

SwisSense

SwisSense MITOMI-based biosensor for NT-proBNP detection

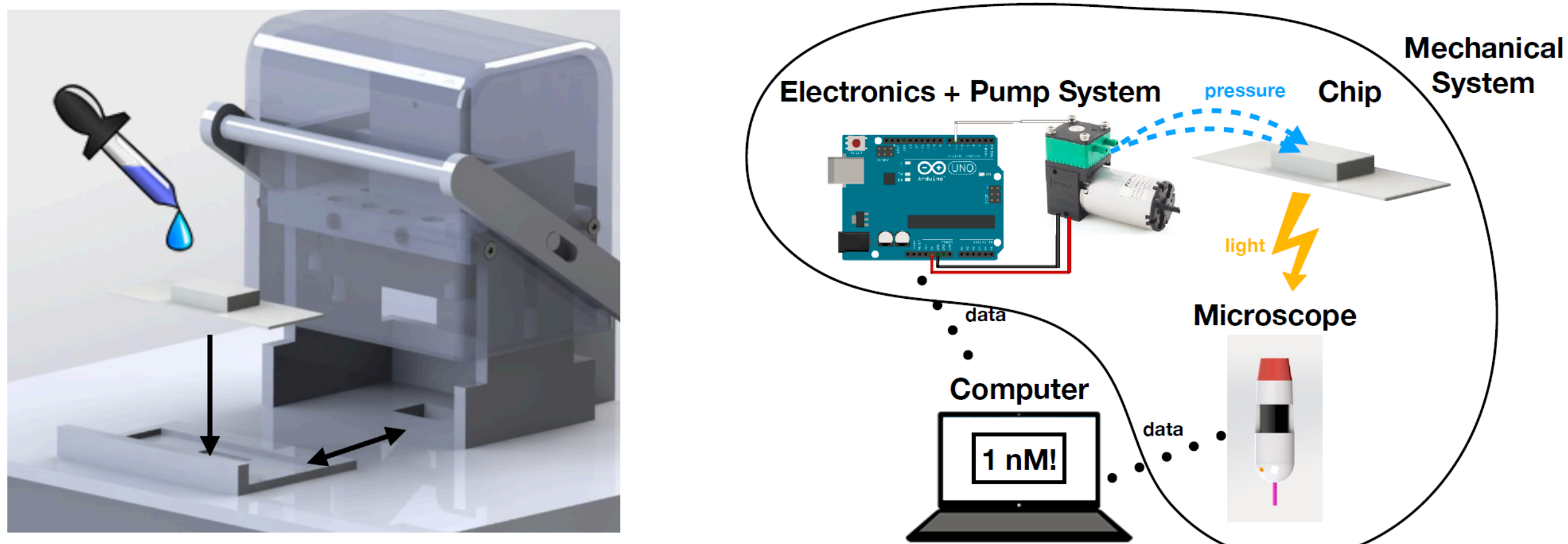
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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Concept

Point-of-care device for fluorescent readout of microfluidic chips with liquid biological samples, based on MITOMI technology [1].



