# Design, fabrication, and testing of microfluidic devices for biochemical analysis

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# Outline

- Introduction
- Design
- Fabrication

# Benefits of Microfluidics Devices

- Improves the precision of experiments
- Run multiple analyses simultaneously
- Can be applied to nanotechnology

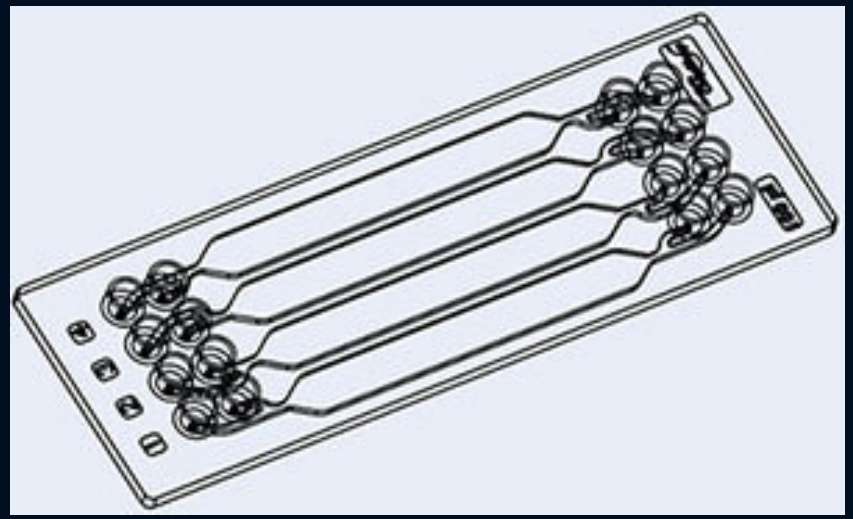


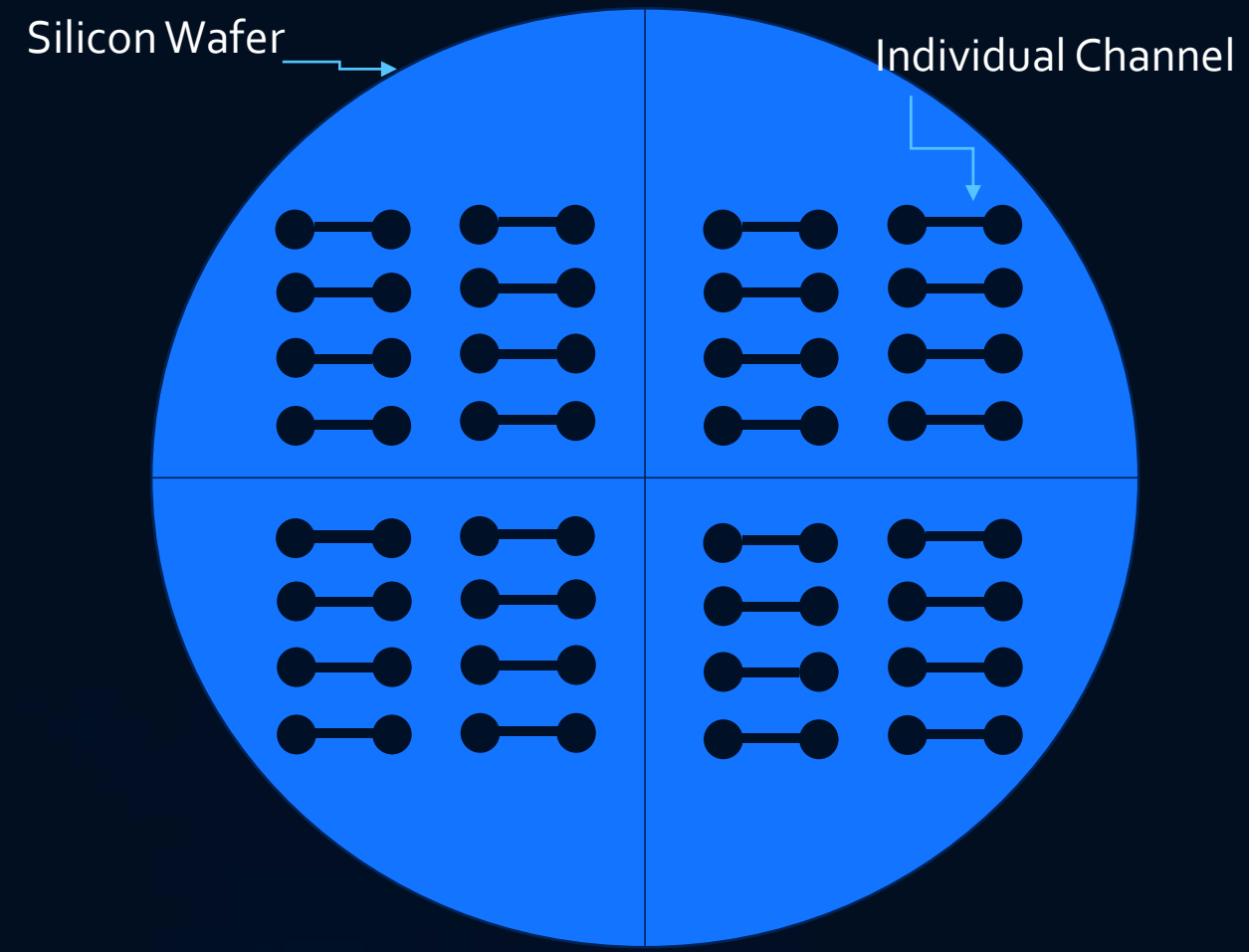
Figure 1 : Example of a microfluidic chip with channels thinner than 1 mm

