Nanospoke Targets and their Fabrication

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3rd European Target Fabrication Workshop

Lady Margaret Hall, Oxford

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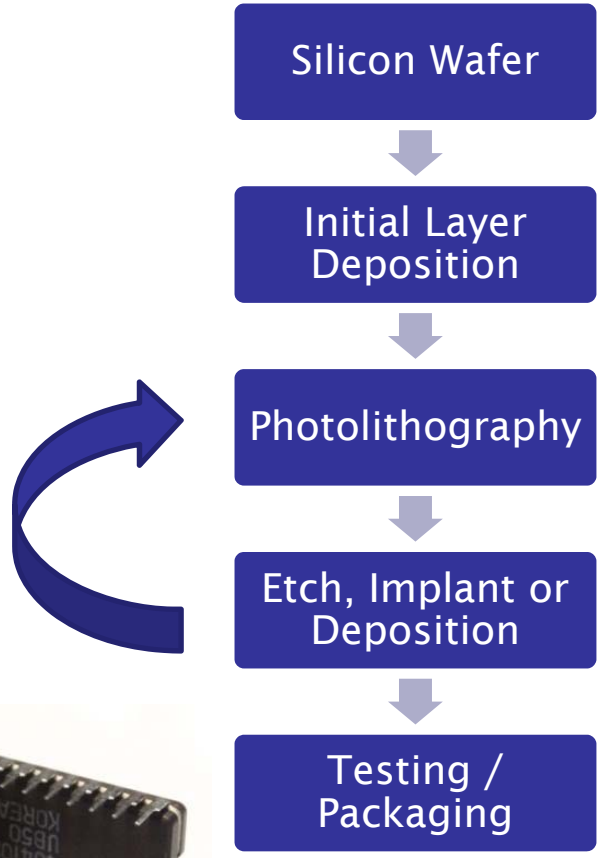
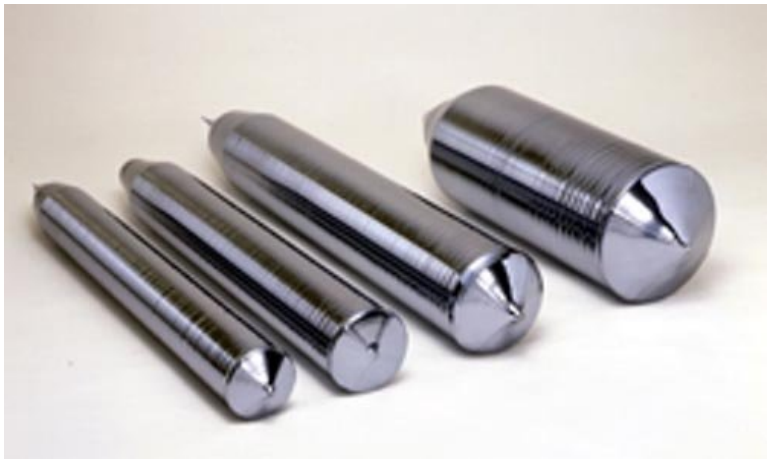
Science & Technology Facilities Council

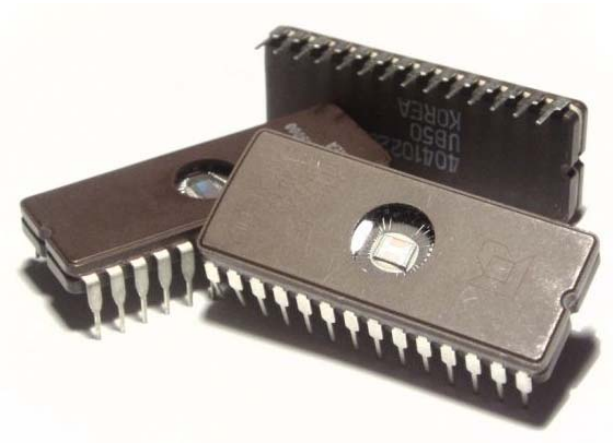
Micro and Nanotechnology Centre

- Based at STFC, Rutherford Appleton Laboratory
- 1200m^2 of class 100 and class 1000 cleanrooms
- Photo- and E-beam lithography
- DRIE and Wet etch
- PECVD and Thermal deposition
- Low Volume Wafer Based Research and Manufacturing

