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

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Chip Design – Top View

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

Unit: [um]
Top View (Enlarged)

Unit: [um]
3D View

- Fluidic channels for sample loading
- Fluidic channels for sensor loading
- Control channels
Multilayer Soft Lithography
Pneumatic Controlled Valves

Push-up valve

Control channel
PDMS membrane
Fluidic channel
Glass slide

Before valve actuation

After valve actuation
Valve Actuation

Valve actuation pressure: < 3.5 psi
Chip Operation with Food Dyes

- **Green** Fluidic channels for sample loading
- **Brown** Fluidic channels for sensor loading
- **Yellow** 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

2um-fluorescent microspheres

Particle sensor