Latest news on 3D detectors

IRST

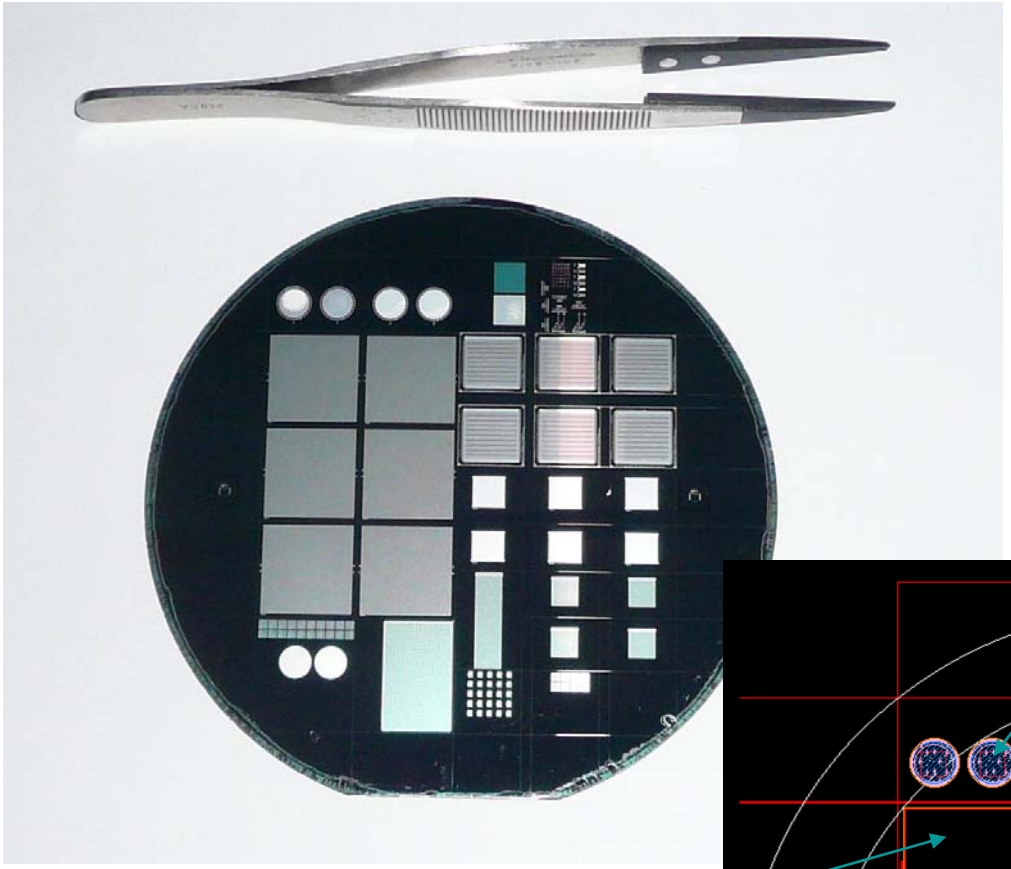
CNM

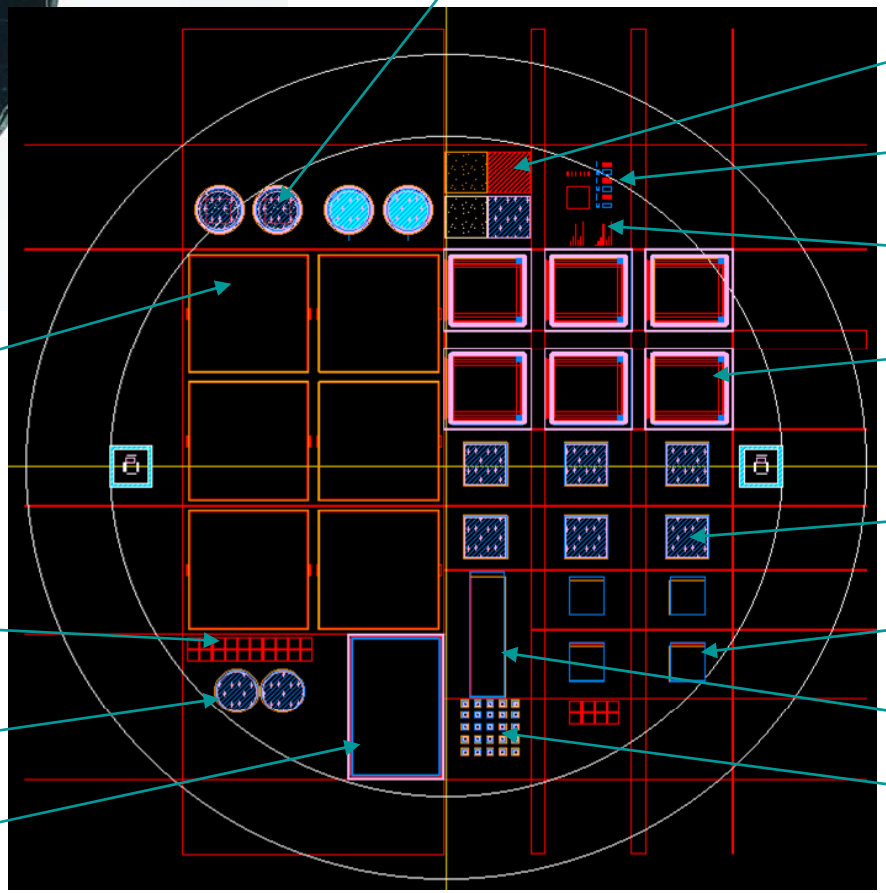
IceMos

CNM

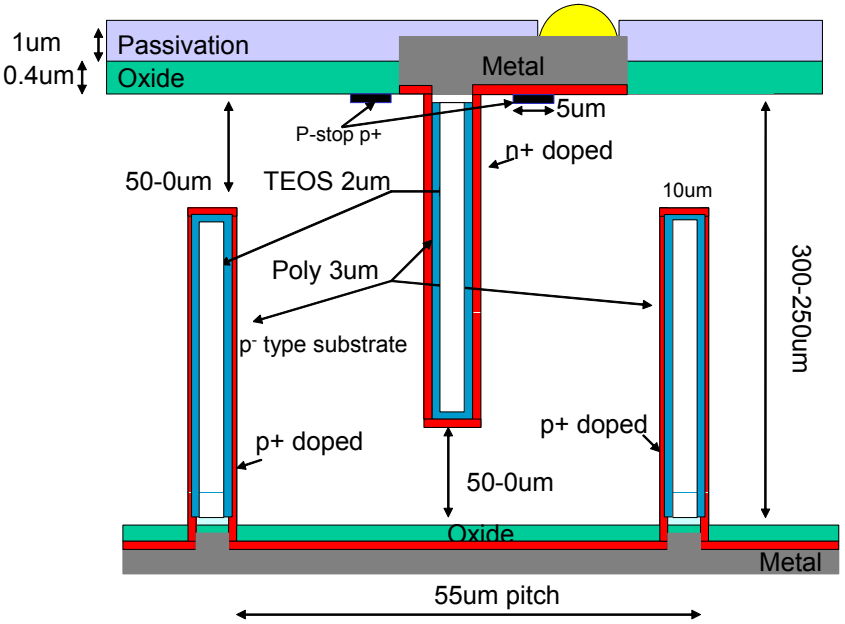
- 2 wafers fabricated
- Double side processing with holes not all the way through, (aka Irst)
- n-type bulk
- Holes collected
- To dice and test 1 wafer
- Second to bumpbond to Medipix2 chips
- Further production (n and p-type) to follow

