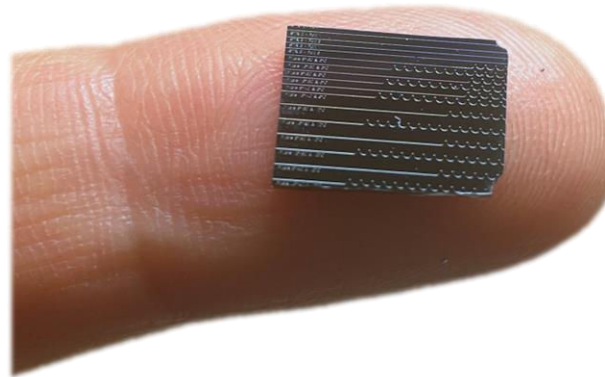


# Photonic Chips for Diagnostic Applications

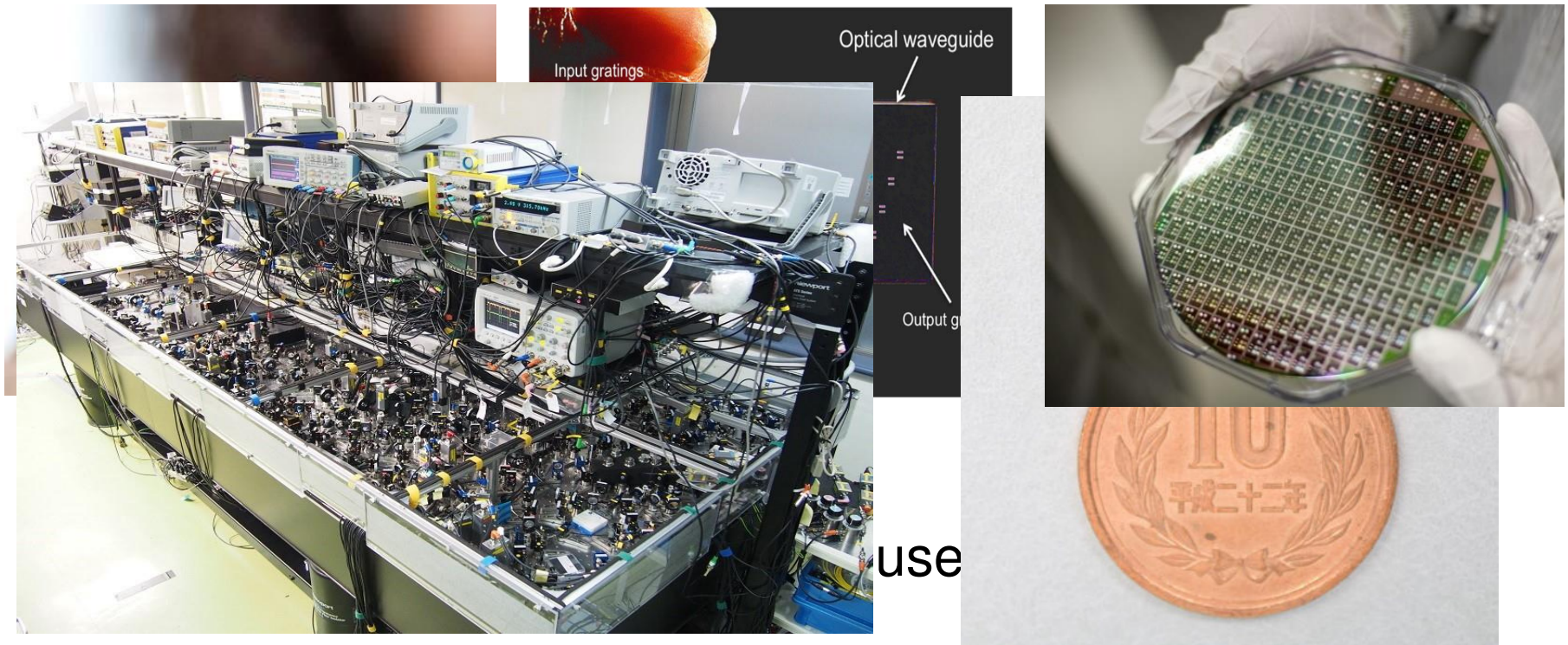


Asst. Prof. B. Imran AVCI

Department of Physics and Astronomy, LaserLab,  
VU University Amsterdam, The Netherlands

[b.i.avci@vu.nl](mailto:b.i.avci@vu.nl)