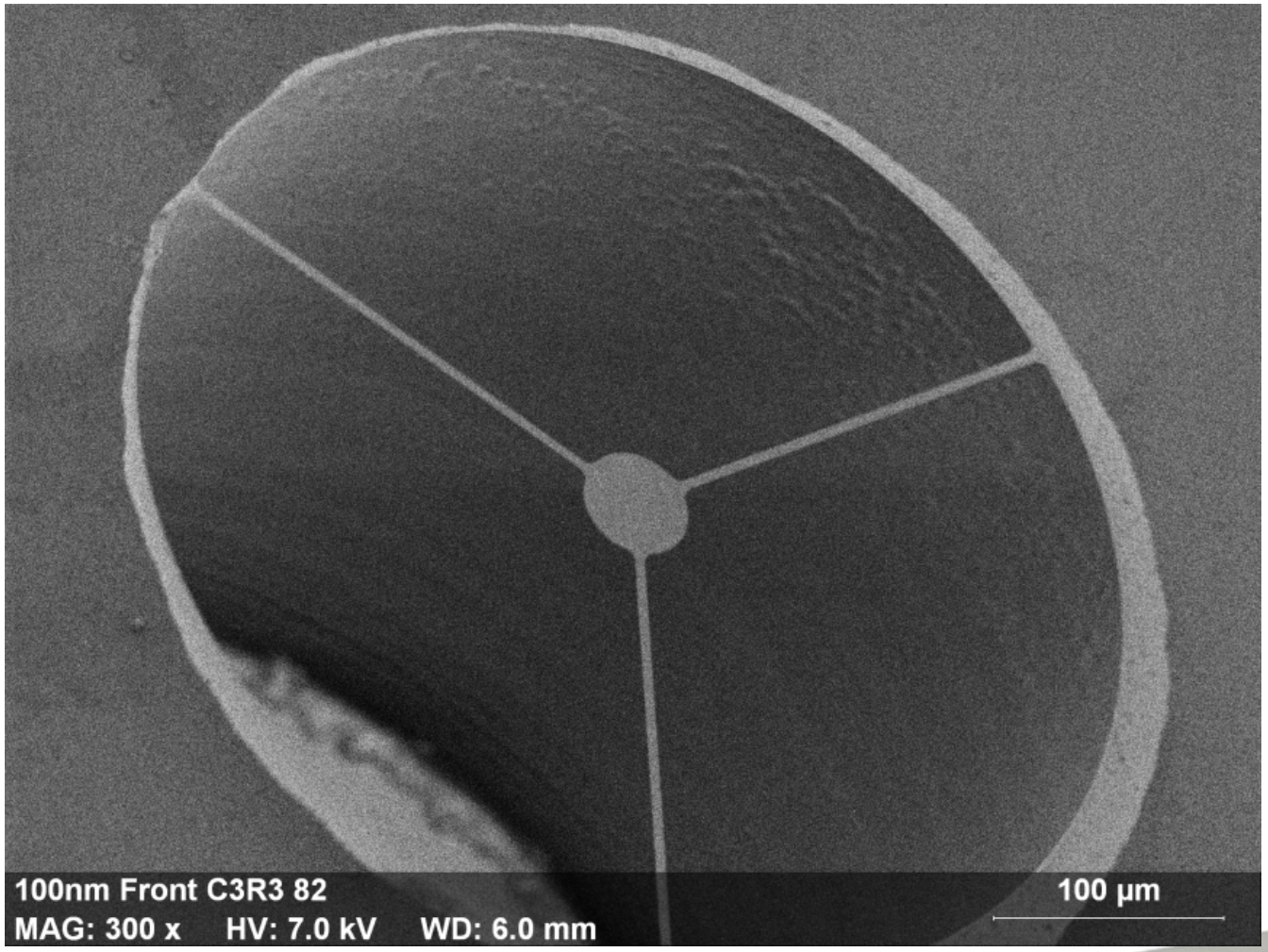
Wafer-based Manufacturing



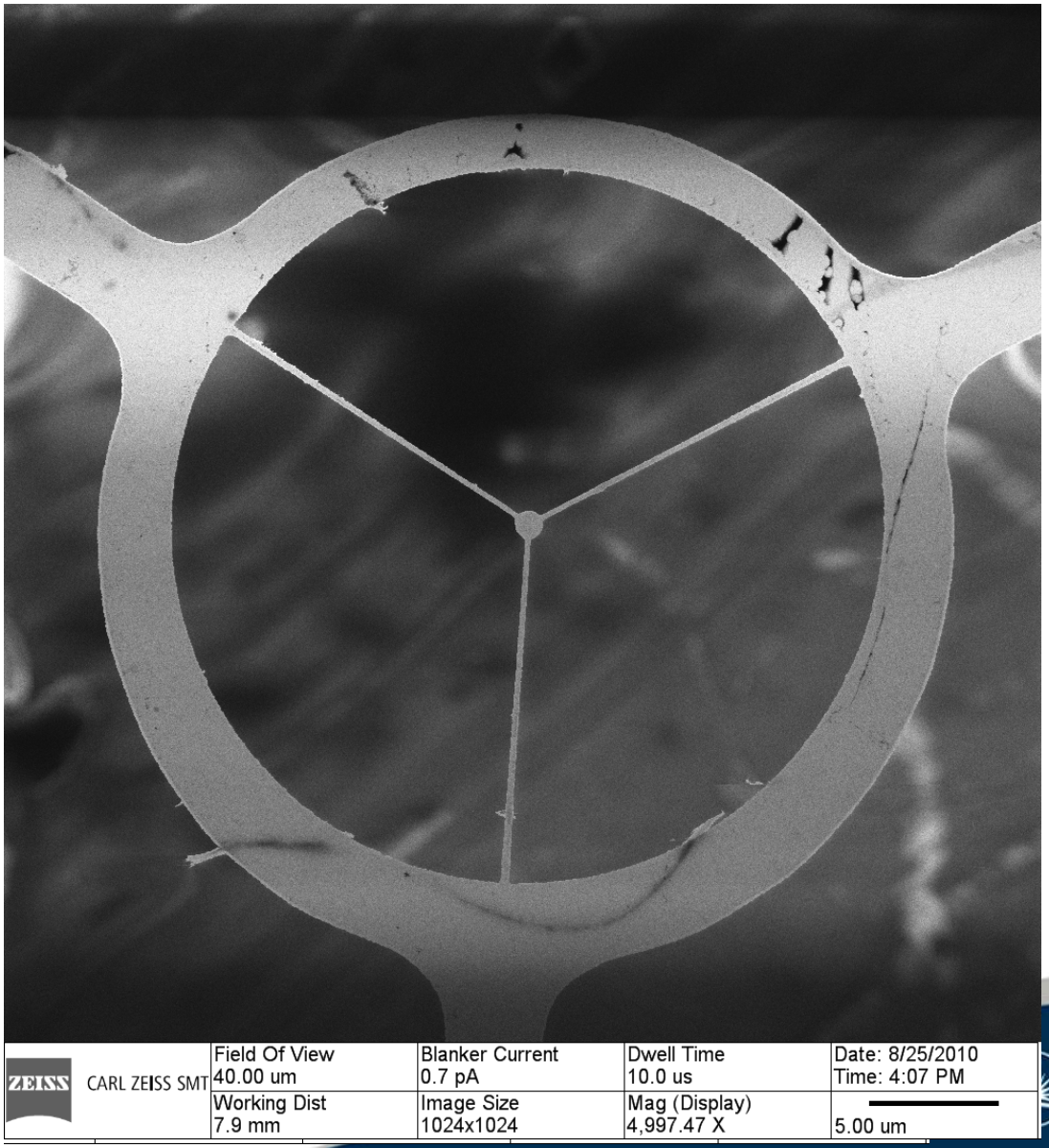