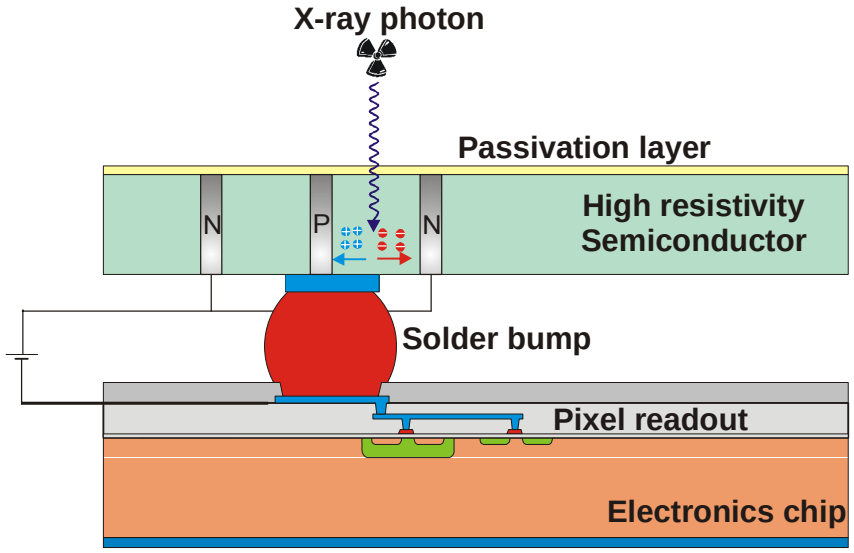
Wafer



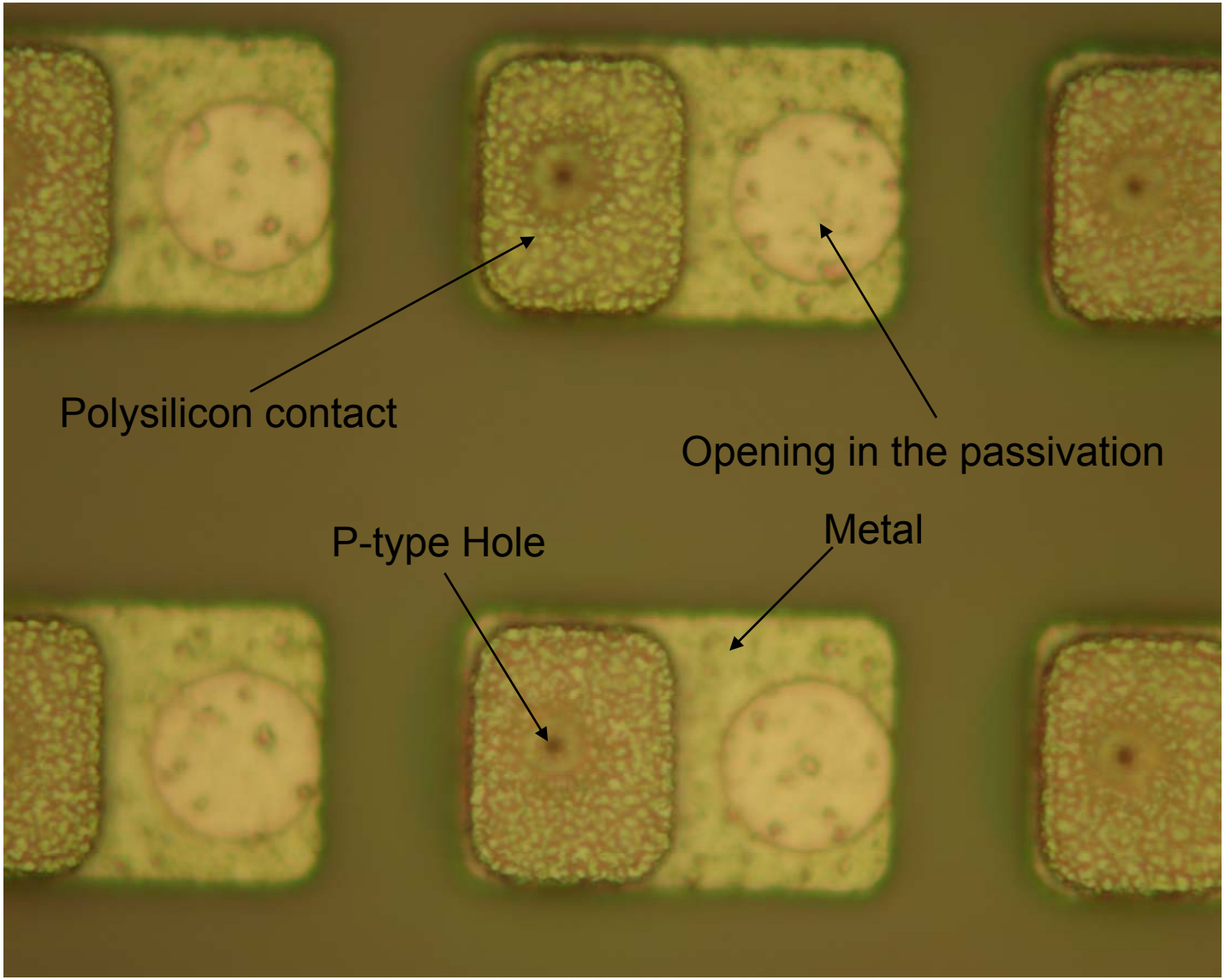

Diodes 2D
spreading
3x3 matrix
Test structures
Medipix2
Atlas pixel
3d pads
Test for SEM
strips
MOS
Long strip
Pilatus
10x10 matrix

