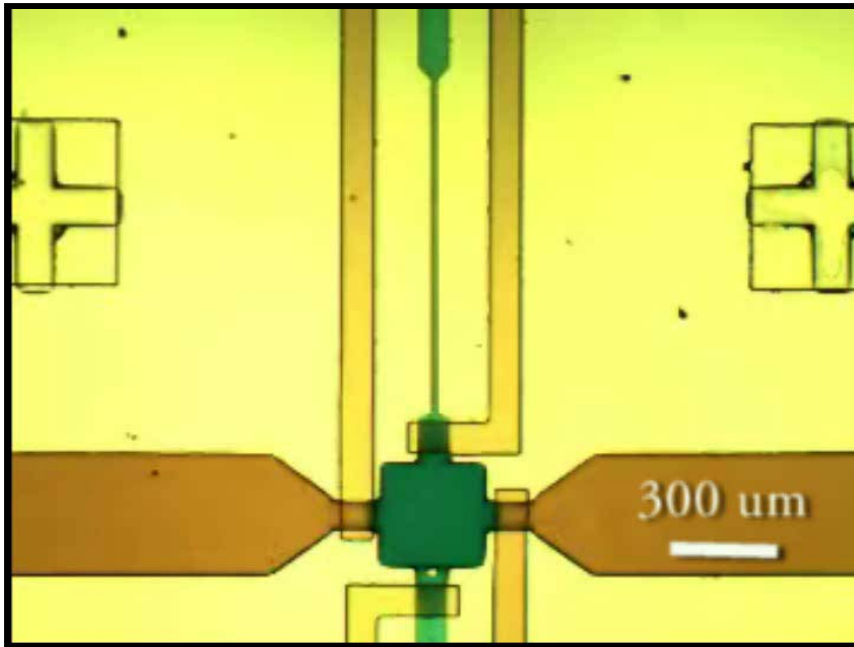
# Valve Actuation



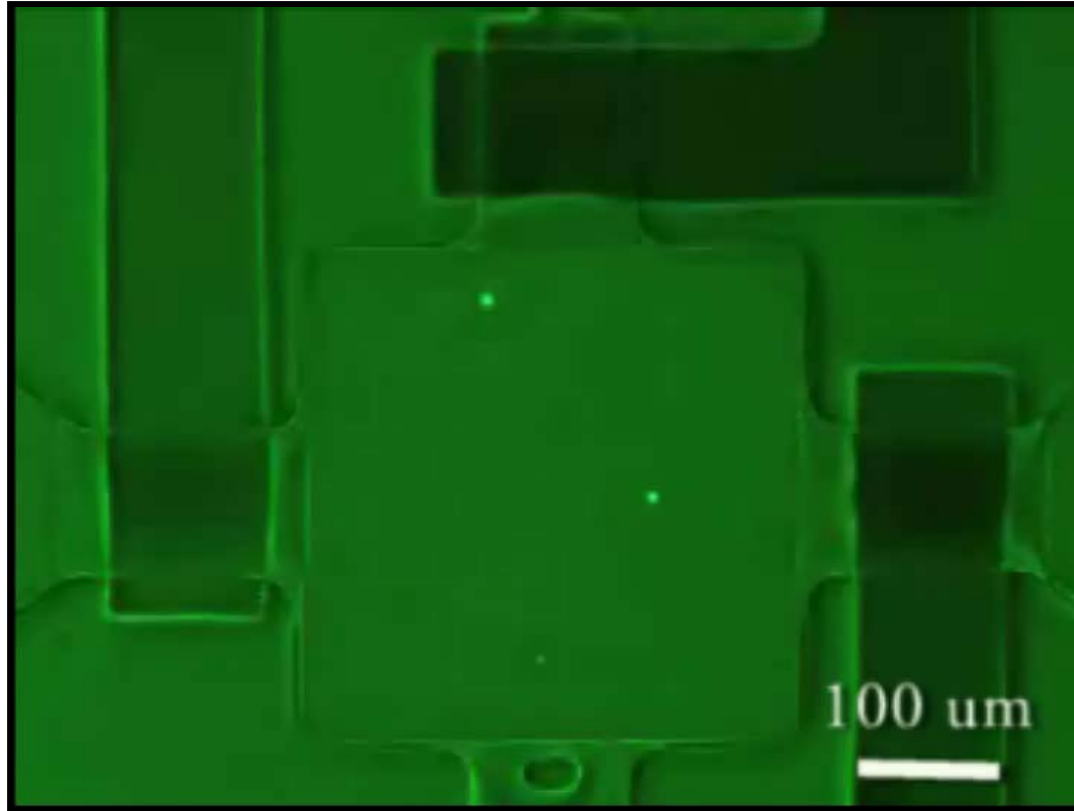
Valve actuation pressure:  $< 3.5$  psi

# Chip Operation with Food Dyes

- Fluidic channels for sample loading
- Fluidic channels for sensor loading
- Control channels