Nitride Membrane Microspoke Targets



Nitride Membrane NANOspoke Targets



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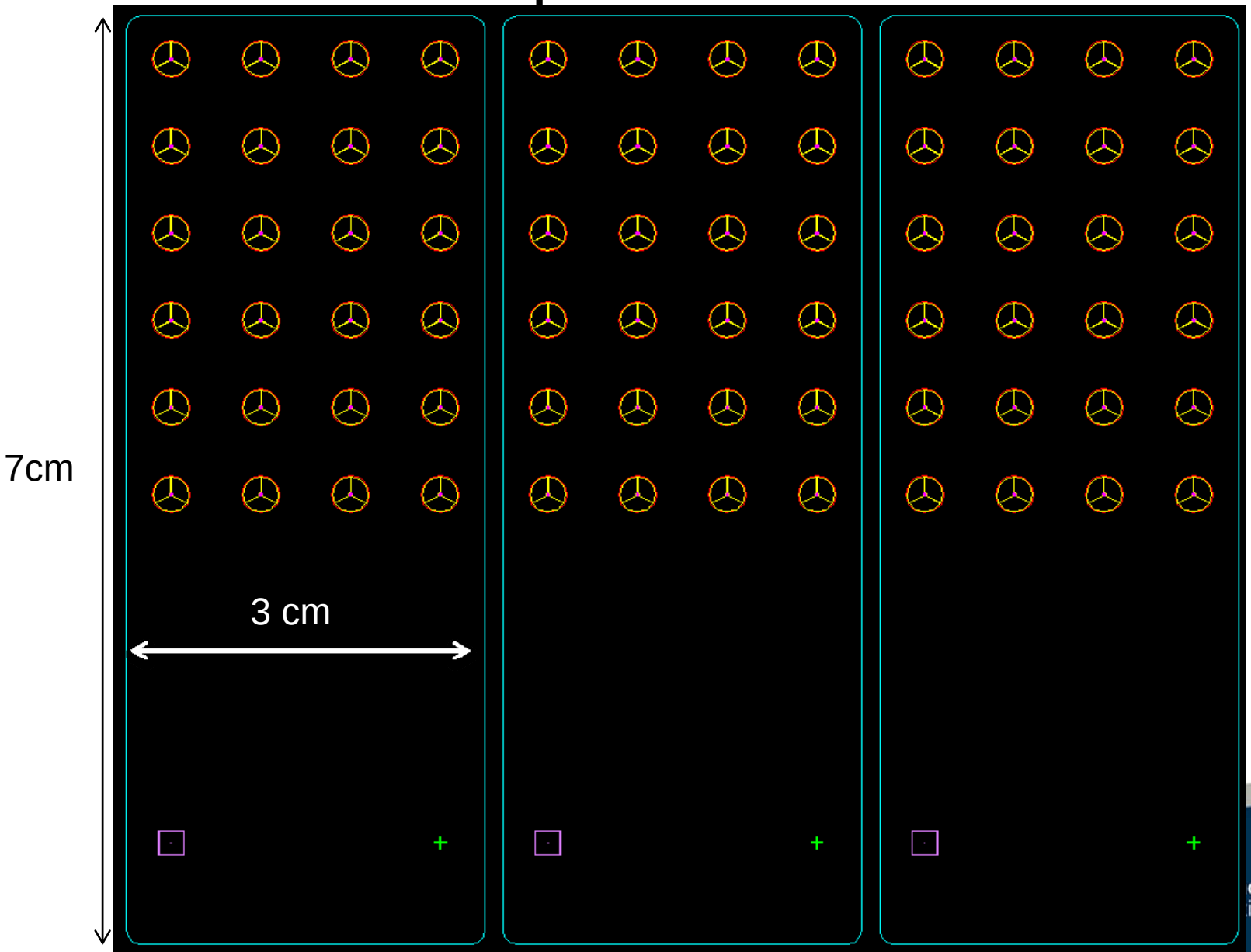
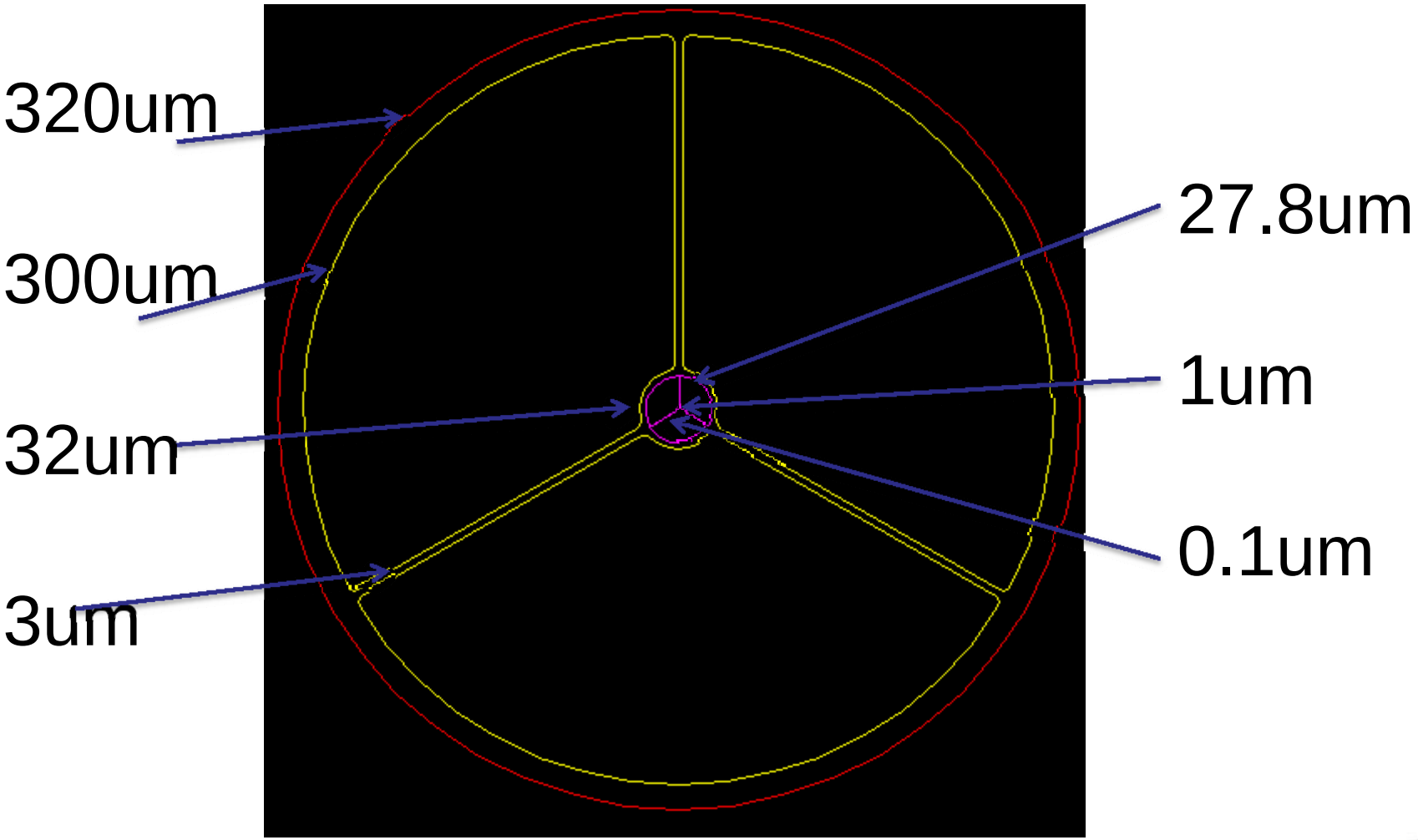
“Target Stats”