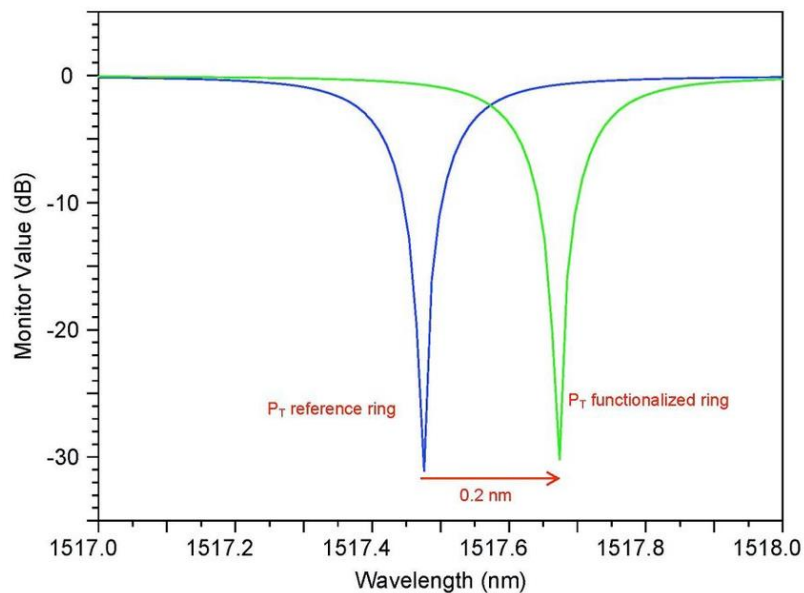
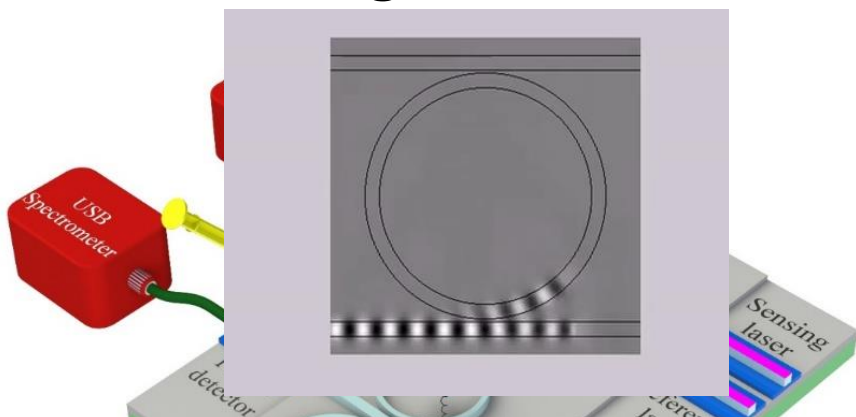
# What is a photonic integrated circuit (PIC)?



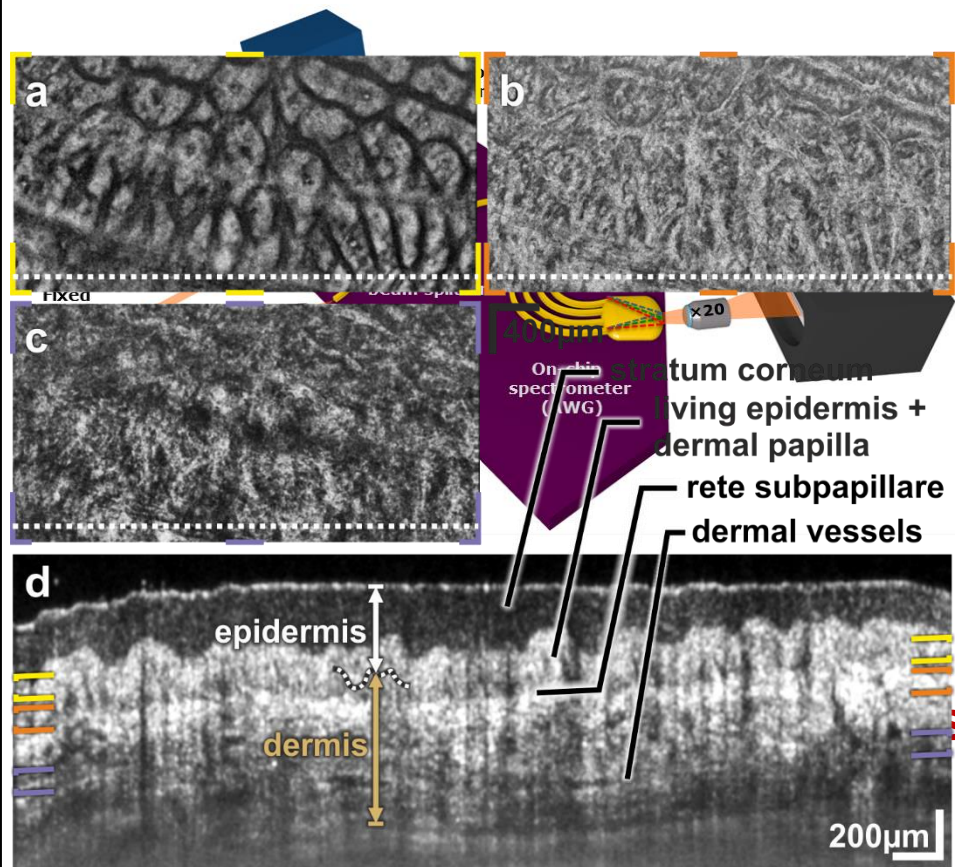
- PIC devices are **compact, multi-functional, multiplexible, and fast.**

