

# NAVOLCHI November

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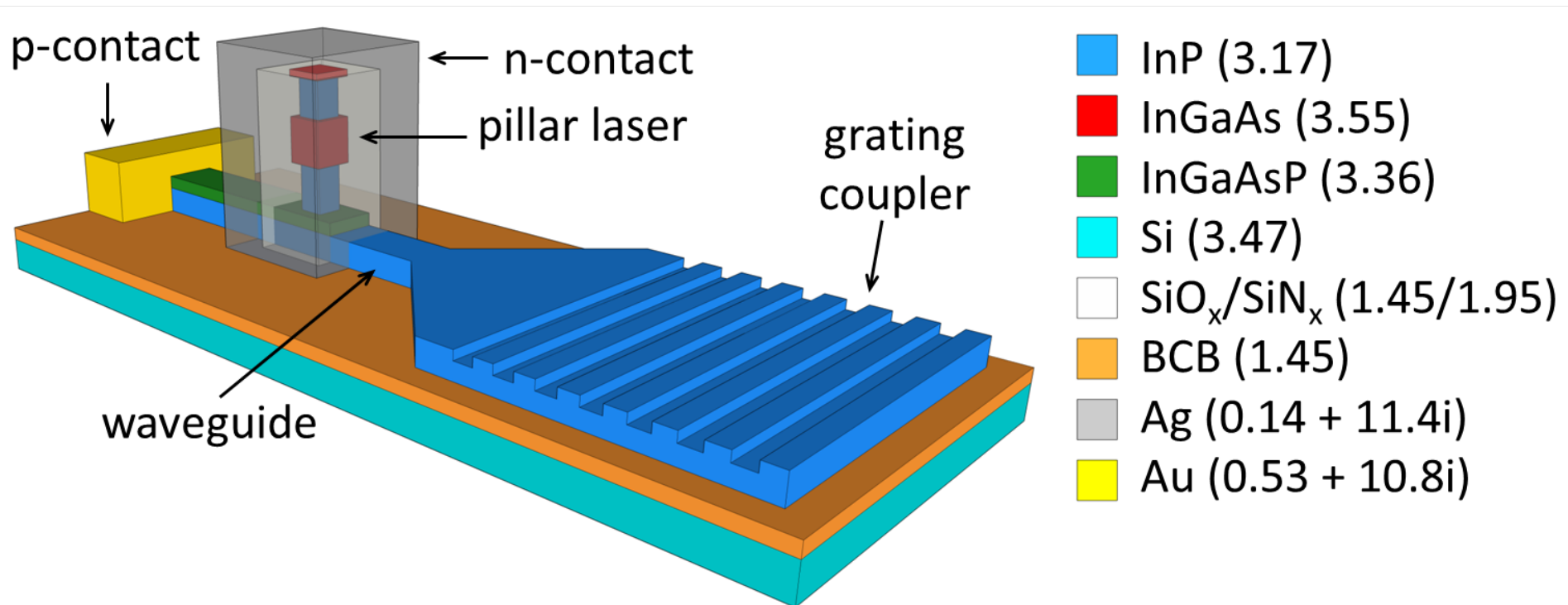
**TU** / **e** Technische Universiteit  
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**Where innovation starts**