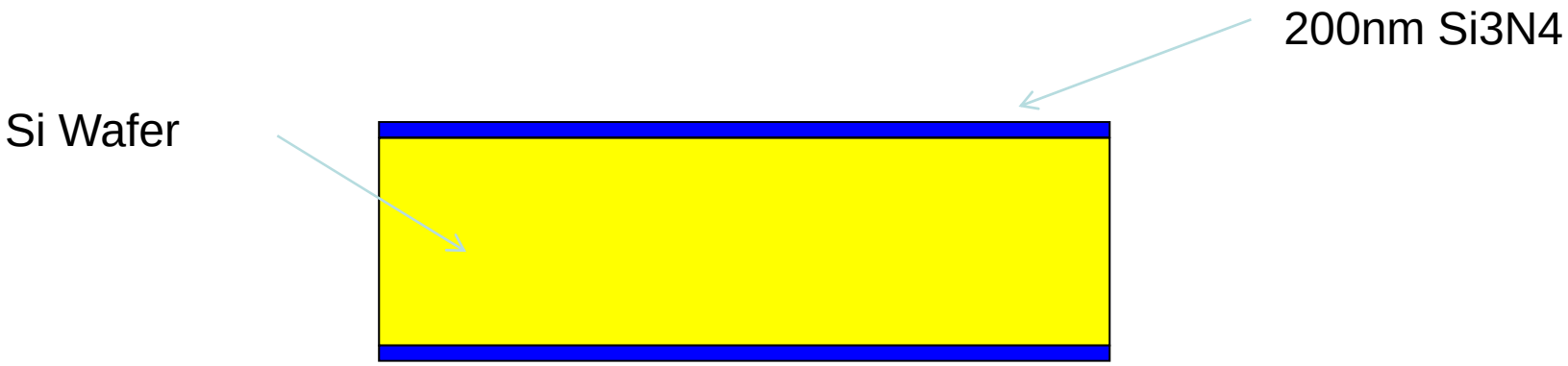
- Nitride Membrane
- ~ 40 – 50 nm thick
- 1um central target disk,
- 100nm wide arms
- 24 targets per chip
- 300 chips per wafer
    - 7200 targets possible !!!!

