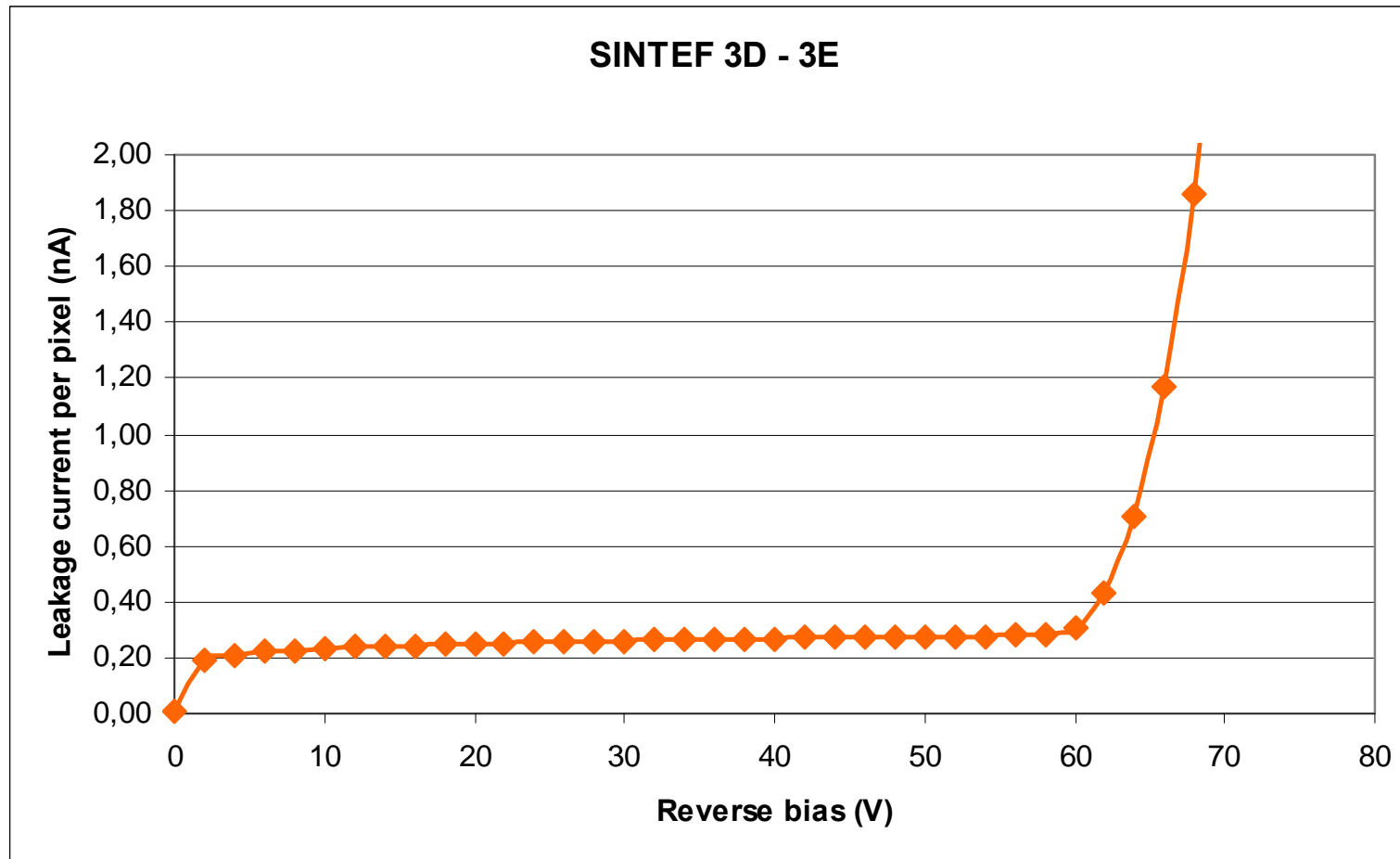


Next lot of 3-D detectors at SINTEF

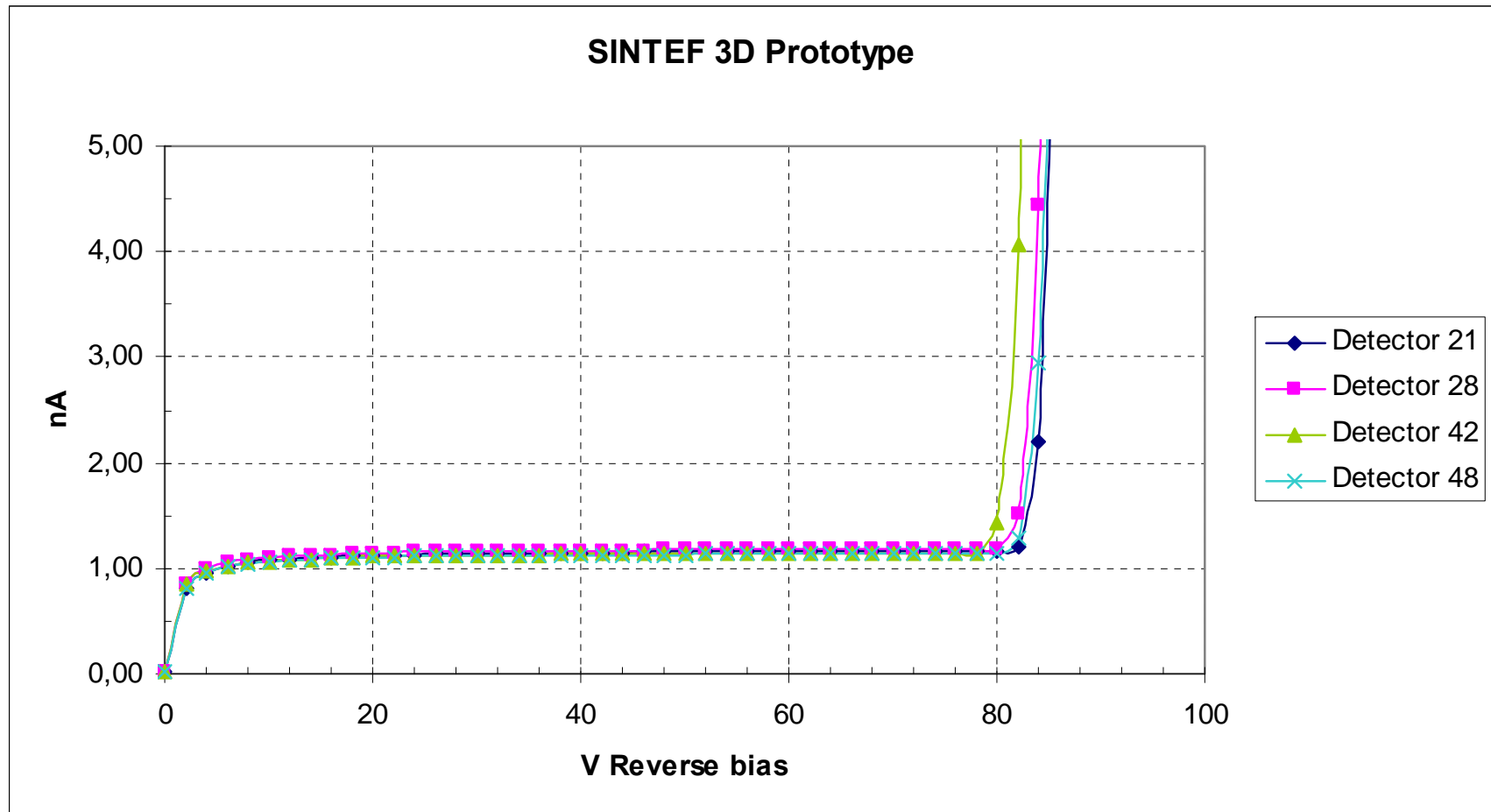
ATLAS meeting 09.01, 2009

**T. E. Hansen, A. Kok, T. A. Hansen, N. Lietaer,
M. Mielnik, P. Storås, G. U. Jensen**

ALTAS 3E chip – average pixel leakage current calculated from measurement of total leakage current – 2700 pixels