# Diagnostic Applications of PICs

- Biosensing

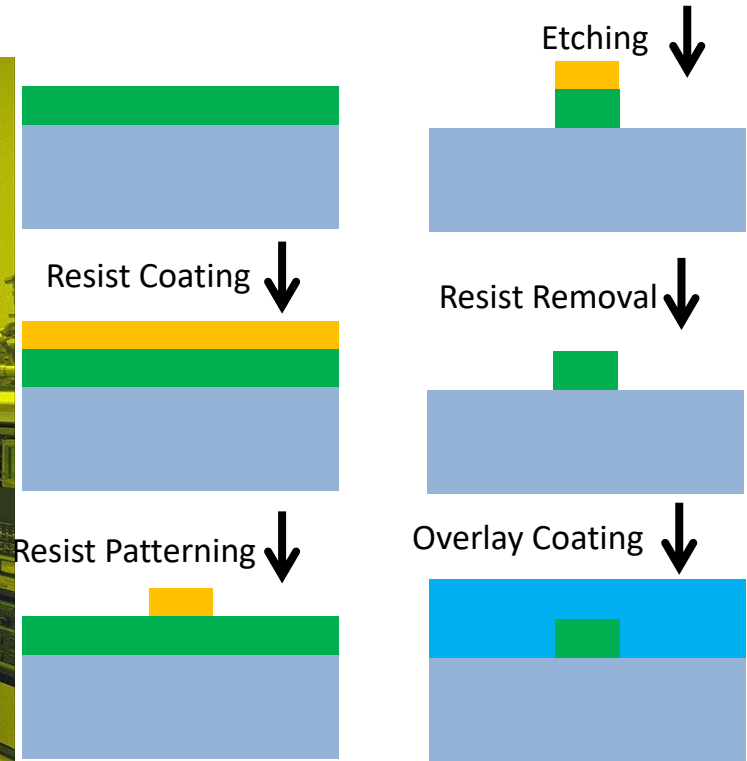
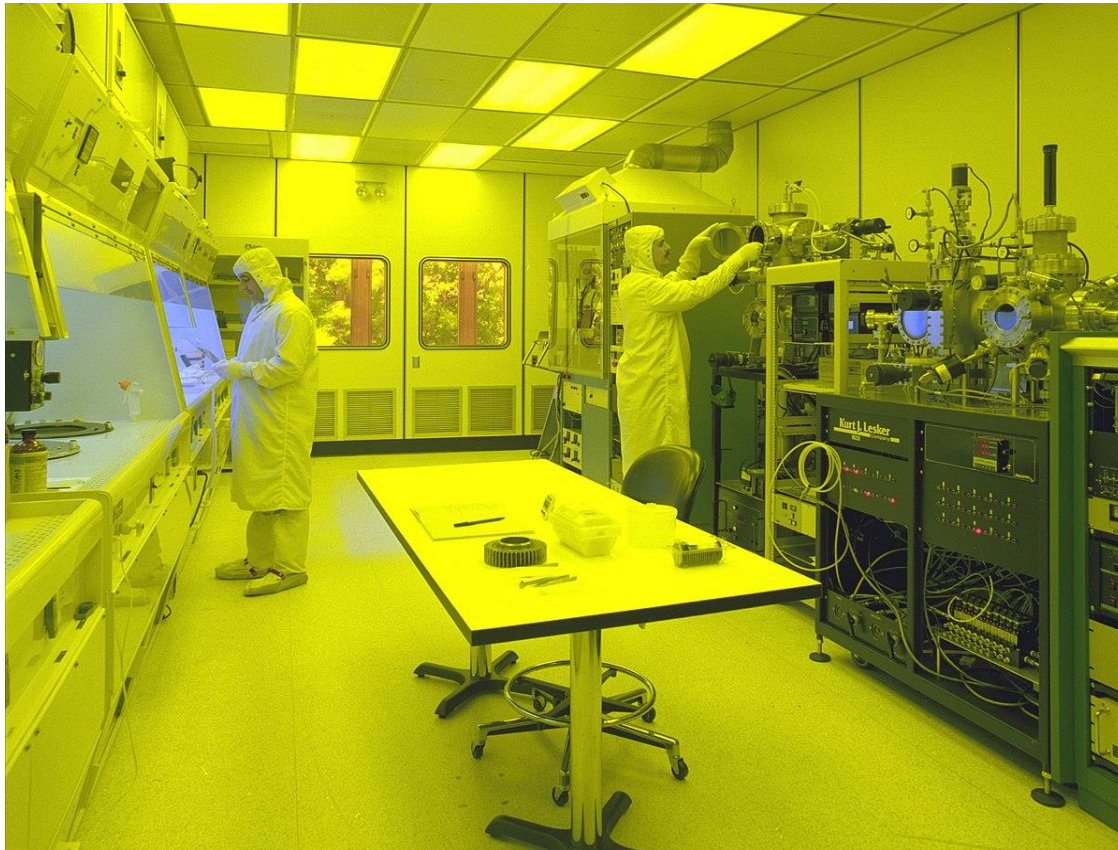