Layout

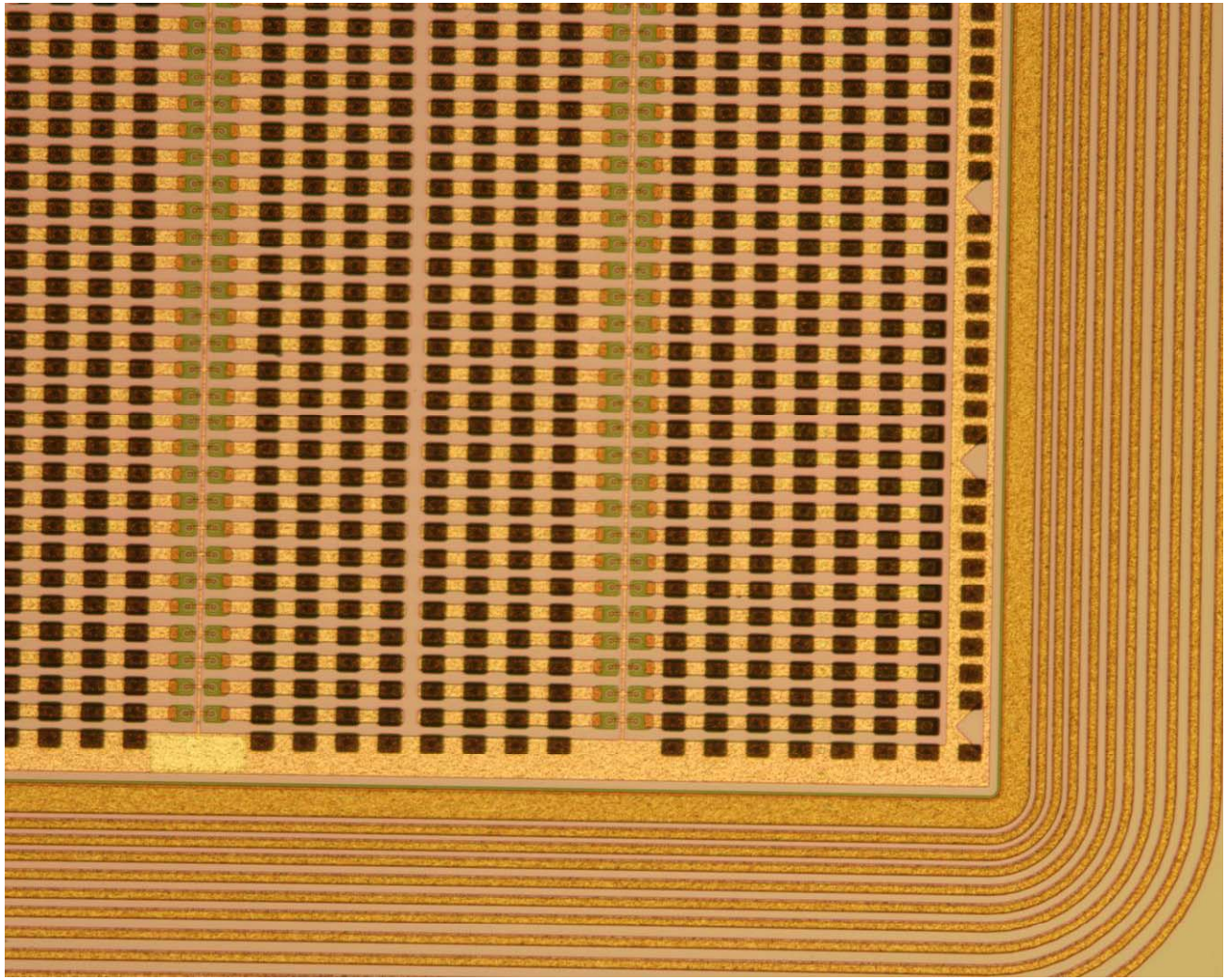

1um
0.4um
Passivation
Oxide
Metal
P-stop p+
5um
n+ doped
50-0um
TEOS 2um
10um
Poly 3um
300-250um
p⁻ type substrate
p+ doped
p+ doped
50-0um
Oxide
Metal
55um pitch