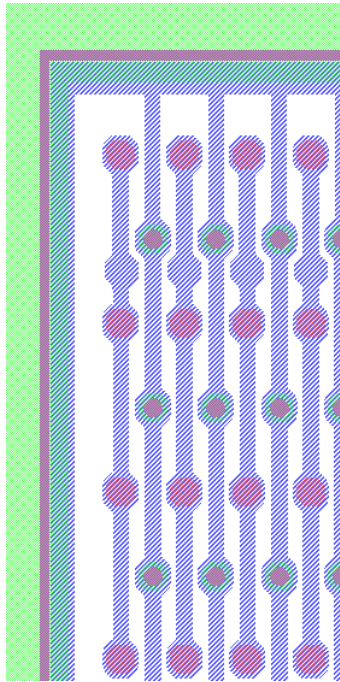
ALTAS 4E chip – average pixel leakage current calculated from measurement of total leakage current – 2700 pixels 4 different chips



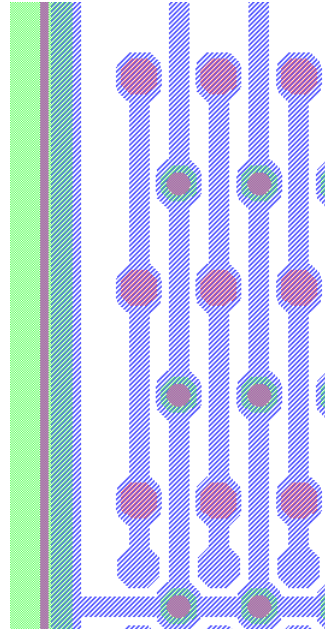
Inter pixel / strip resistance

Measured between n-electrodes in neighbouring pixels/strips at 60 V