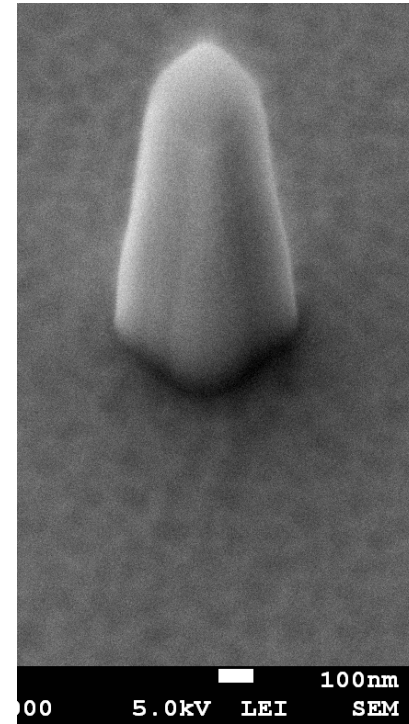
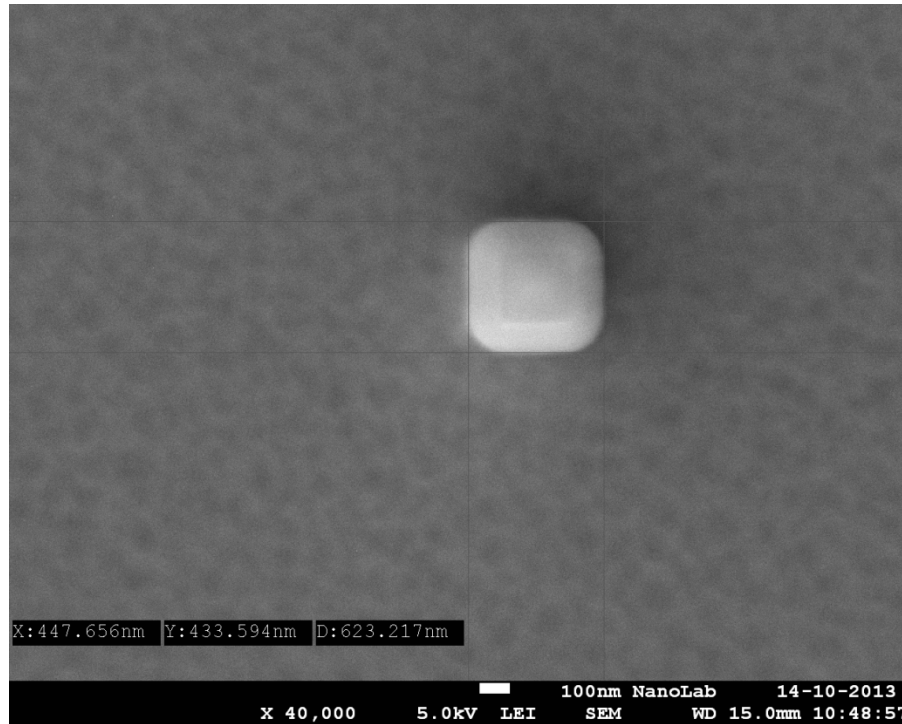
# Update on first run of nanolasers

- Chip size: 7x7 mm<sup>2</sup>
- About 200 devices (initial plan)
- 3 e-beam and 4 optical lithography steps
- Processing time ~ 2 months
- Progress: 70%

# Schematic of nanolaser to fabricate



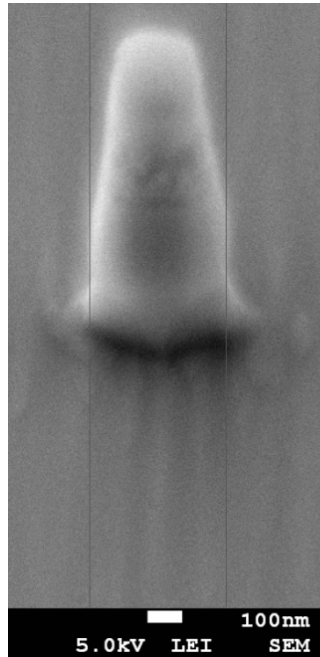
# After pillar etching, ICP (CH<sub>4</sub>-H<sub>2</sub>)



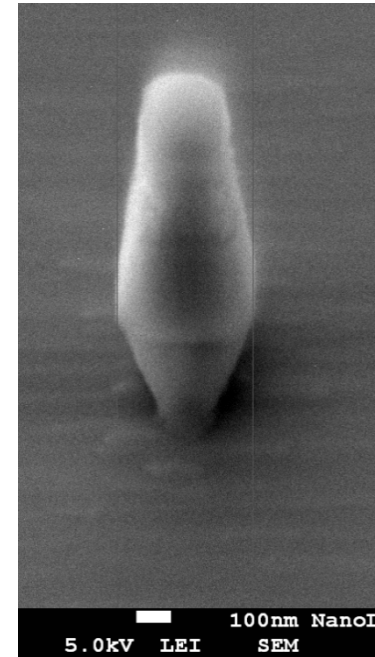
- Large sidewall angle (~5 deg)
- InGaAs angle > InP angle