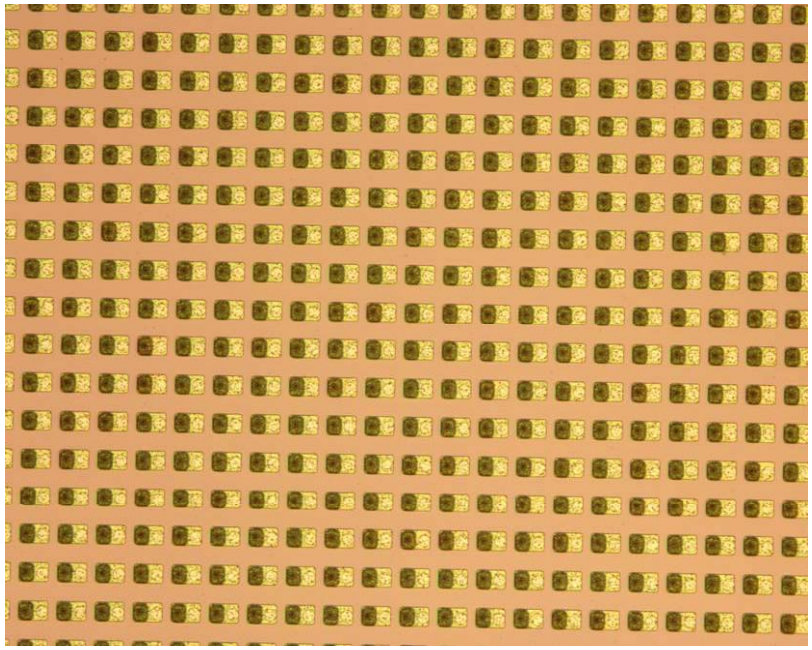

X-ray photon
Passivation layer
N
P
N
High resistivity
Semiconductor
Solder bump
Pixel readout
Electronics chip