Assay protocol

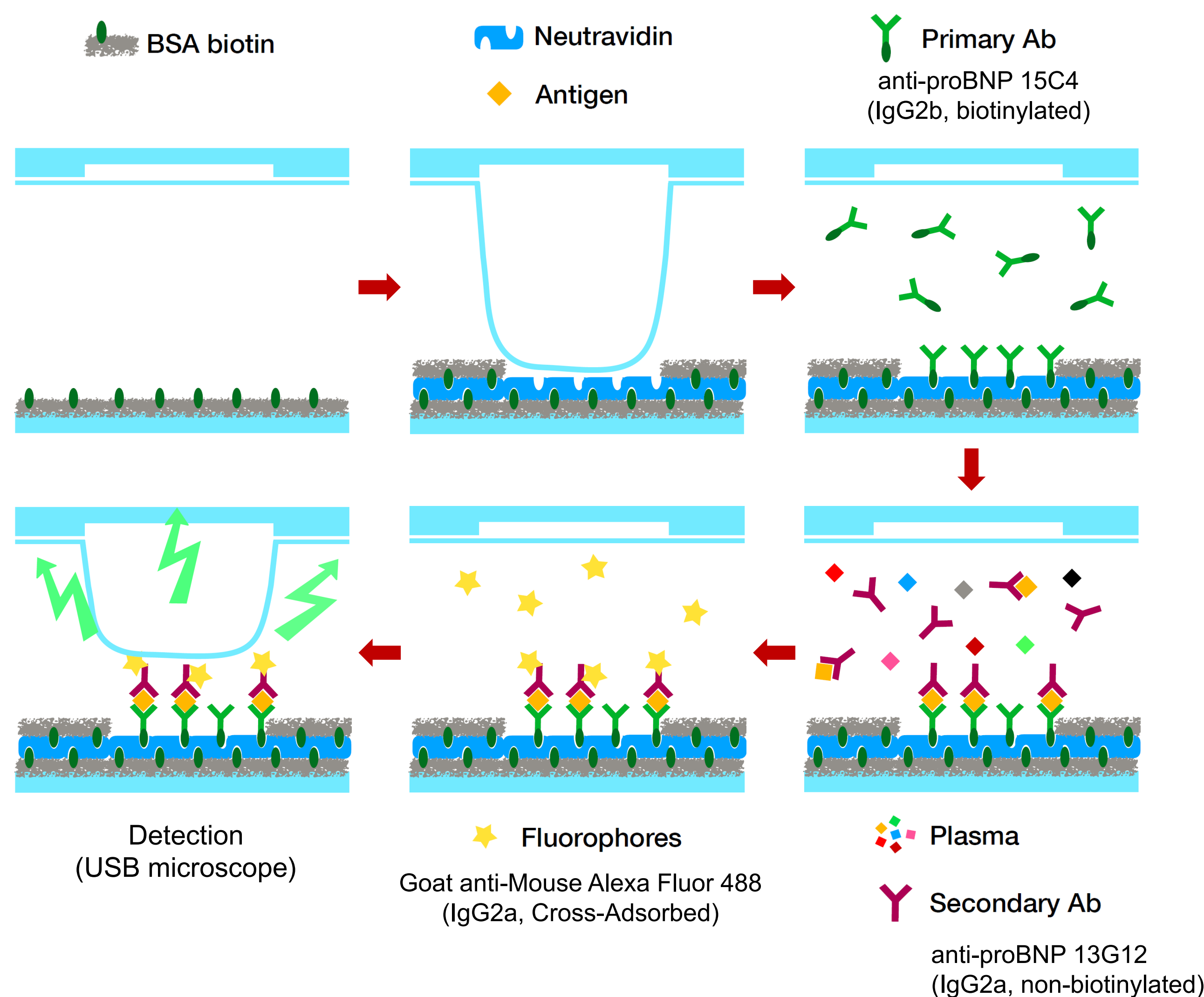