- Optical imaging





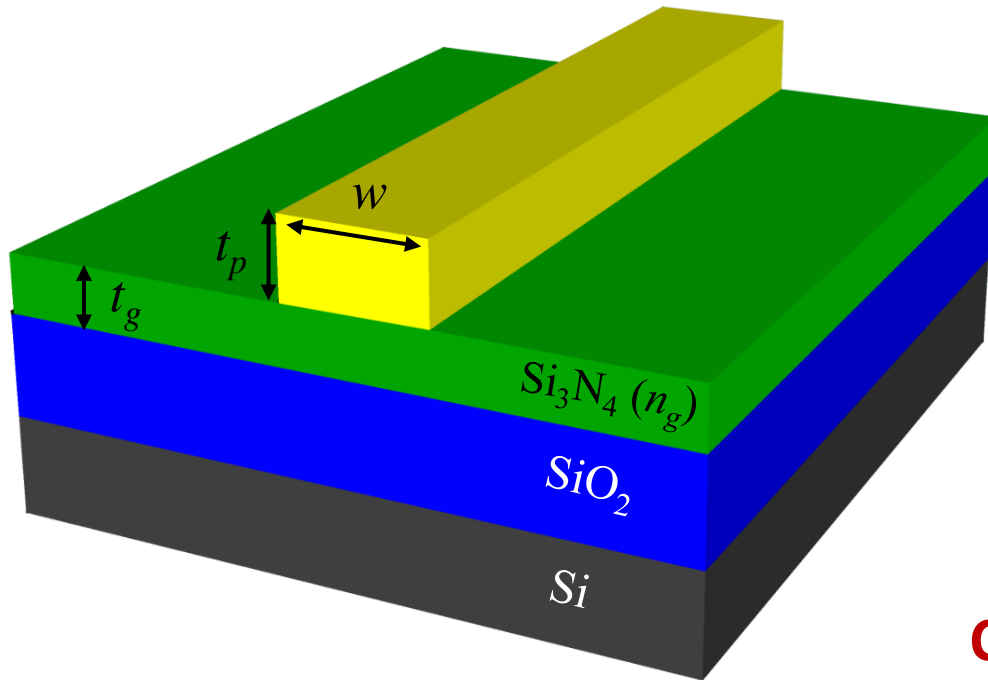
# The dilemma: cost and time



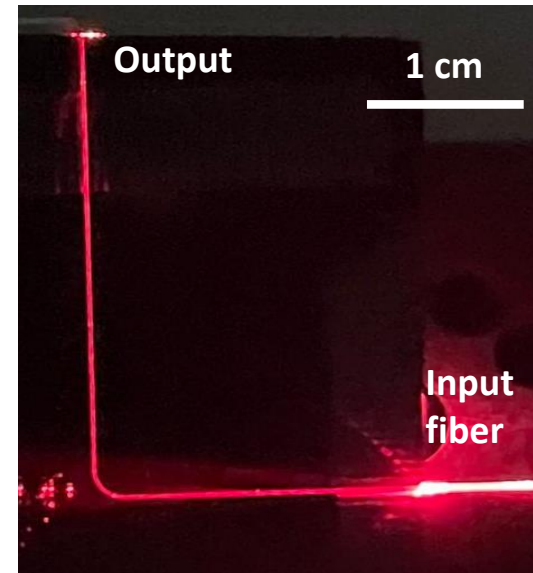
Budget:  $\geq 100.000$  Euros

Waiting time: min 10 weeks

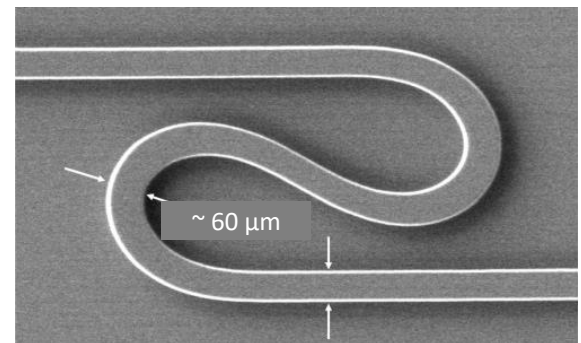