# Final Product : Microfluidic Device

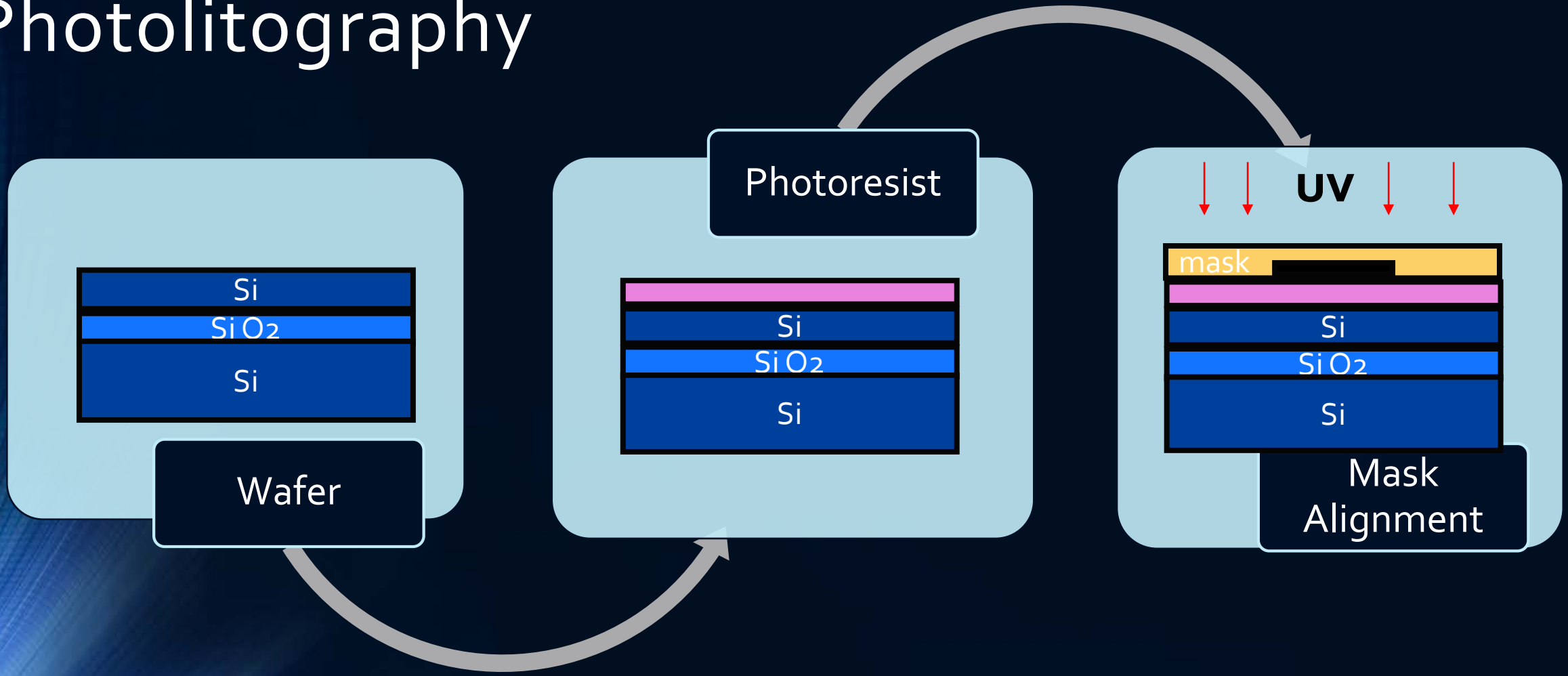
- Ready for Biochemical Analysis

# Dimensions

- Length : 10 mm
- Side : 10mm
- Between: 15mm