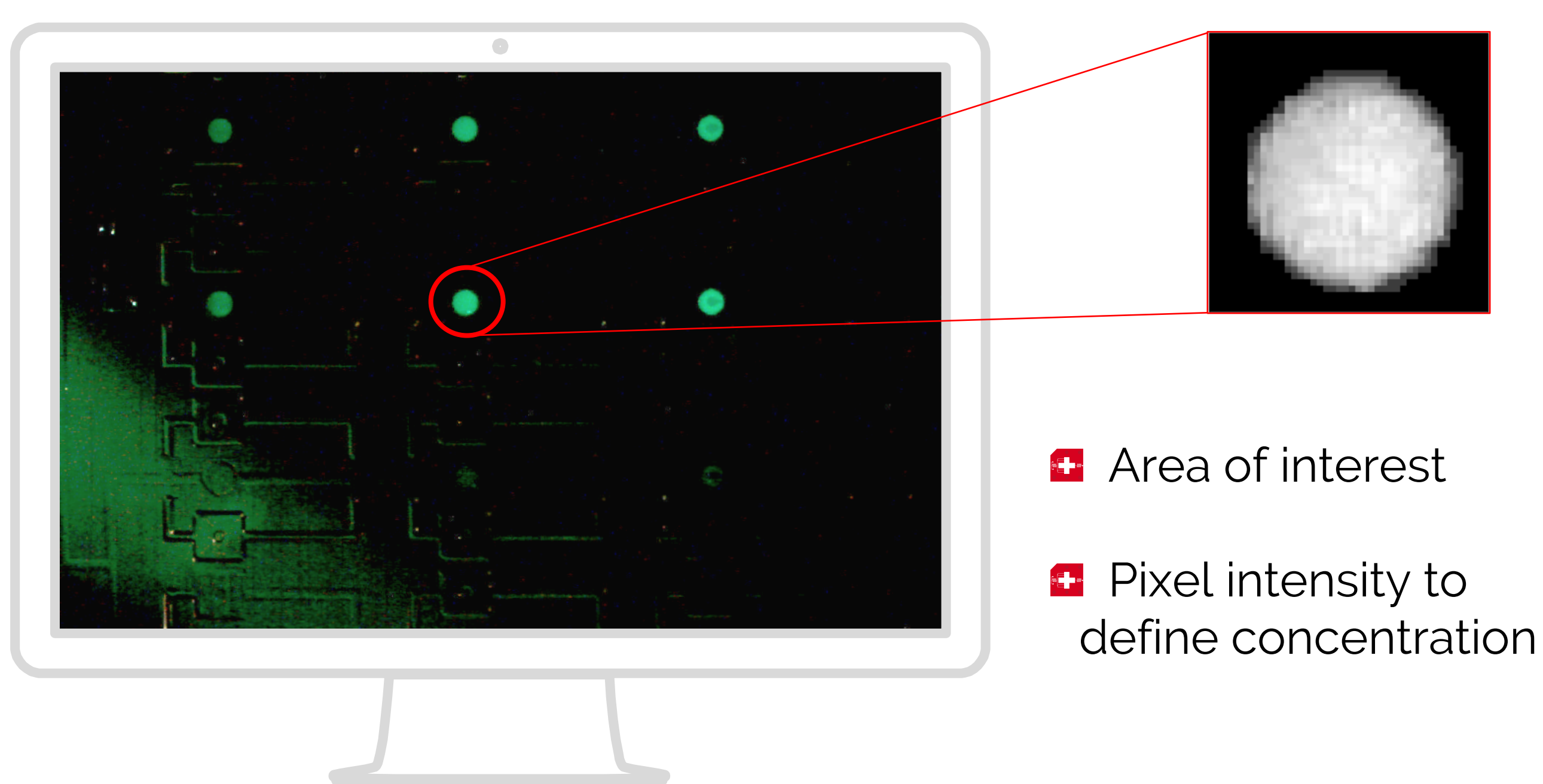