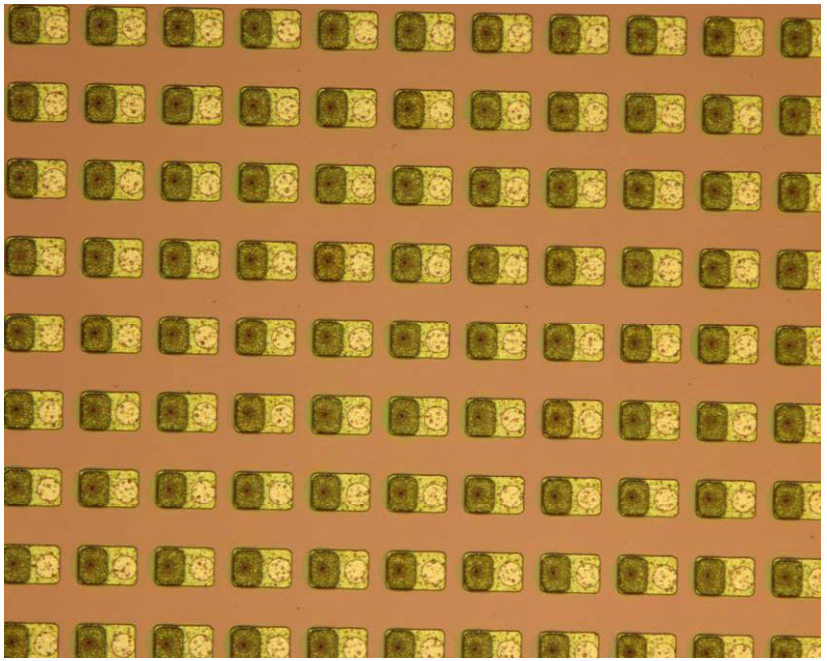
Bump pad detail



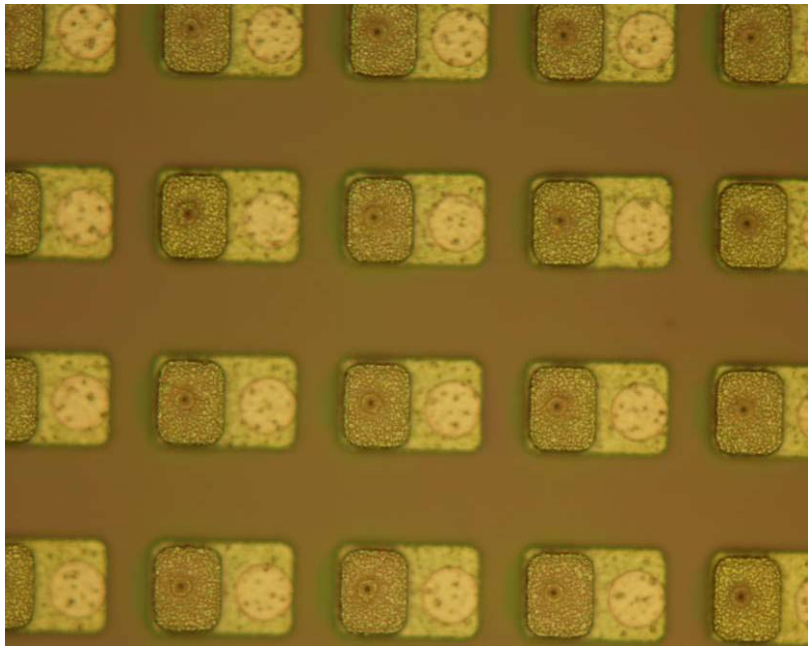
Atlas pixels

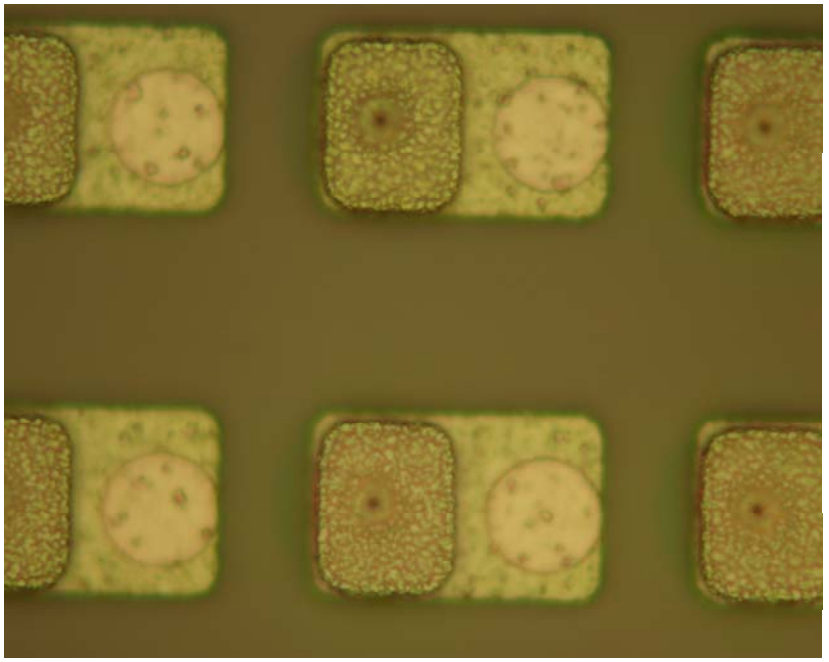




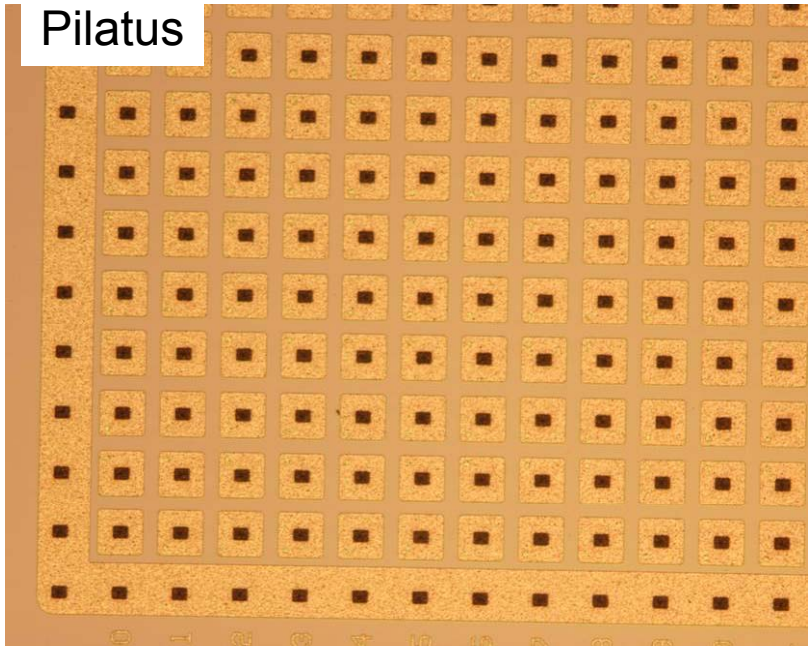


Medipix 2

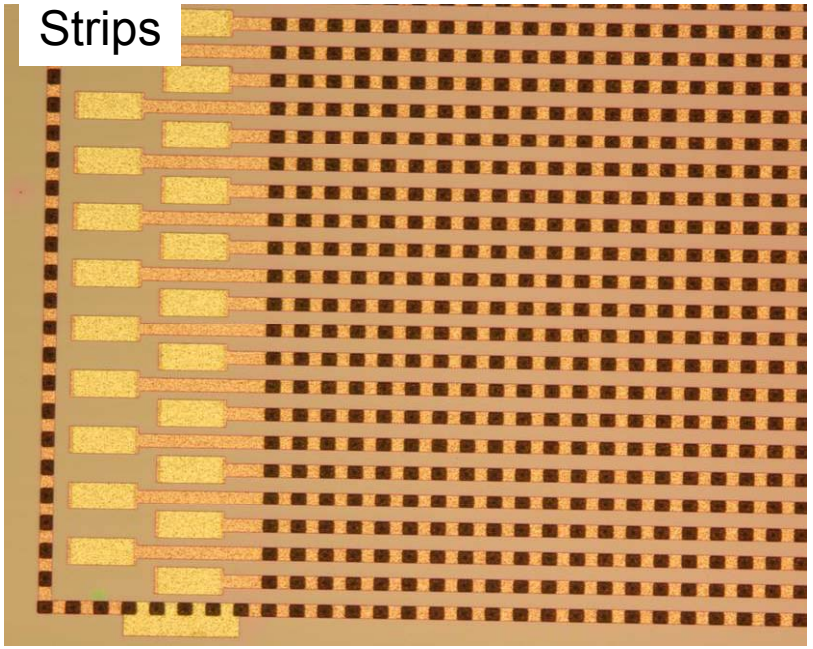




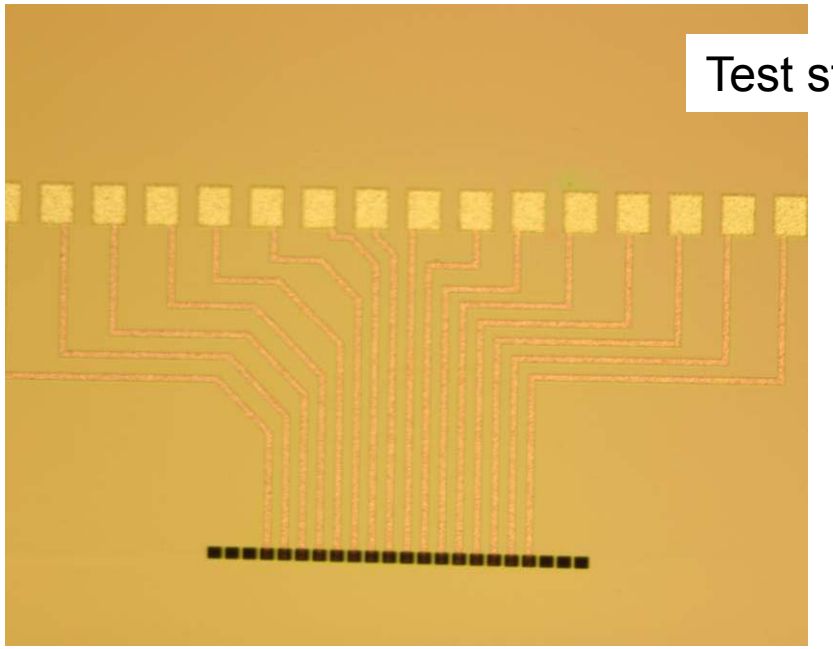
Pilatus

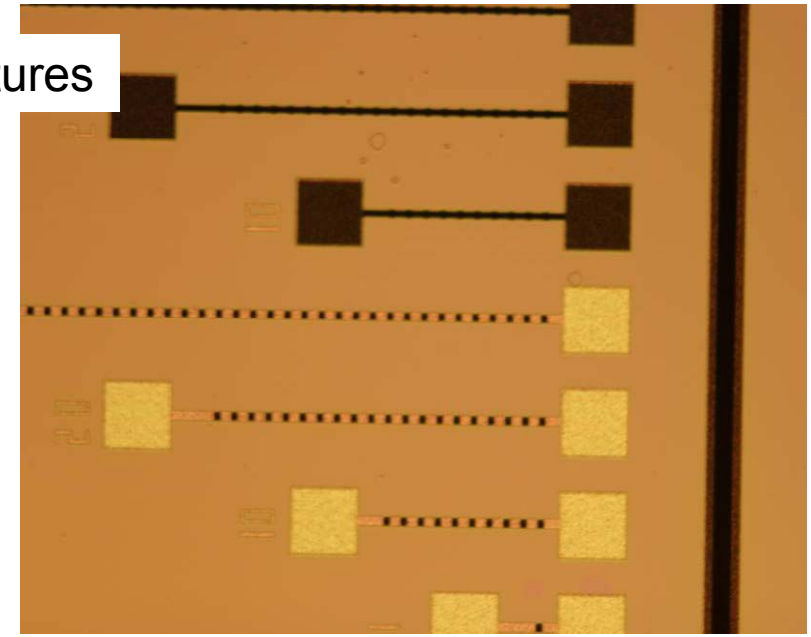