# An enabling waveguide technology



Low loss:  $\sim 0.8 \text{ dB/cm}$



Compact:  $60 \mu\text{m}$  bending radius



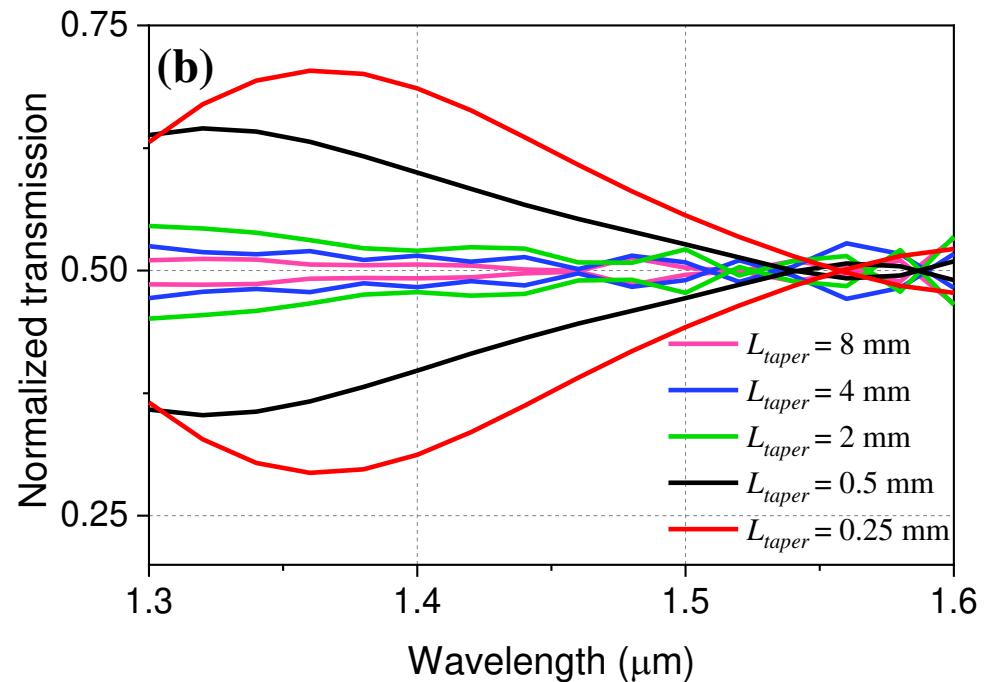
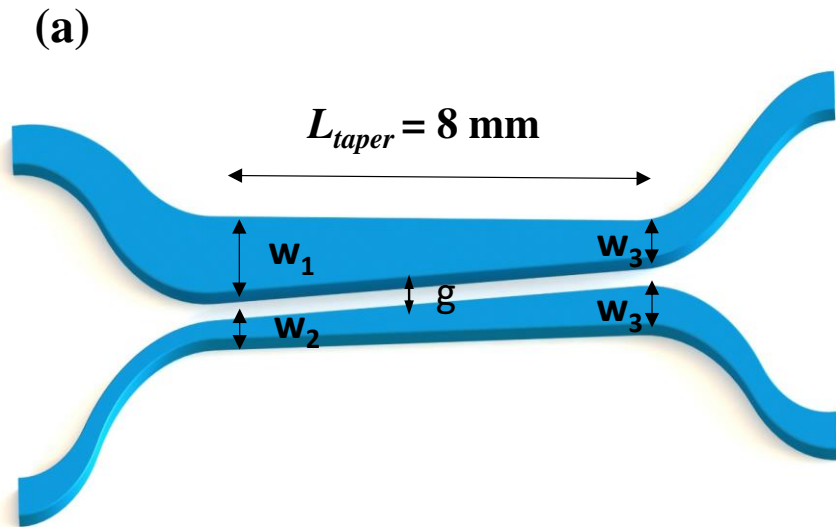
Budget:  $\sim 1000$  Euros