Image processing



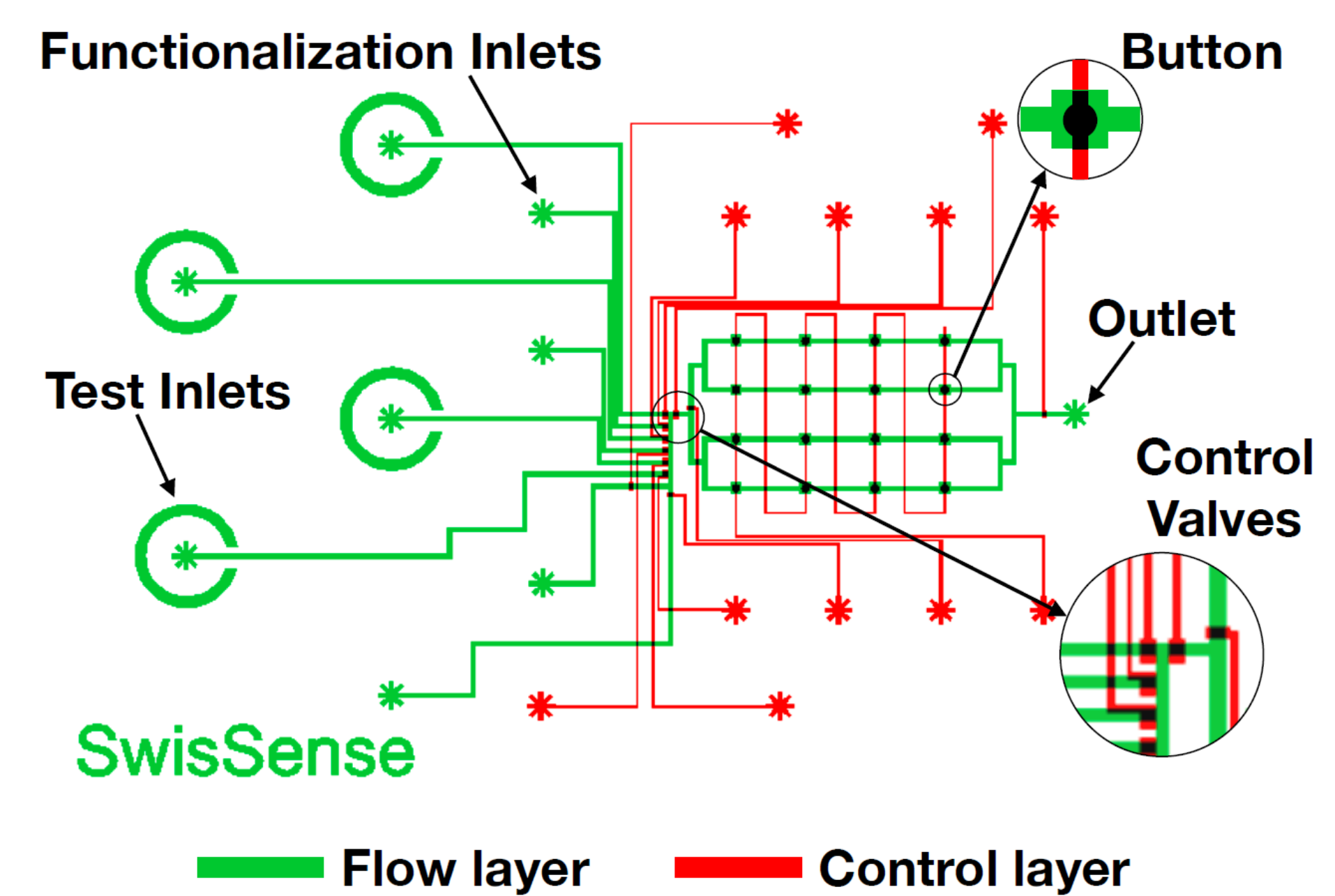
References

- [1] Maerkl, S. J., Quake, S. R., Programming microfluidic devices with molecular information. Patent WO 2007117346 A2. Published 18.08.2007
- [2] S. Maerkl et al., Annu. Rev. Phys. Chem (2014).
- [3] Hong, Studer, Hang, Anderson, Quake, A nanoliter-scale nucleic acid processor with parallel architecture (April 2004)