Strips

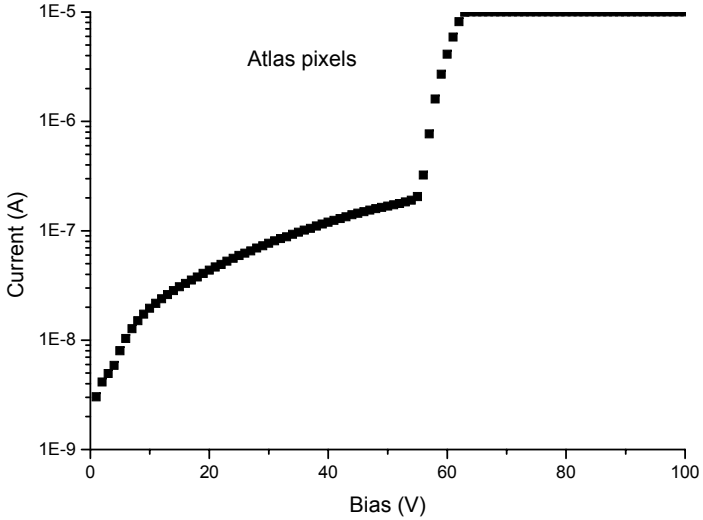


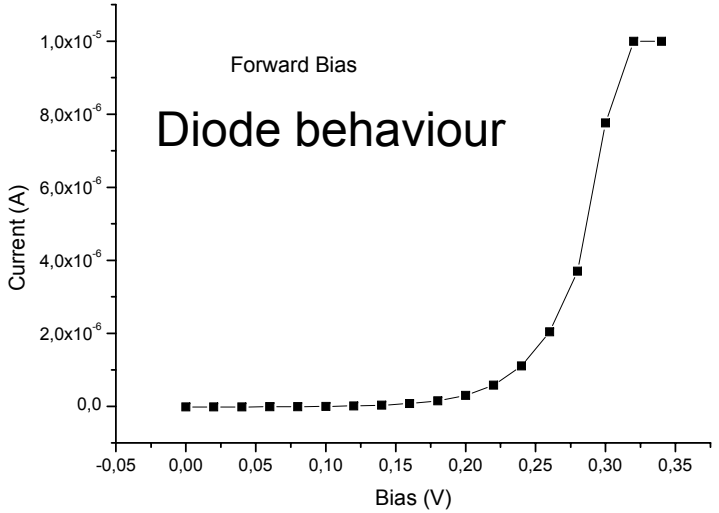
Test structures



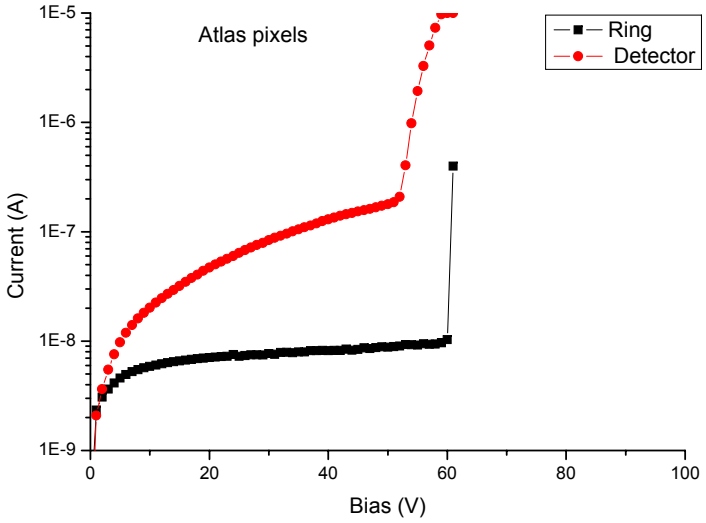


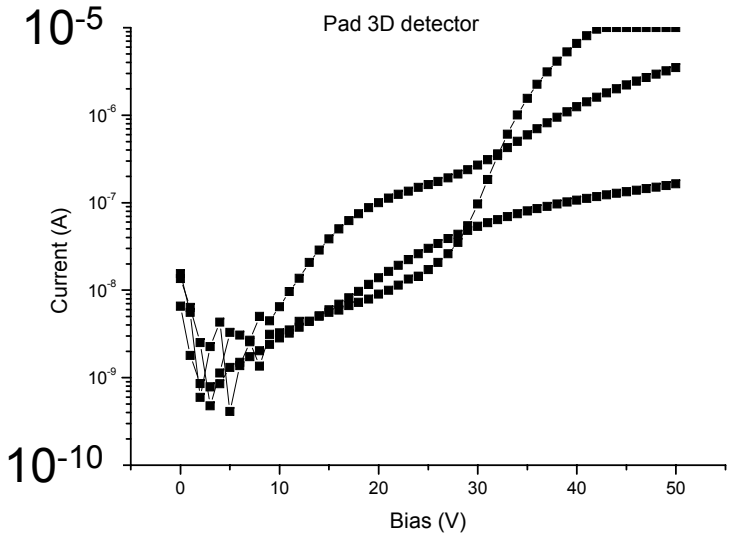
Current vs. Voltage



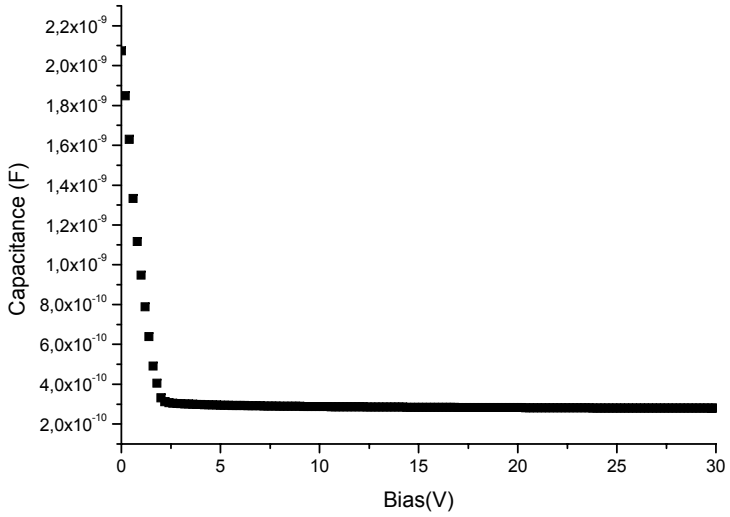


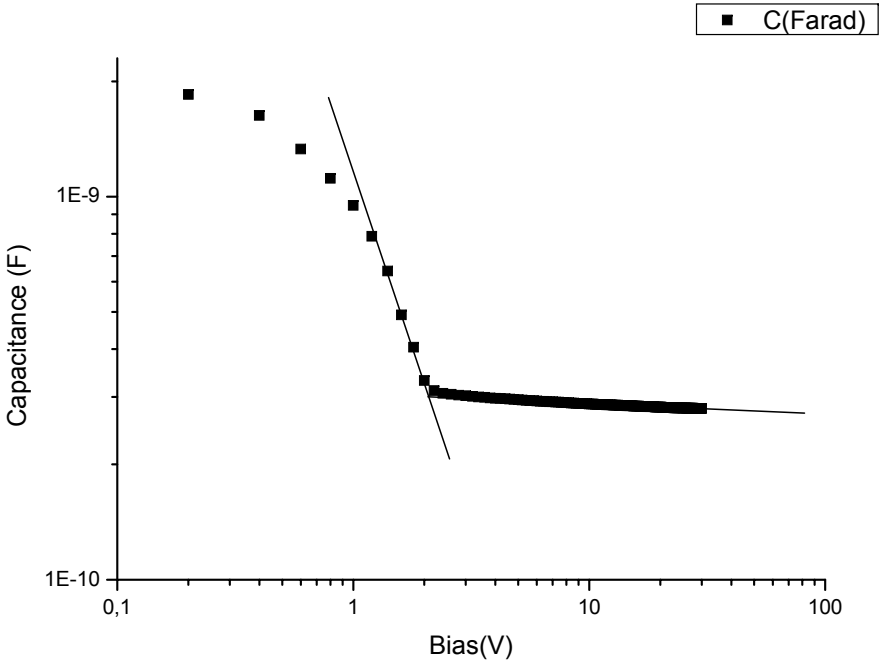
Vbk at about 55V