# After InP wet etch - H<sub>2</sub>O:H<sub>3</sub>PO<sub>4</sub>:HCl(2:4:1)

- Parallel to waveguides

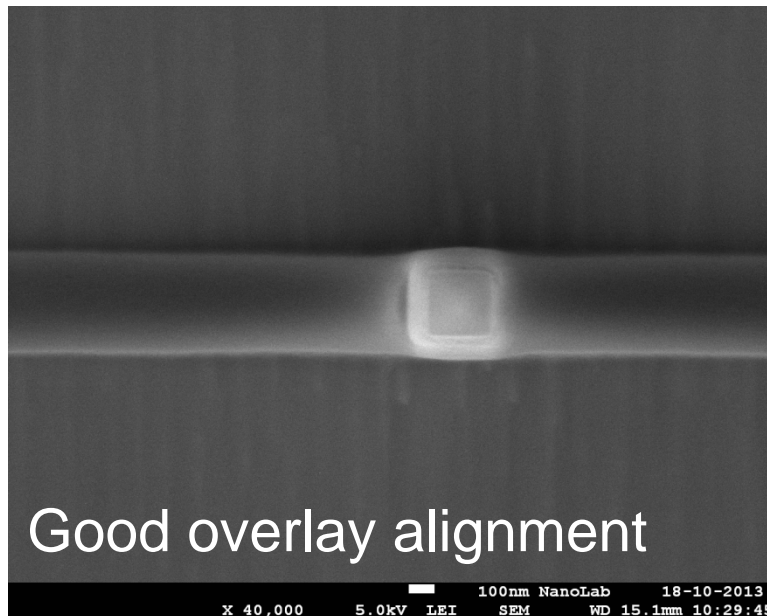
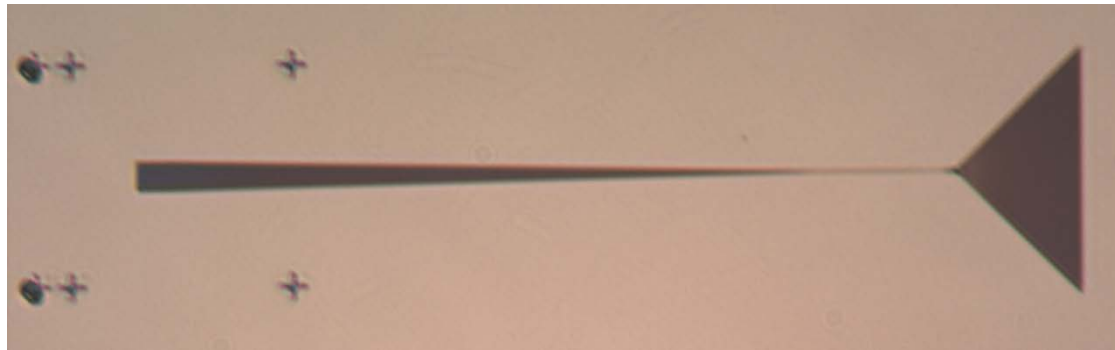