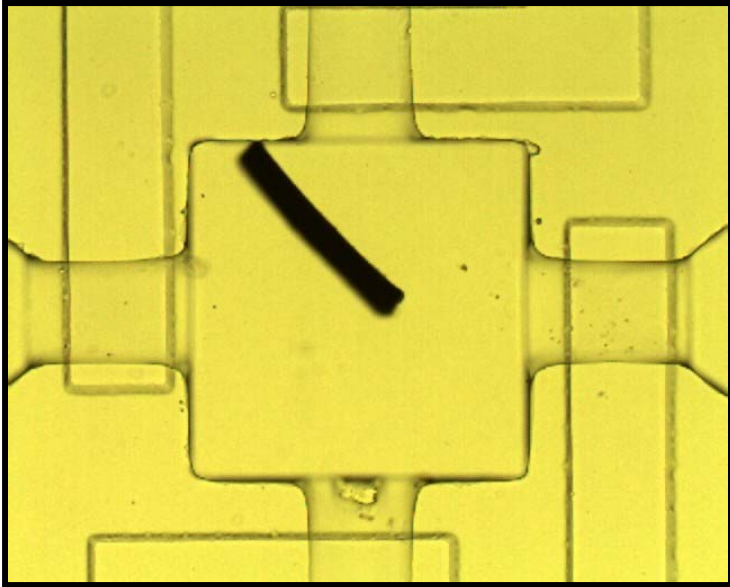


# Chip Operation with Fluorescent Microspheres

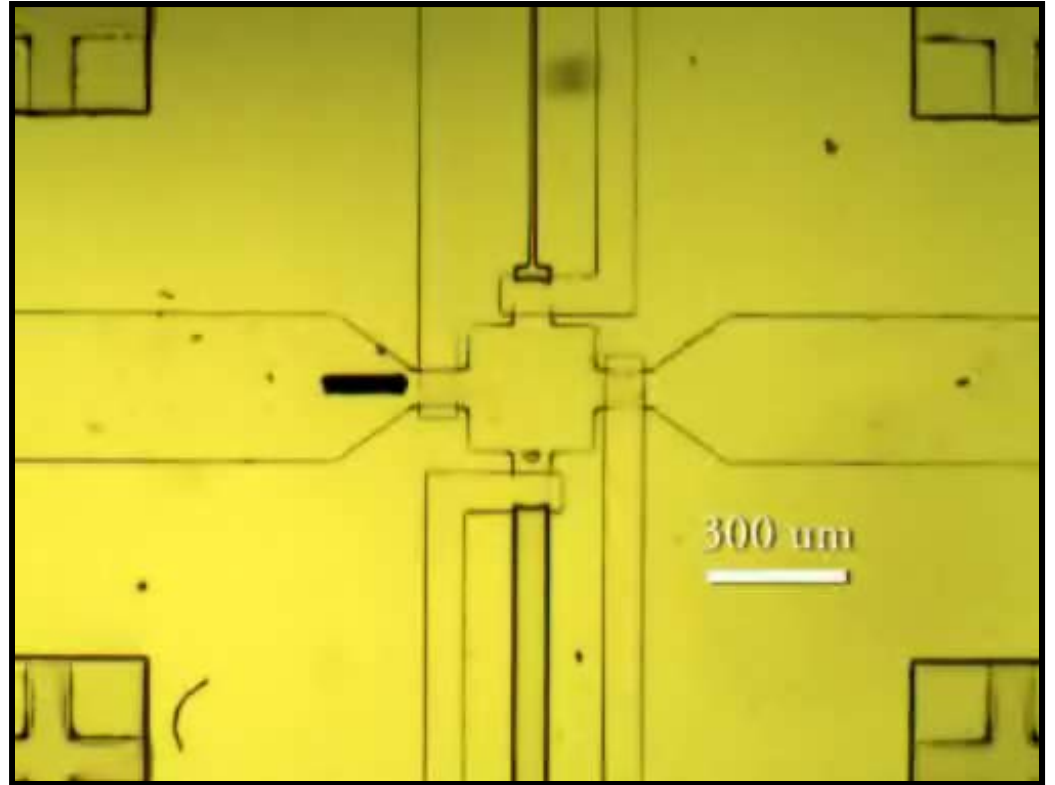


Fluoresbrite YG 2.0-um microspheres (Polysciences, Inc.)

# Sensor Loading



A particle sensor in the chamber



# Spore Capture