“Chip” Schematic





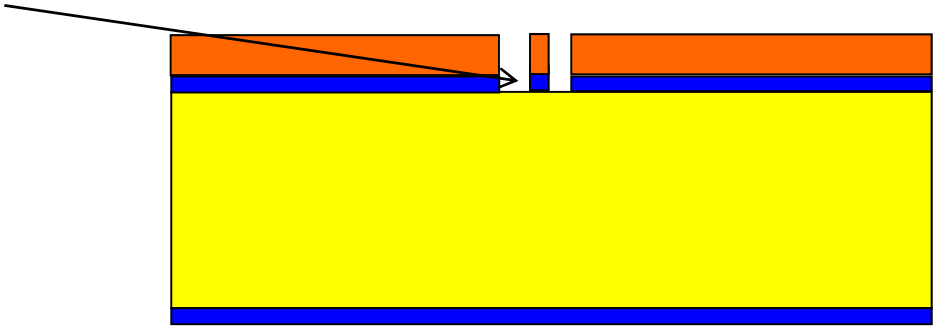
The Process

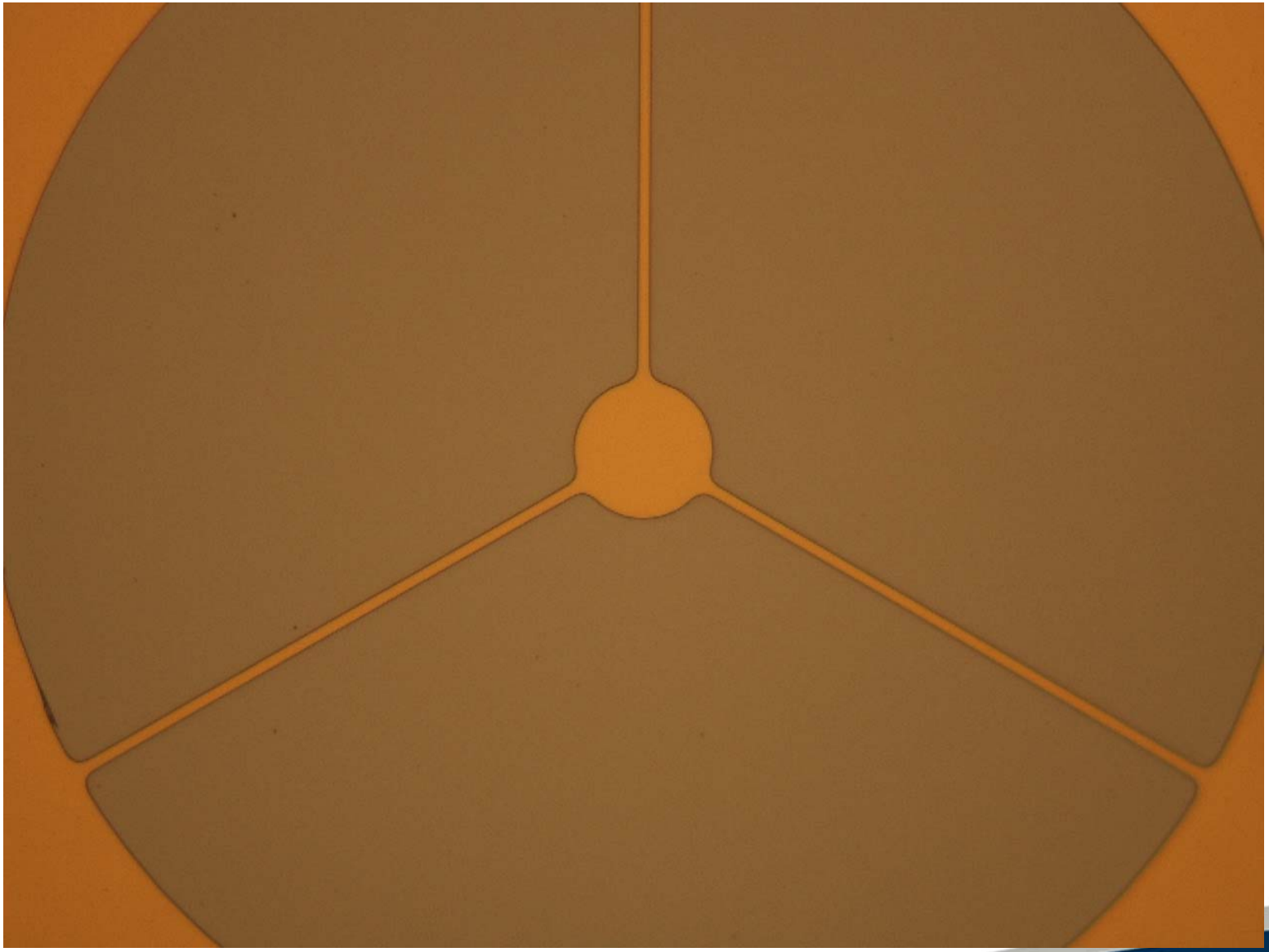


The Process

Photo and

Etch through Nitride





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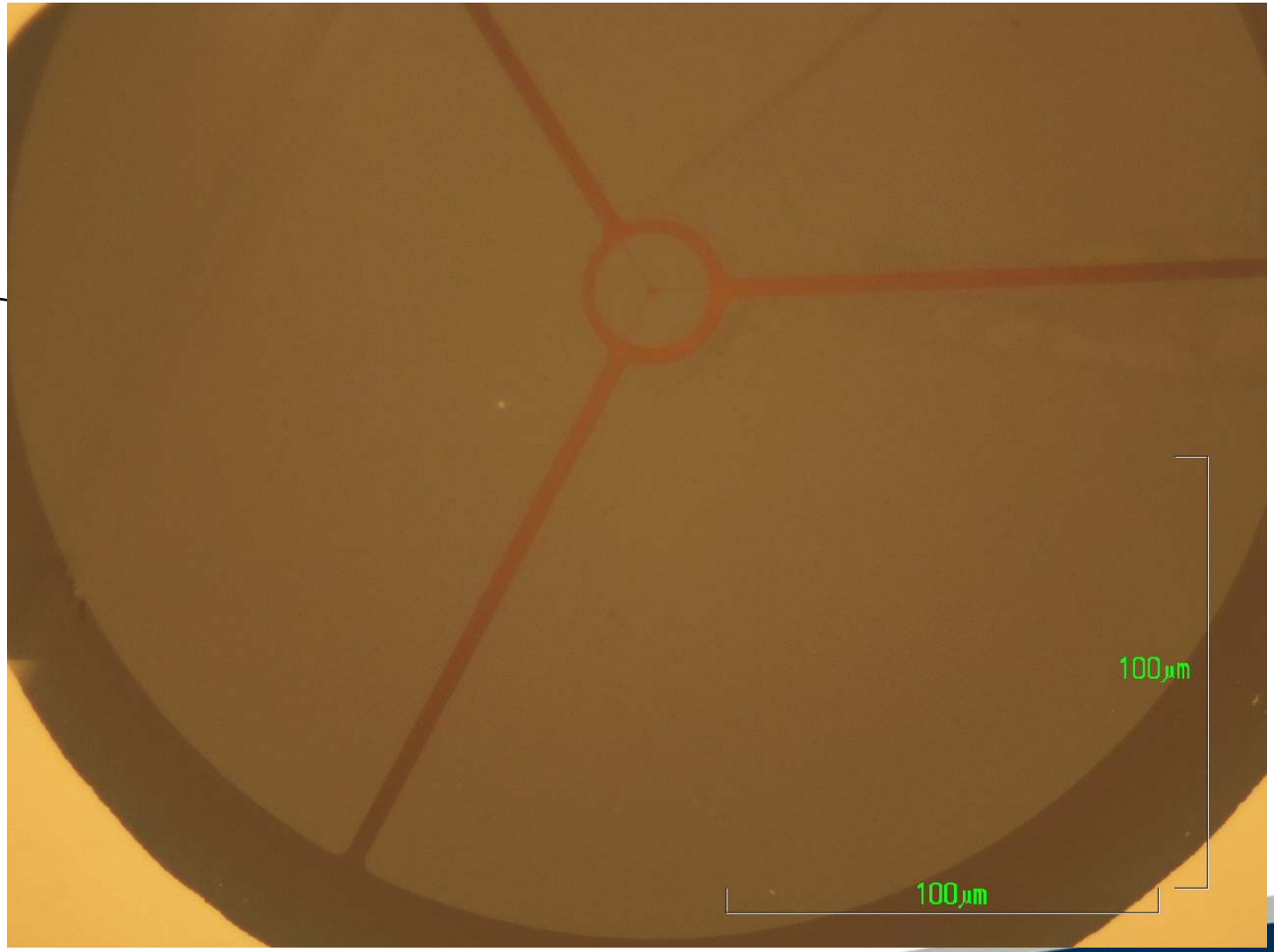
The Process