Pad detector capacitance



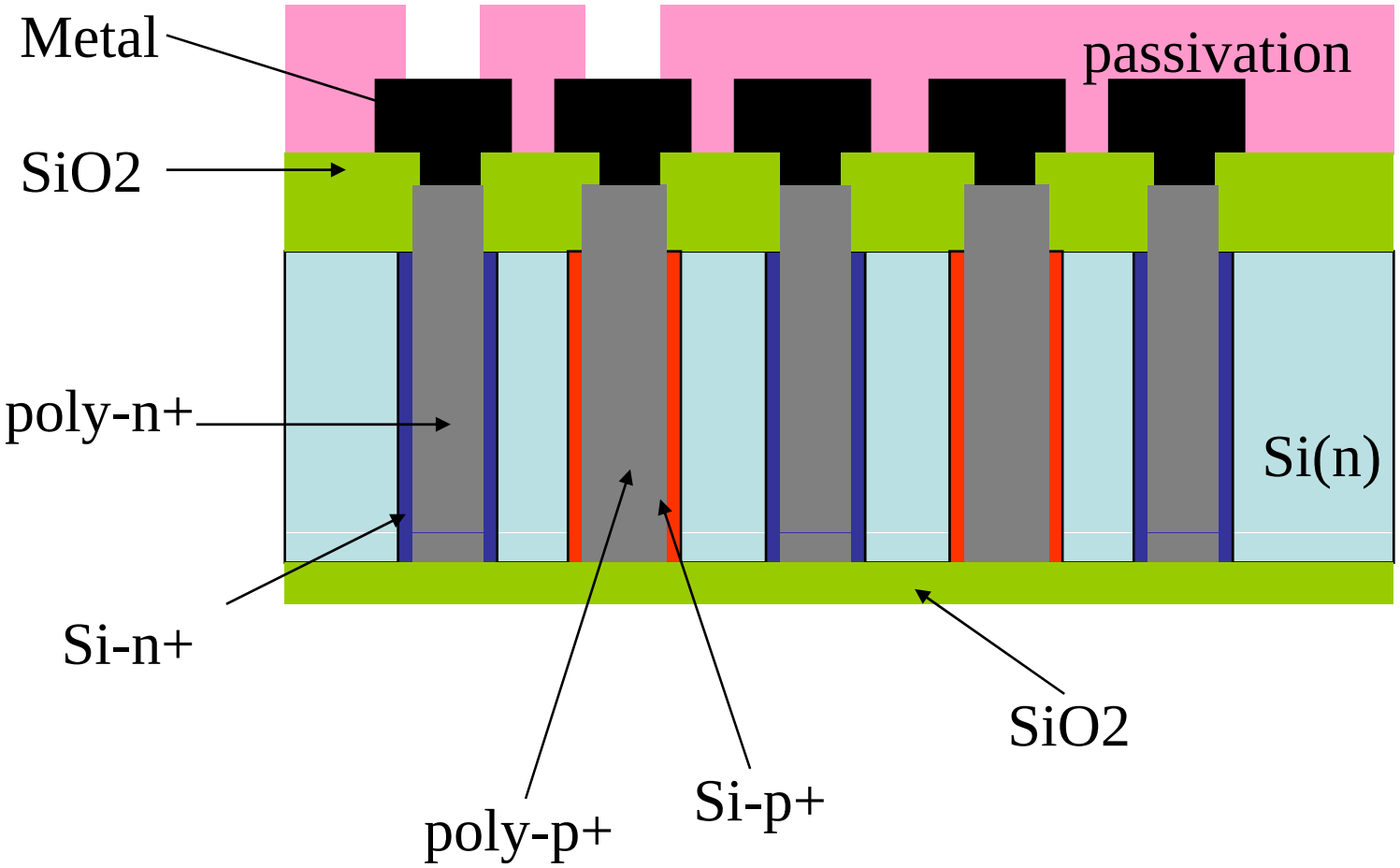


- Full depletion occurs a 2-3 V
- However “plateau” value of C is not constant
  - may be due to the silicon below the holes depleting.
- Simulation will be run to investigate this

IceMos

- Wafer ready, will collect on Friday
  - 4inch wafer
  - n-type bulk
  - readout p holes only, no p-stops
  - No processing at all on back side
- Full 3D design, holes all the way through
- No active edges, for now
- Φ=10 μm
- Depth = 250 μm
- Future mask and production to be decided
  - Aim for p-type bulk, electron collection, metal on both sides, active edges

Final IceMOS device, no p-stops



Wafer layout