Microfluidics

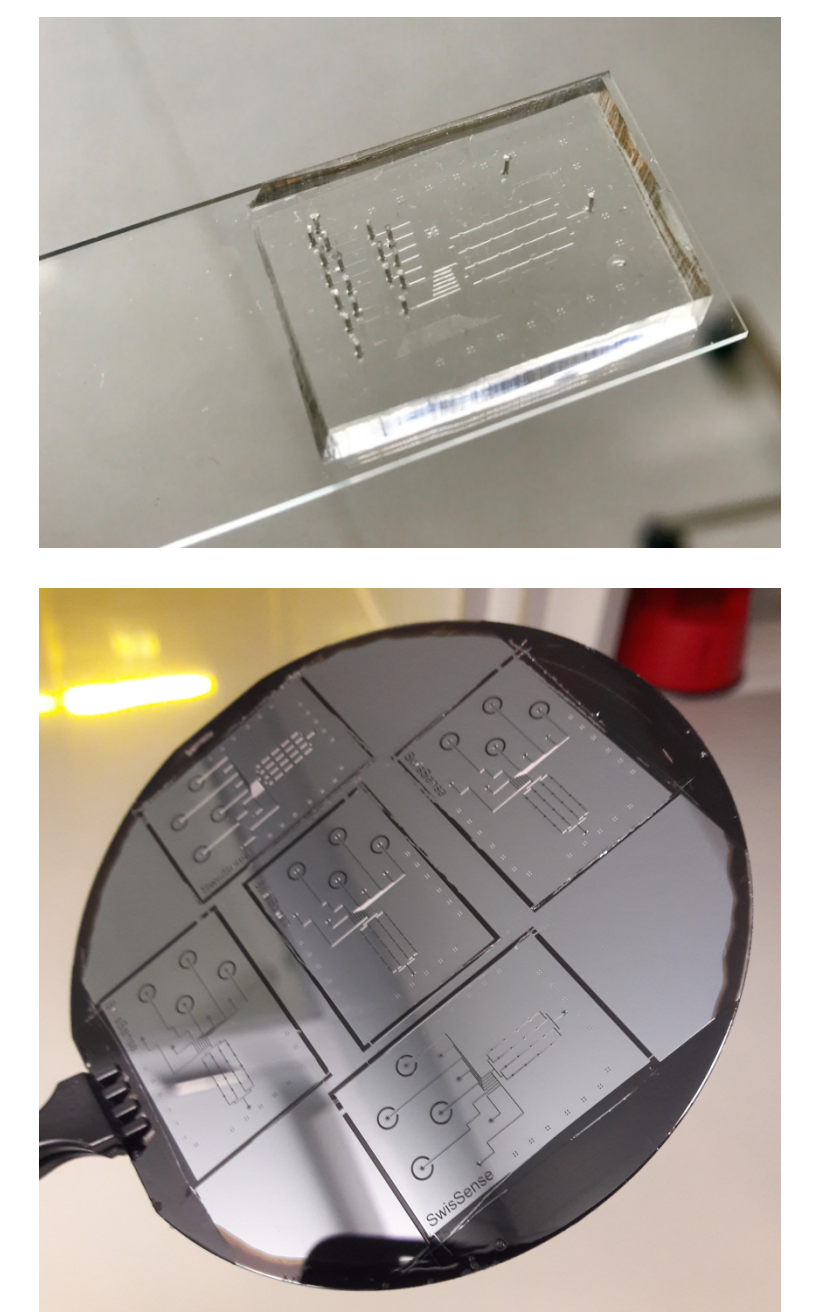
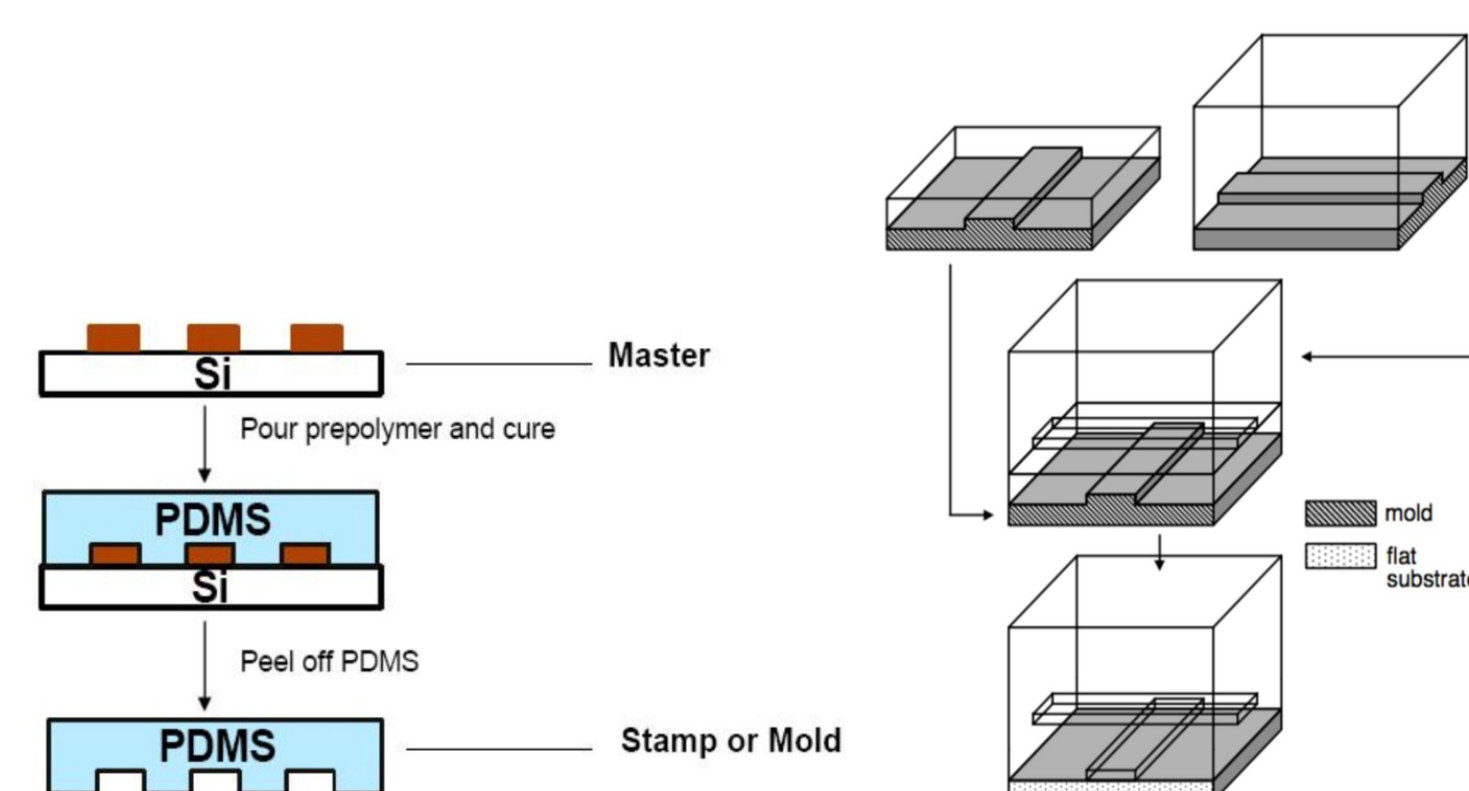
The microfluidic chip is composed of a freestanding membrane that can be actuated by applying a differential pressure. When pressurized this membrane acts as a "valve", that expands and physically blocks liquids, enabling the functionalization in specific areas.