E-beam and

Etch through



The Process

Protective Layer

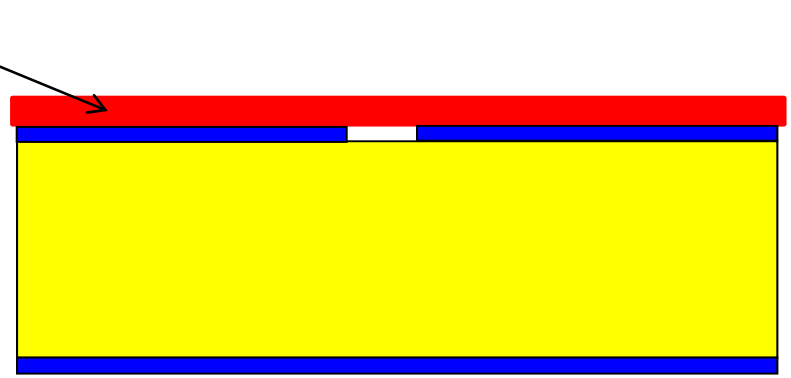
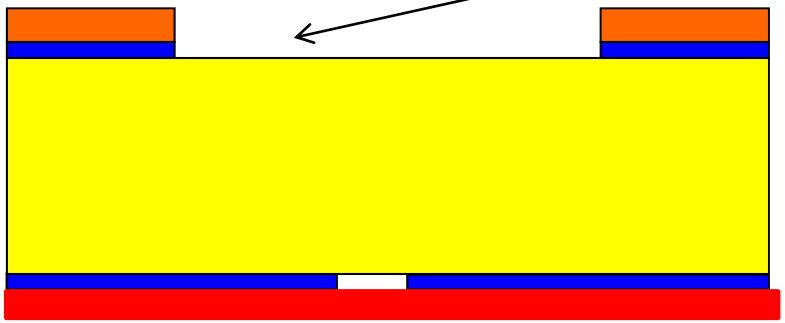
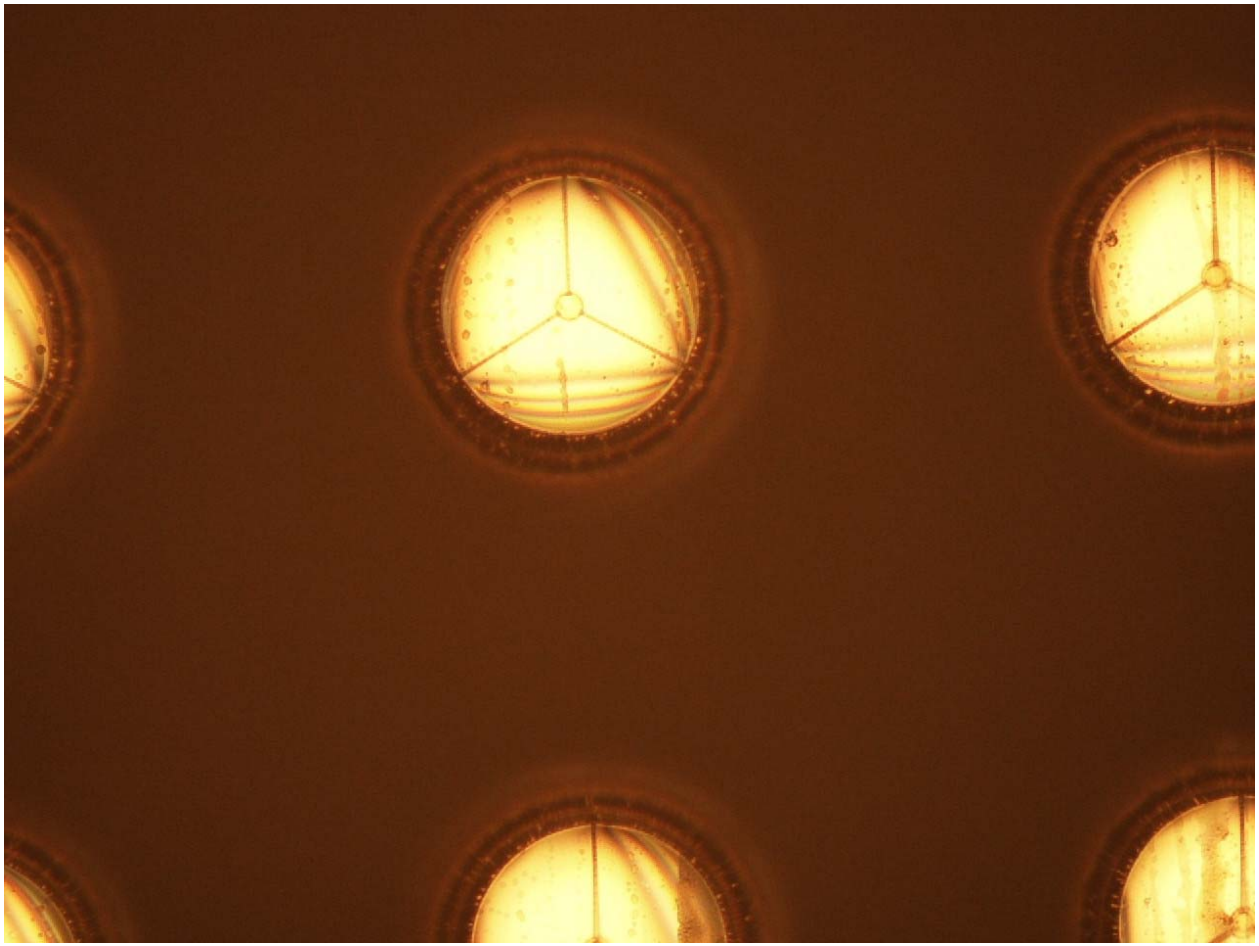