- Diameter: 1mm
- W1= 50 µm
- W2 = 100 µm



# Photolitography



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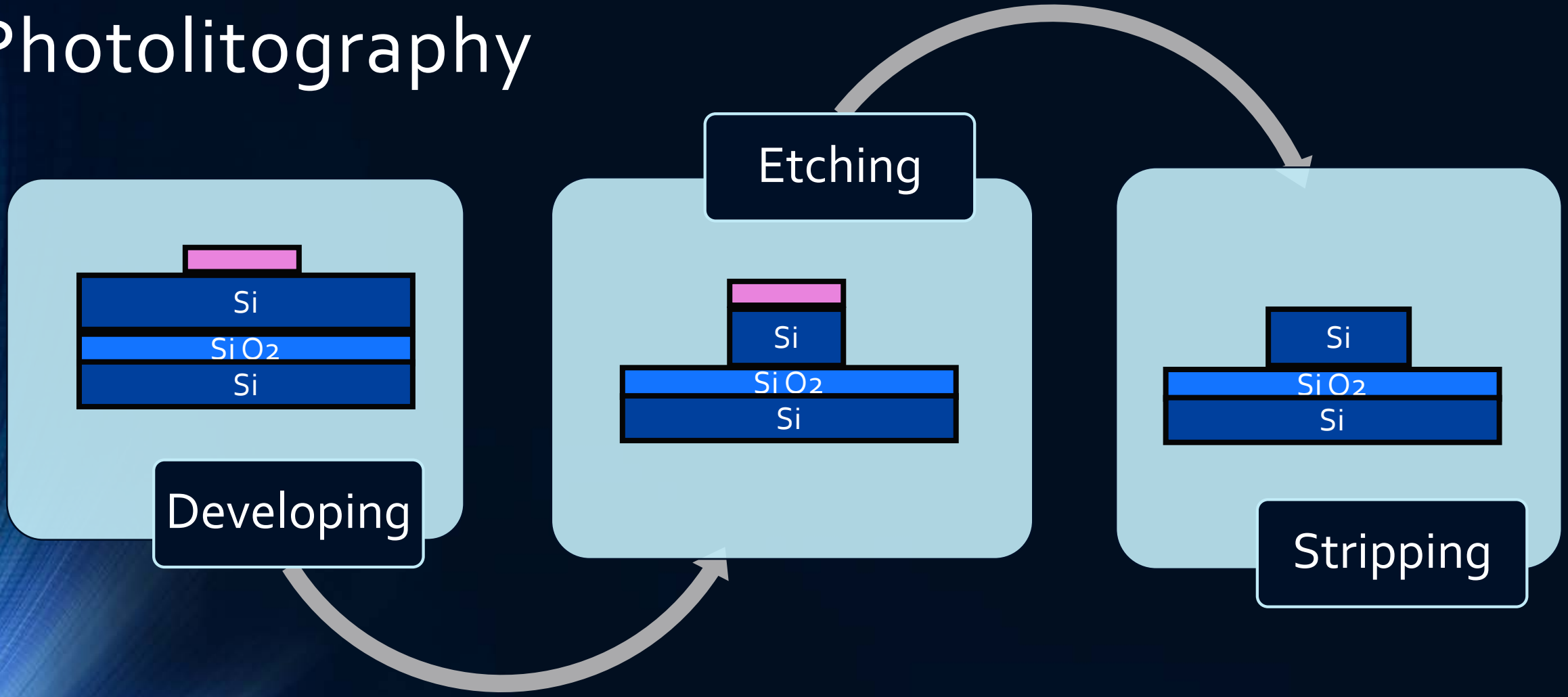