- Perpendicular to waveguides

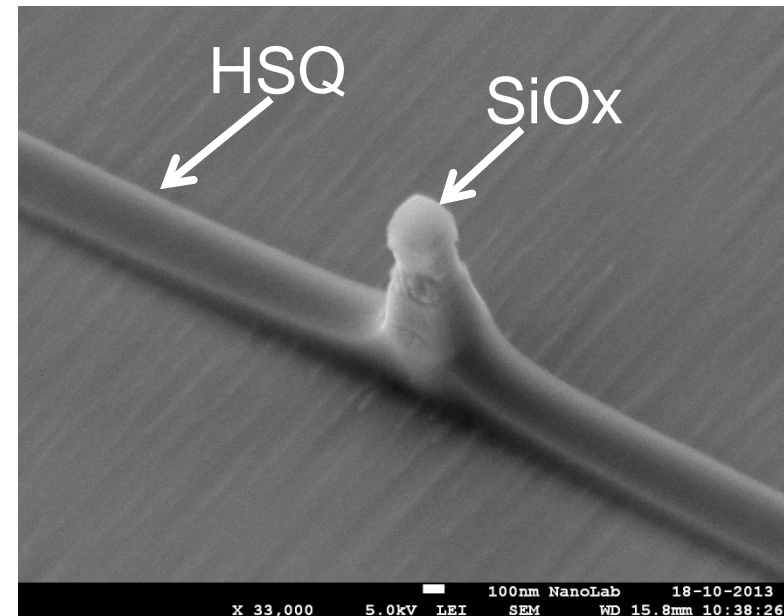


# After 2<sup>nd</sup> EBL and HSQ development

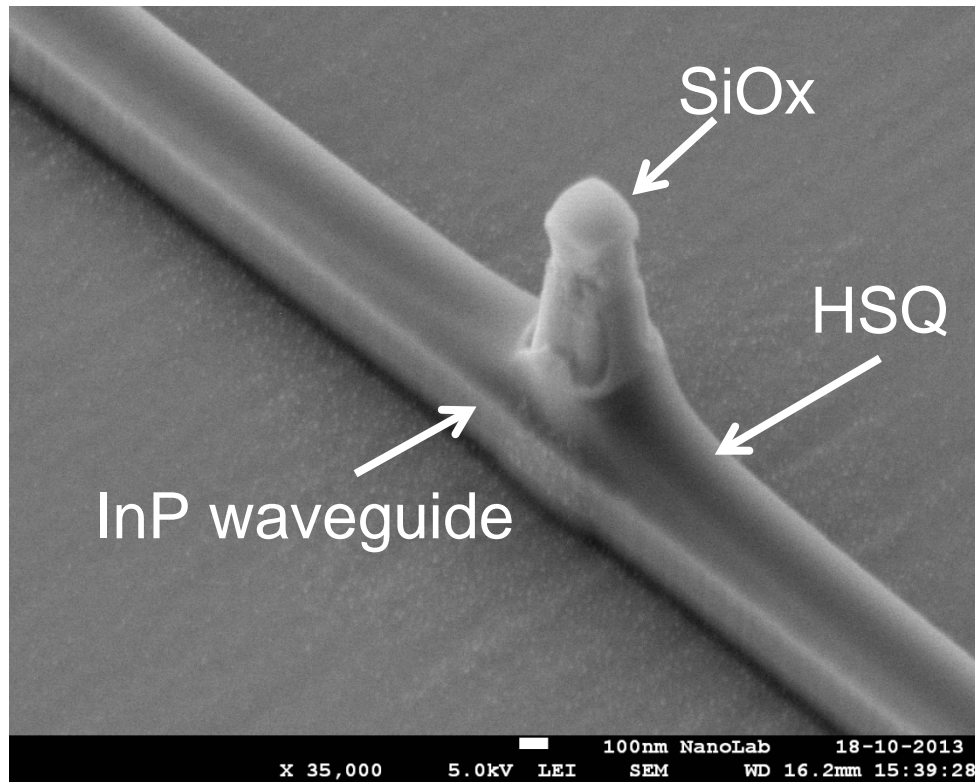
- Optical microscope