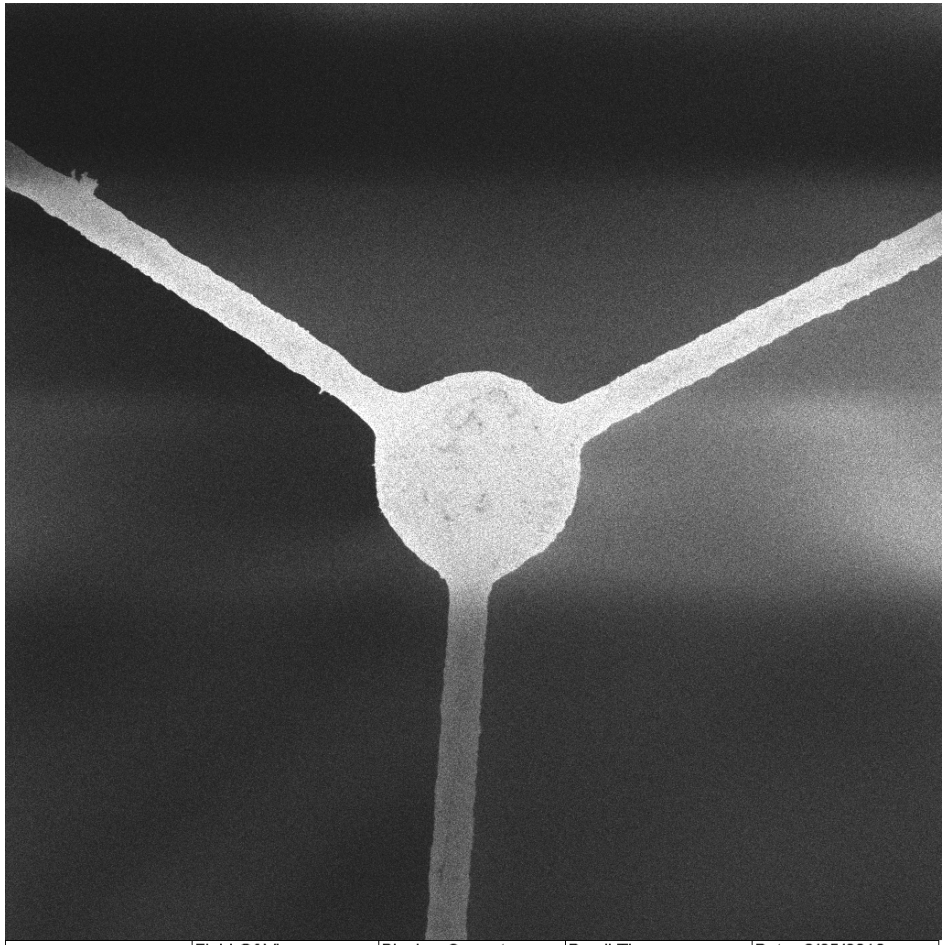
Photo and

Etch through Nitride



The Process





CARL ZEISS SMT	Field Of View 5.00 um	Blanker Current 0.7 pA	Dwell Time 2.0 us	Date: 8/25/2010 Time: 4:10 PM
	Working Dist 7.9 mm	Image Size 1024x1024	Mag (Display) 39,979.76 X	500.00 nm

Summary

- Small and fragile targets fabricated on silicon !
- "Industry" standard processing is possible for laser targets
  - High volume production of targets
- Huge capital investment for tools
  - More likely to outsource

Thank You