# Thermal Oxidation : Conditions

Purpose:
To produce a thin layer of oxide on the surface of a wafer

Temperature :1100° C

Time: 8hrs

- Furnace at O2 Flows in ---→ SiO2
- 2µm of SiO2

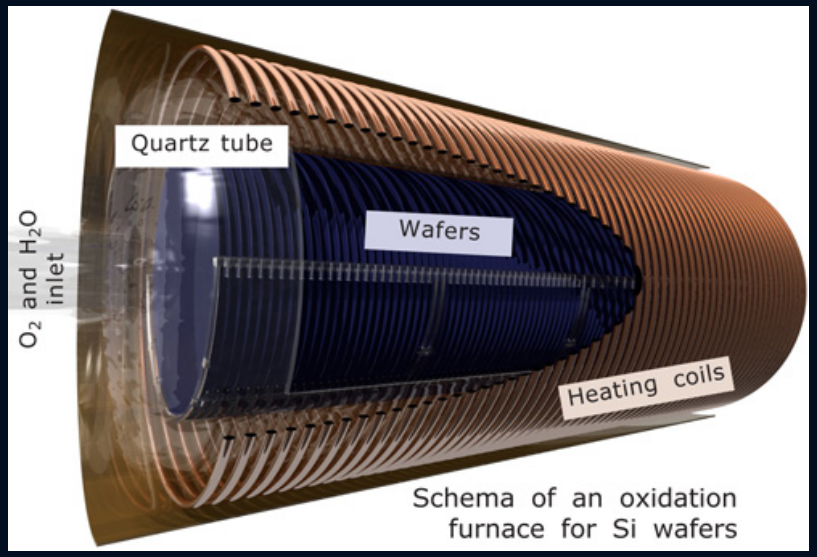



Figure 2 : Example of the inside of a furnace.