Good overlay alignment

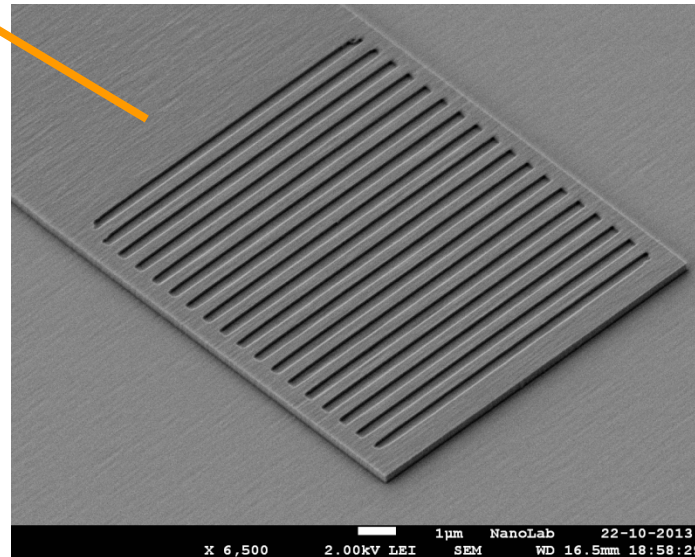
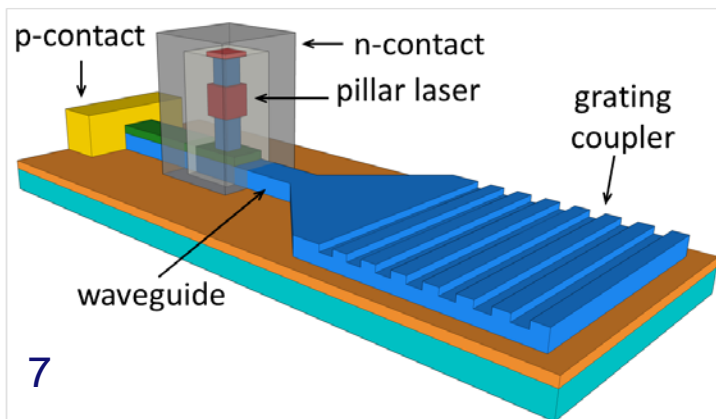
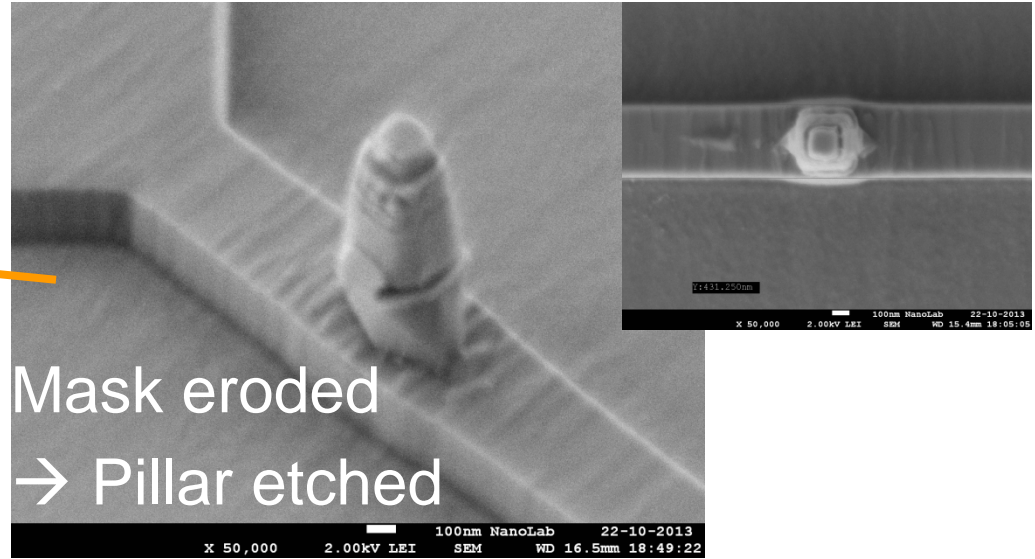
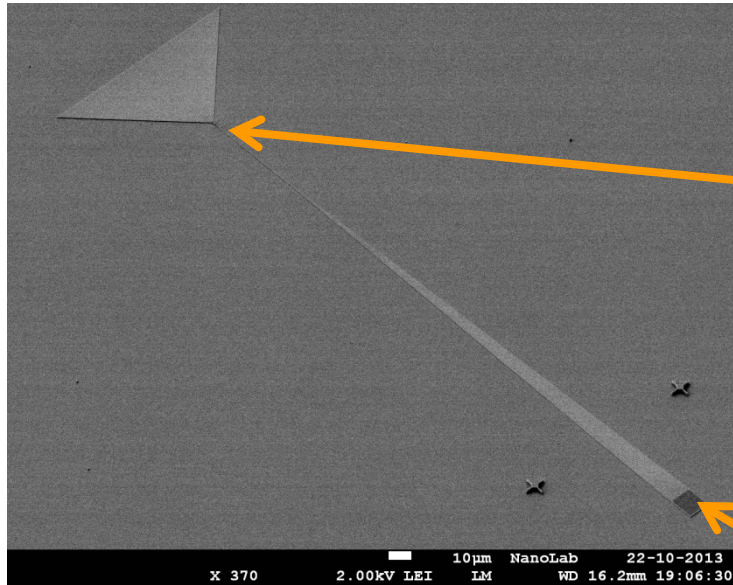