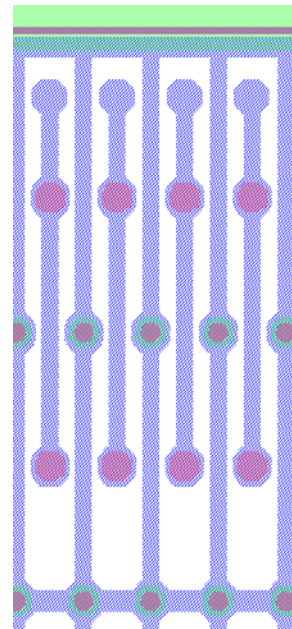
4E structures:
100-300 M Ω



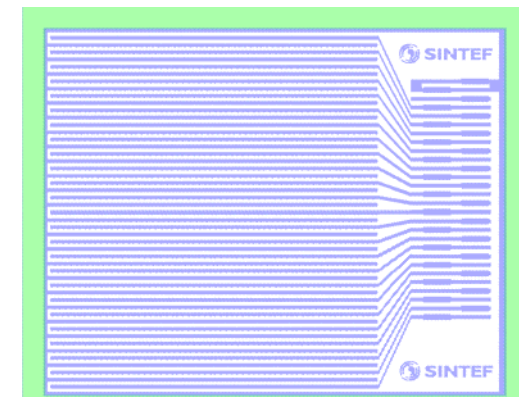
3E structures:
300-500 M Ω

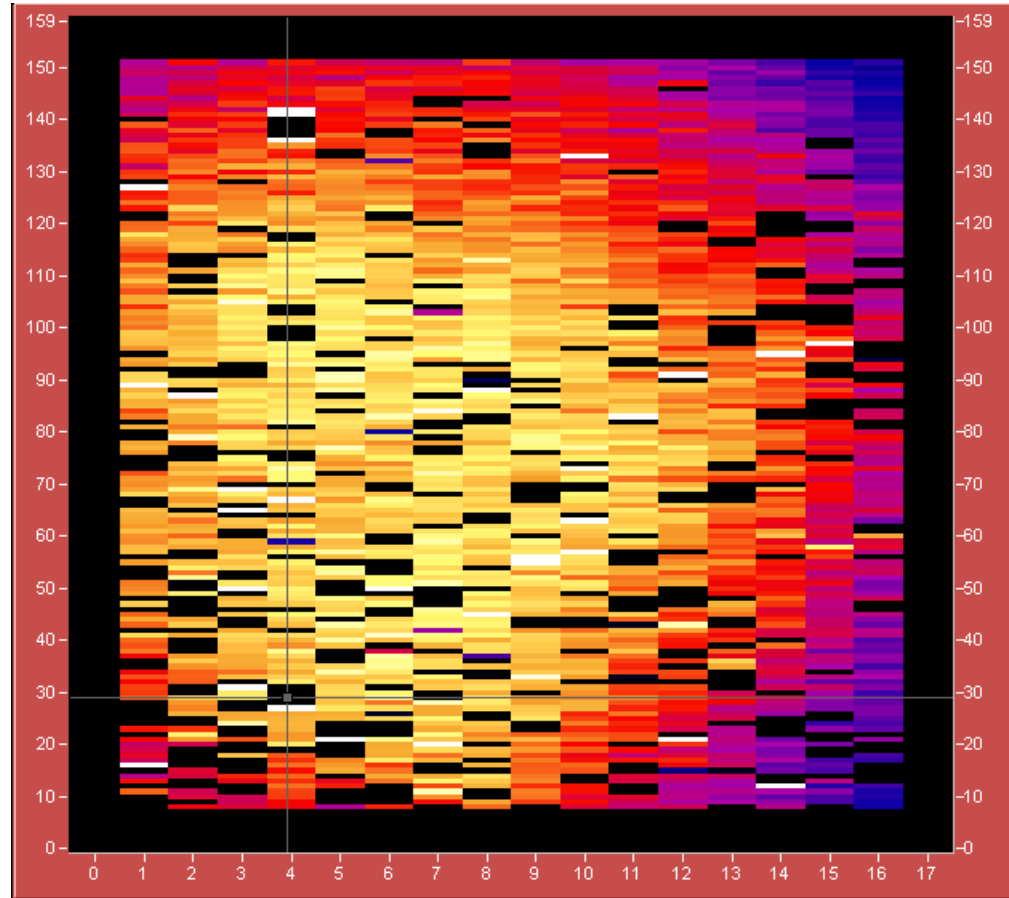


2E structures:
600-800 M Ω

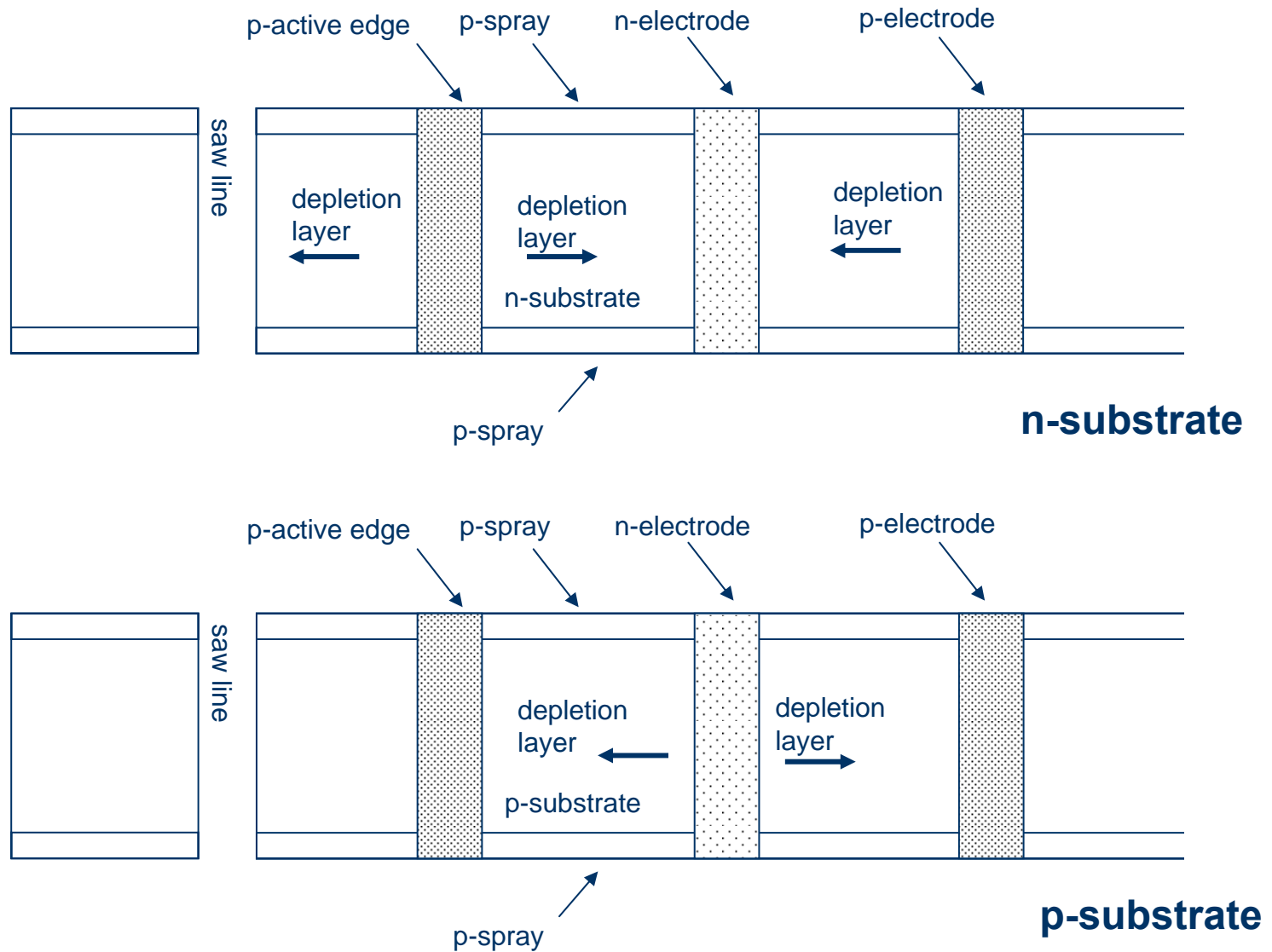


Baby strip:
6.0 - 6.5 G Ω





Hit map recorded with SINTEF bump bonded 3D –detector.
Americium source



Why n-readout 3D- detectors made on p-substrates are more robust

Second 3D-run at SINTEF

N - readout devices on p-wafers. P-doped active edge acts as depletion stop and not part of pn-junction. More robust!