# Thermal Oxidation: Cross Sectional View

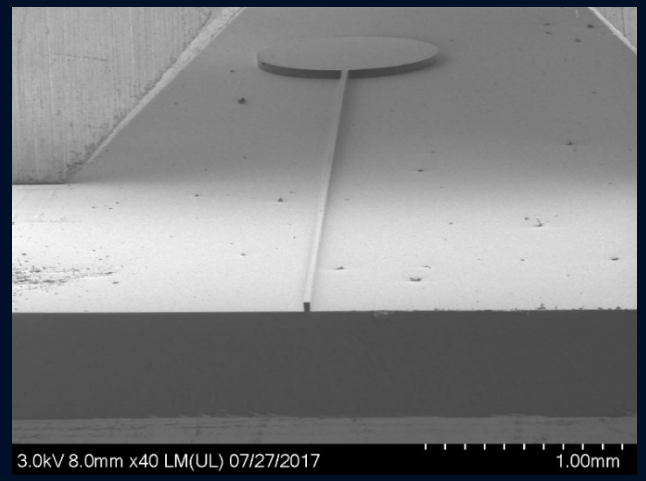



**Figure 4:** Cross sectional view of a 50µm channel.

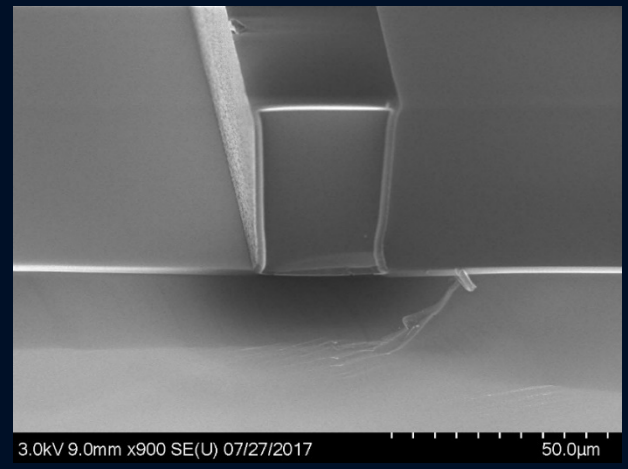


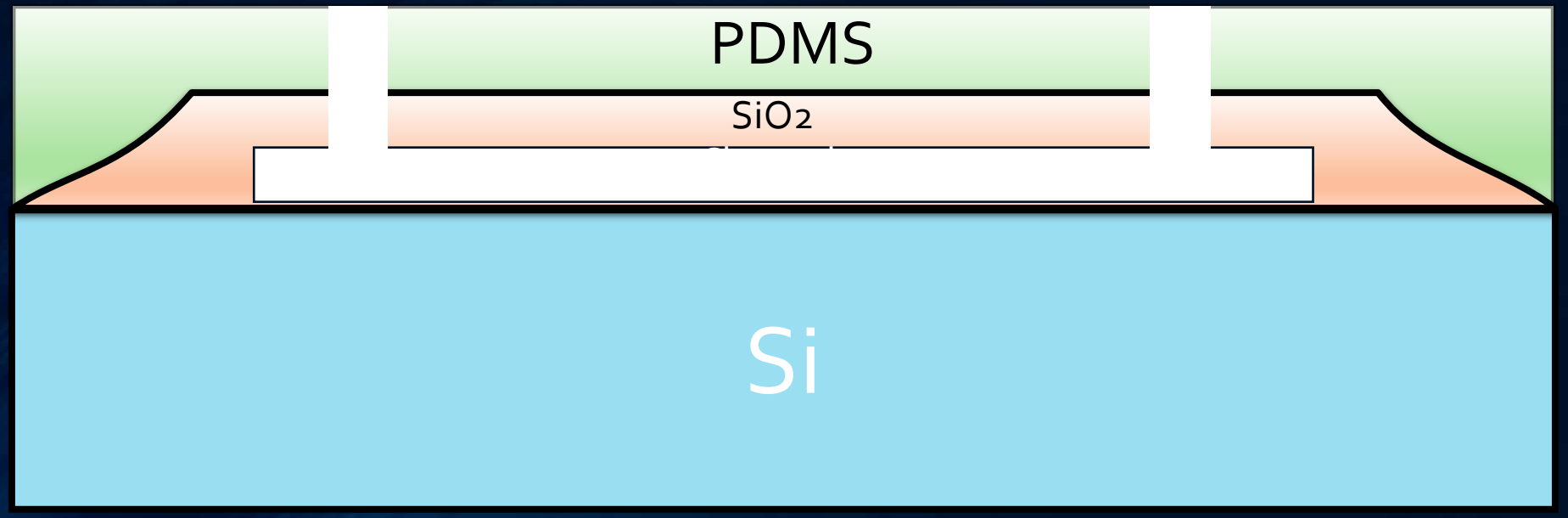

**Figure 4:** SEM image of a sample device revealed a 90° between the Si layer and the wall of the device.

# Soft Lithography

- Coat the sample with PDMS
- Spin Cycle
- Holes Punched
- BOE Etch to remove the $SiO_2$