# After waveguide etching (RIE)



# After InP RIE gratings etch and hardmask cleaning

- Device 120



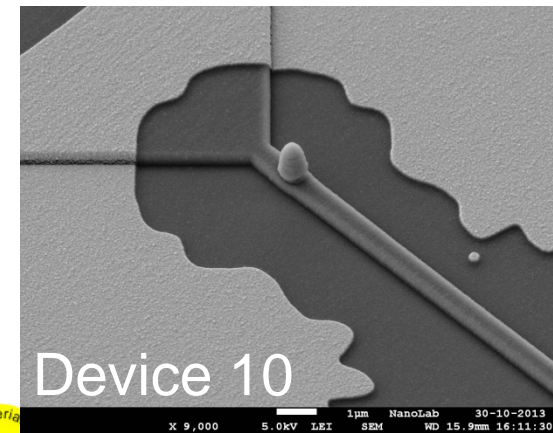
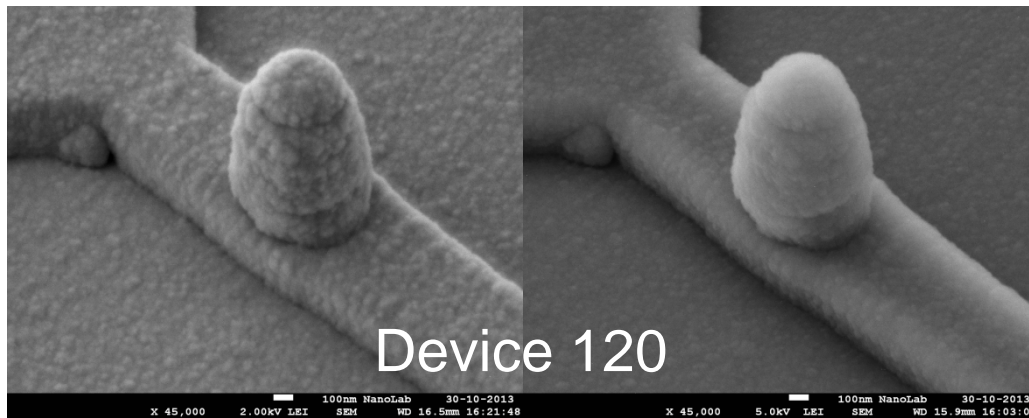
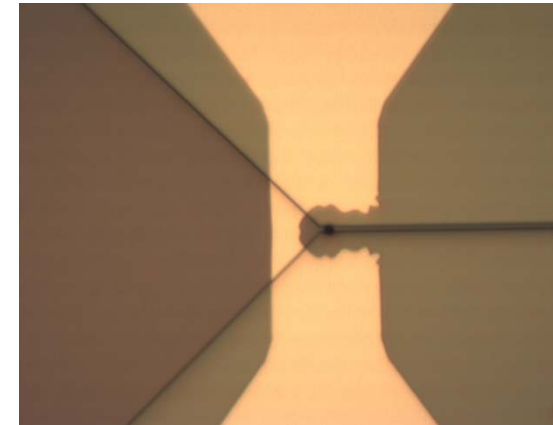
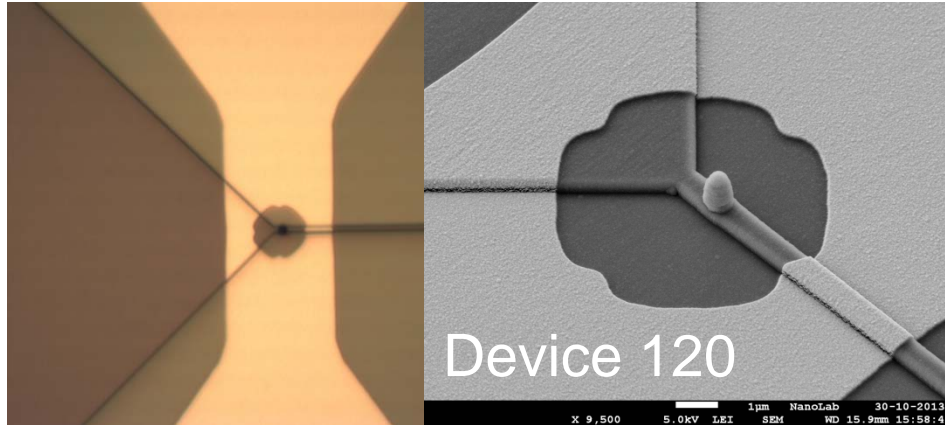


# Adhesion pads

## After Ti/Au(50,40nm) deposition and lift-off

- Only pillar protected

- Pillar and waveguide protected



# Main fabrication issues (so far)

- Non-vertical etch of bonded samples
- Too much mask erosion during etching of grating coupler  
→ Pillar is also etched
- Low quality of SiO<sub>x</sub>
  
- Others:
  - Dicing of processed samples

# Other issues

- MS15: Initial testing of bonded plasmonic lasers (10/2013)
  - It will be delivered next year. To be discussed with Martin Sommer.