Design

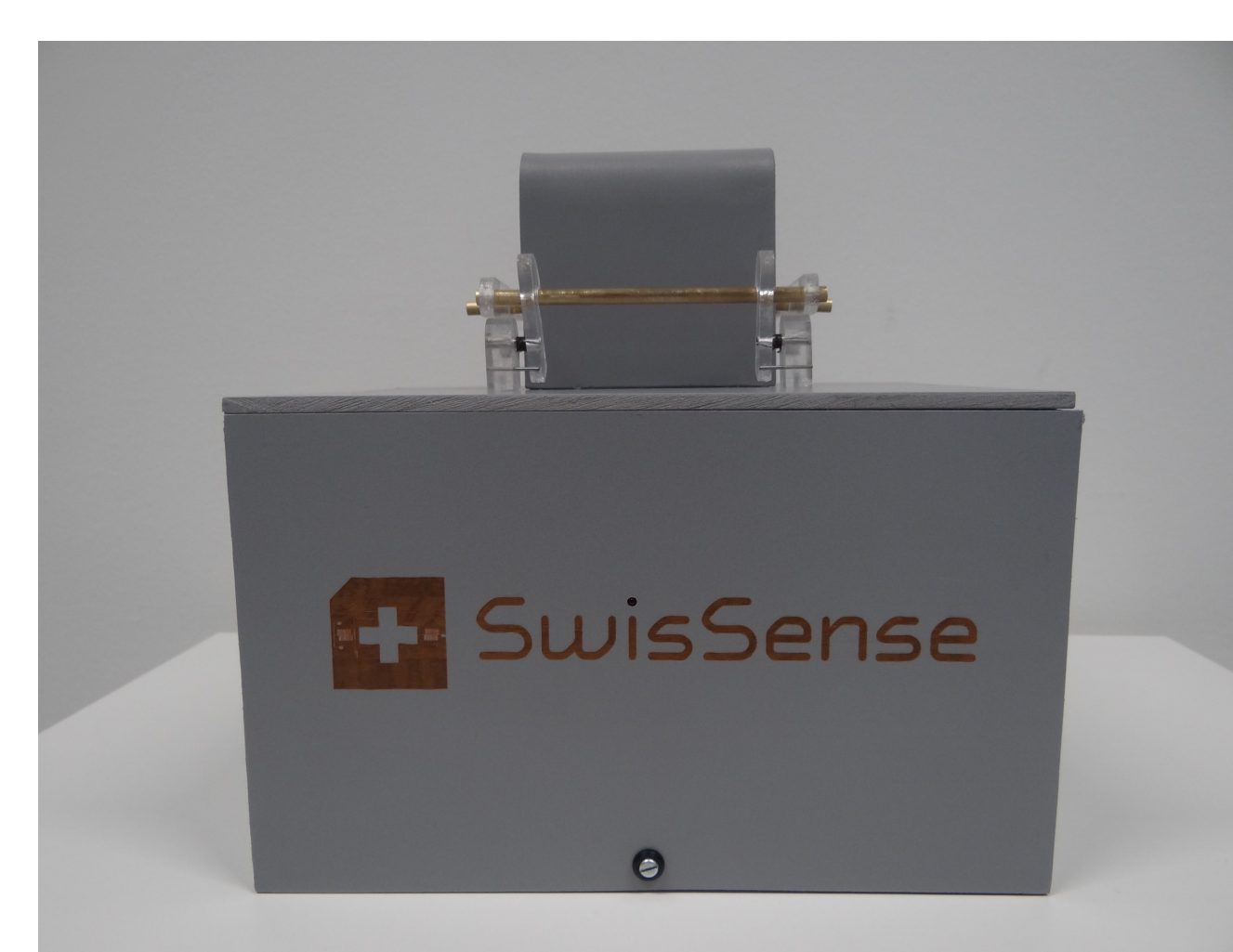


Fabrication

- + PDMS chip on glass slide
- + Two aligned layers
- + Multilayer soft lithography



Prototype



Lab Setup

- + Mechanical valves & manifolds
- + Compressed Air required
- + Tubings and pins

Point-of-care device

- + Electronic Pumps & Valves
- + USB Fluorescence Microscope
- + Plug & Play mechanism

Outlook

Key Advantages

- + Multiplexing with other biomarkers
- + Stable surface chemistry
- + Easy handling

What to improve

- + Sensitivity (hardware & software)
- + Try other fluorescent labels

Translation Potential

- + Silicon wafer molds
- + Cheap electronics
- + Miniaturizable