# $XeF_2$ Etch

- Remove Si Inside the channel



# XeF2 Etch : Results

- Conditions

  60 cycles
  40 s pulses time

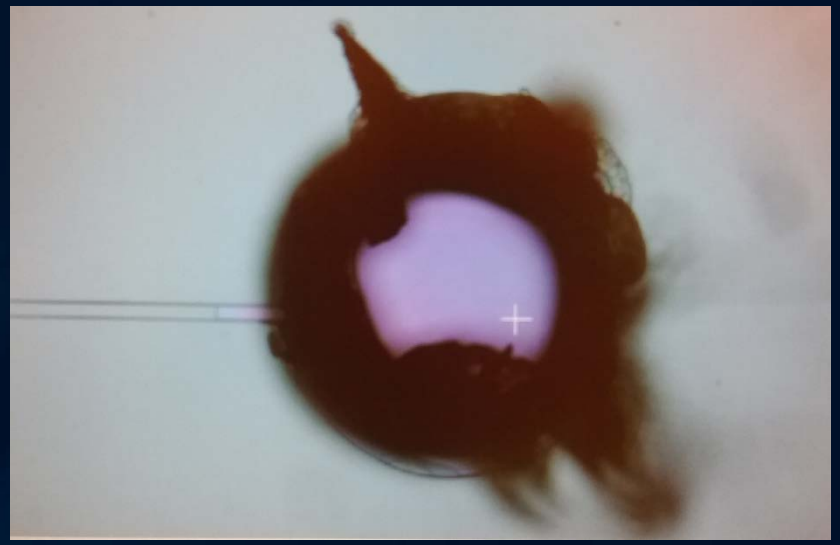


**Figure 4: XeF2 etch sample**

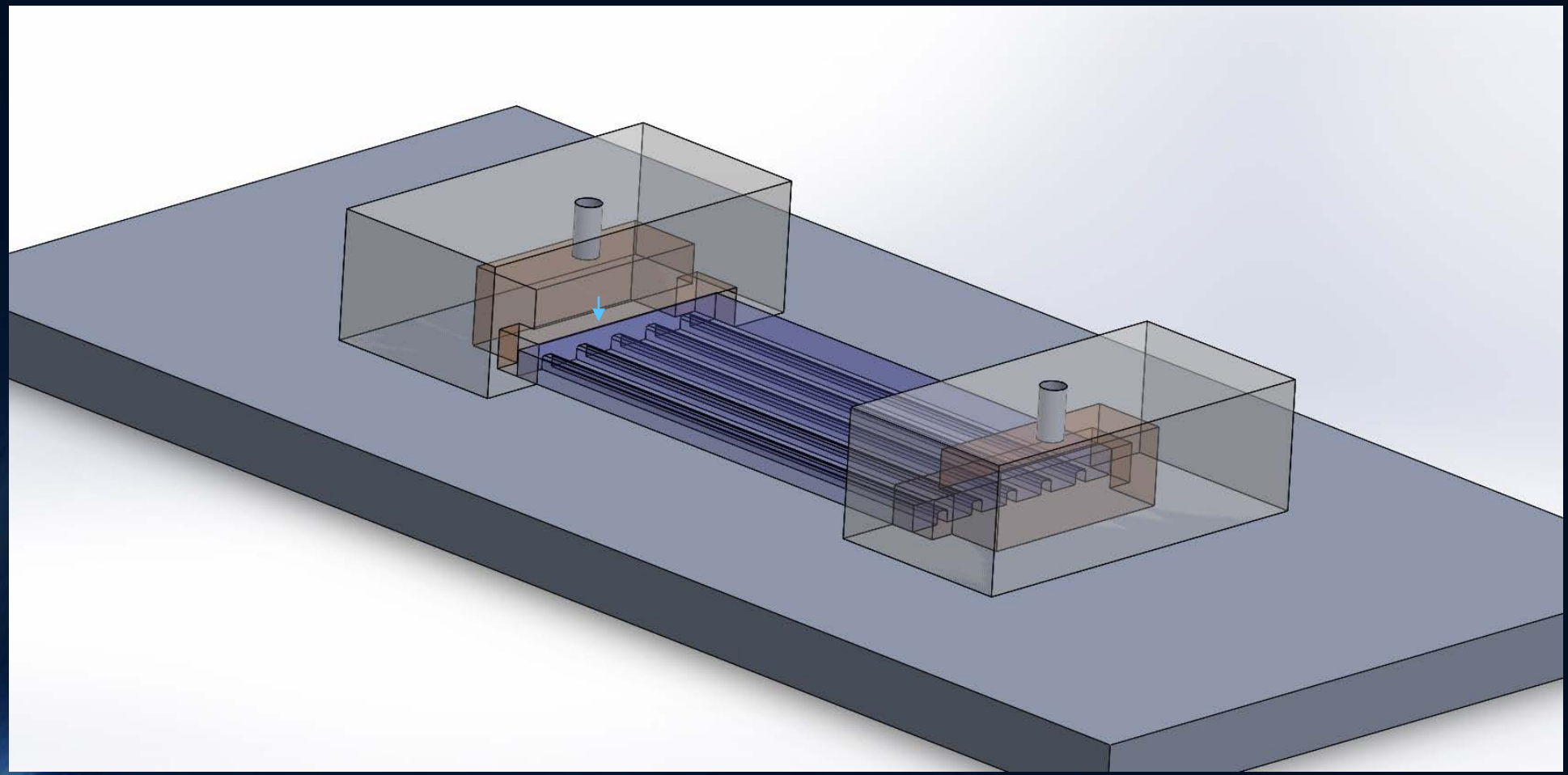
# Final Product : Microfluidic Device

- Ready for Biochemical Analysis

# Further Work:

- ALD Deposition
- Varying Ni and XeF2 ratios

# Nanotechnology



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