Waiting time:  $< 2$  weeks

Patent: PC-ACTIVE\_UK.FID4621352

# Broadband components:

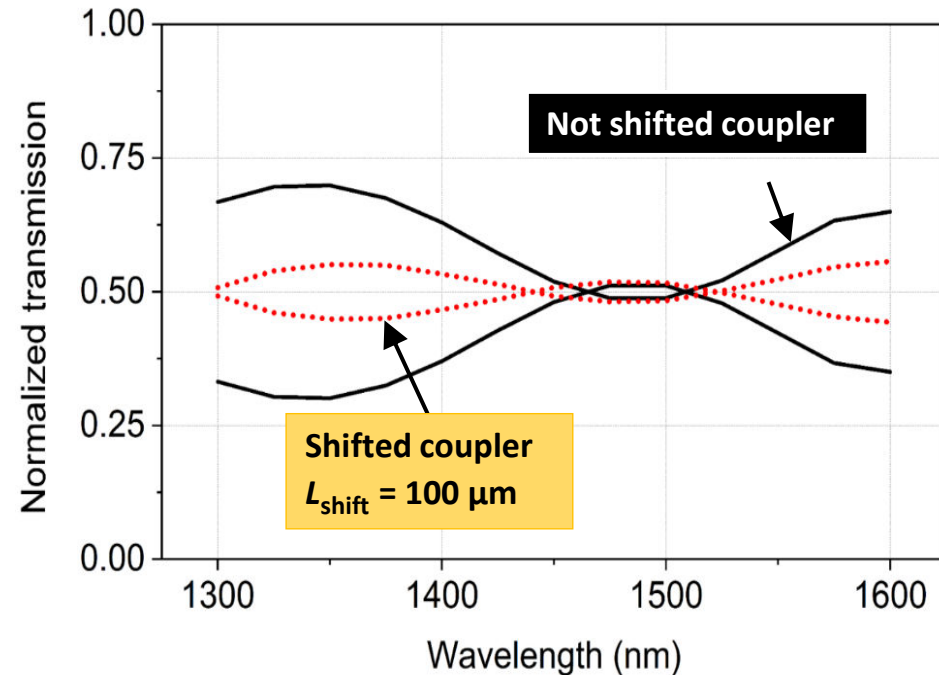
## A new type of coupler



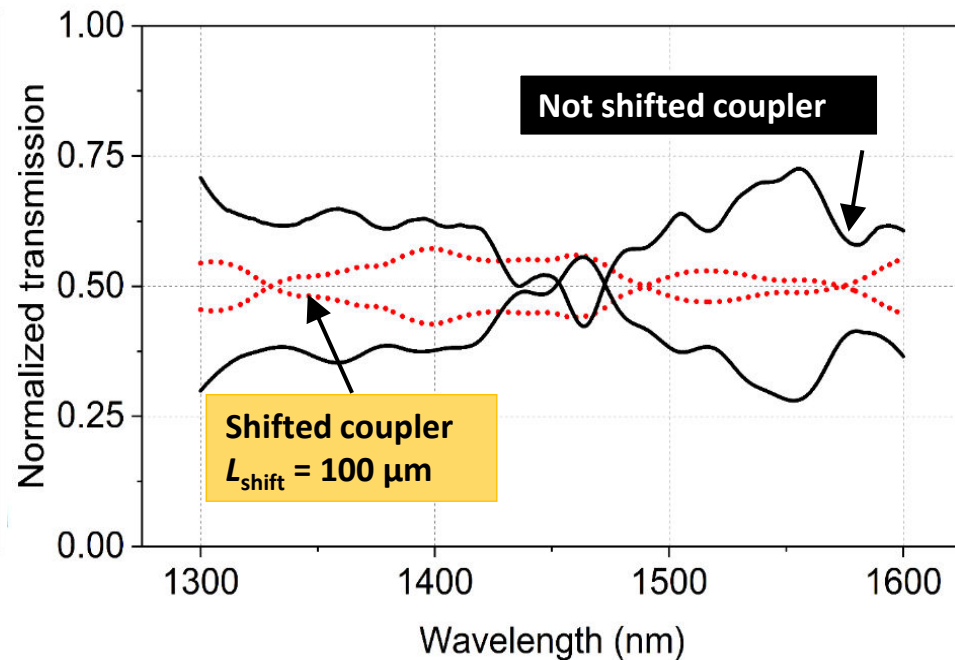
# Broadband on-chip components:

## A new type of 3dB coupler

### Simulation



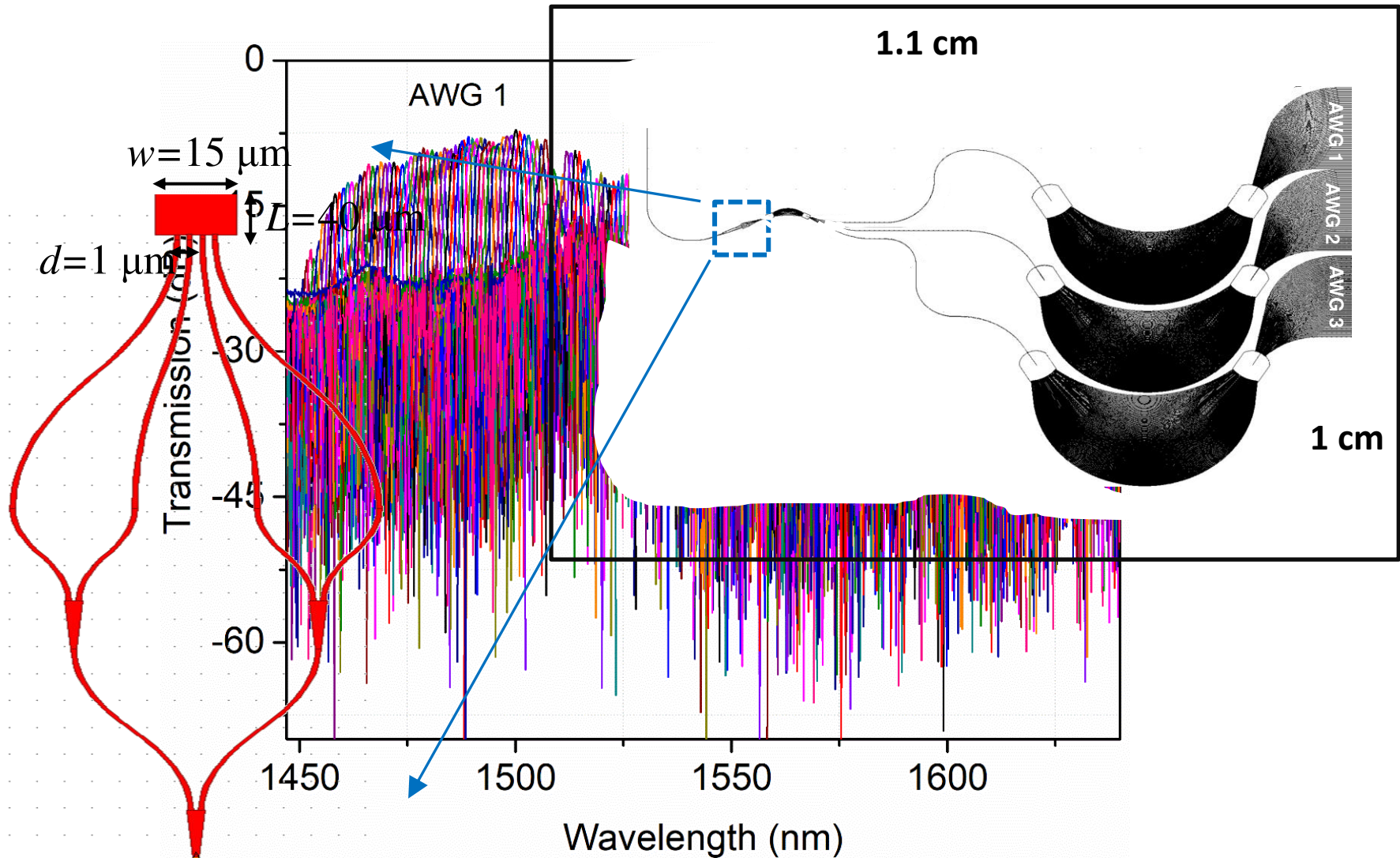
### Measurement





# Broadband on-chip components:

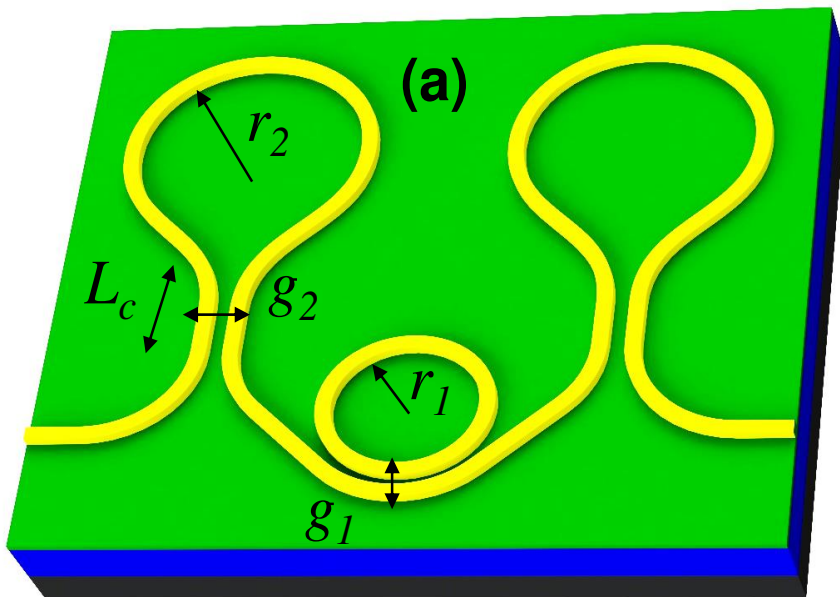
## Cascaded AWG spectrometer



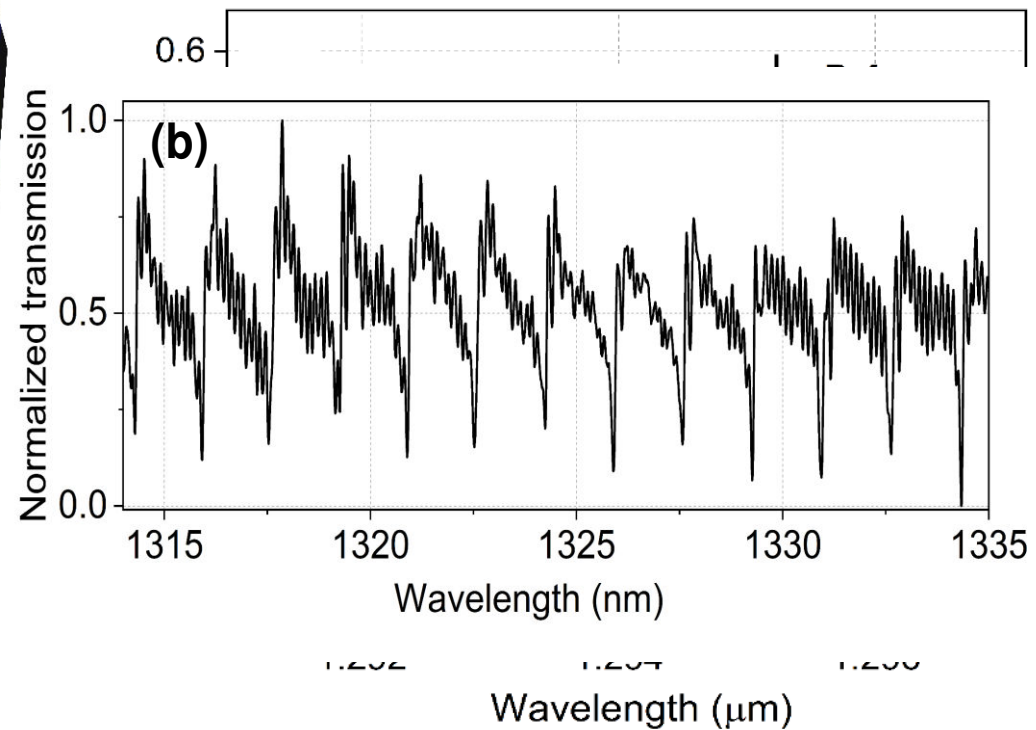


# Minimizing Environmental Effects:

## Coupled cavities



Yellow Polymer    Blue  $\text{SiO}_2$   
Green  $\text{Si}_3\text{N}_4$     Black Si



# Thanks so much!