Wafer specifications

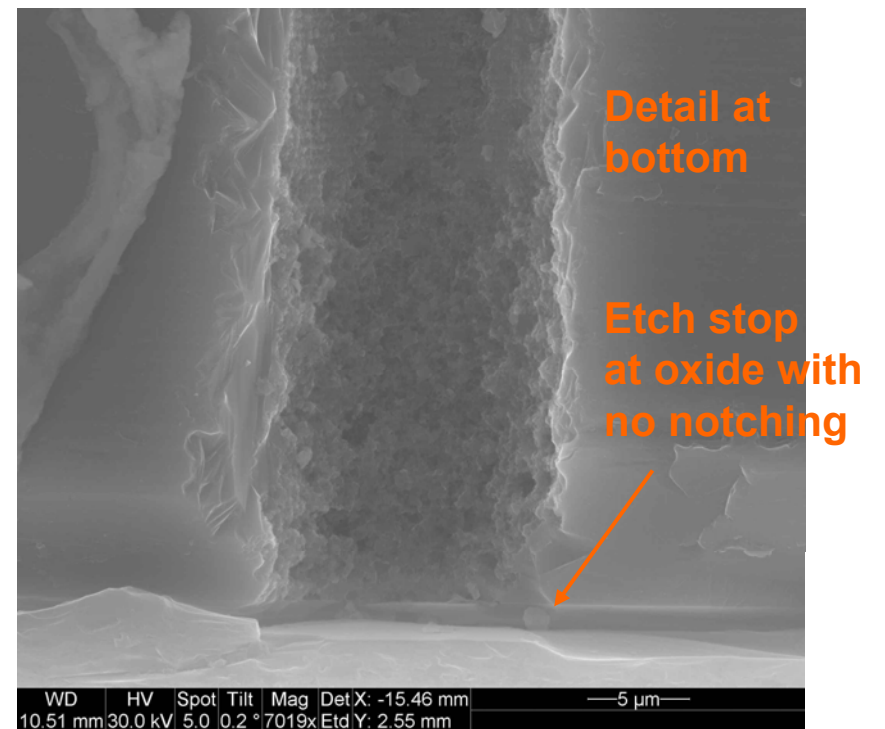
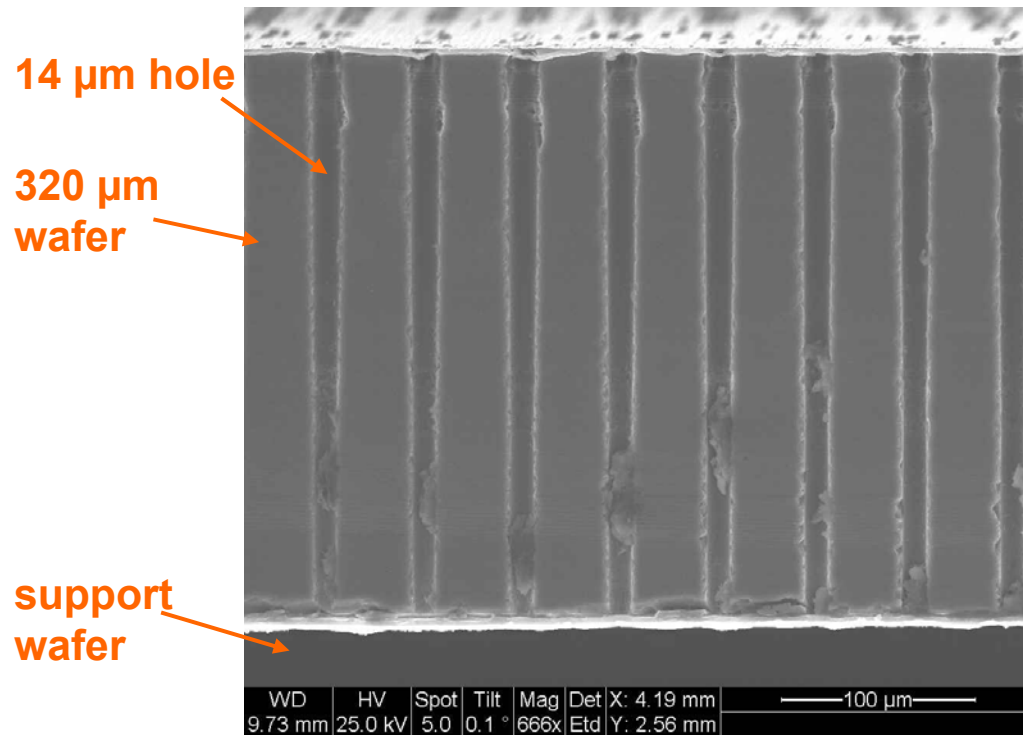
4 - inch 200 μm , 17 pcs 285 μm , 6 pcs $\geq 10000 \Omega\text{cm}$	Depl. Voltage		
	4E	3E	2E
	$\leq 3.5 \text{ V}$	$\leq 6 \text{ V}$	$\leq 12 \text{ V}$

1. Based on experiences from first run focus on
 - Reduce wafer stress and bow to improve lithography and reduce breakage
 - Improve on topography
2. New AMS 200 ISPEEDER to be used for DRIE etching
3. Mask design completed including ATLAS, CMS and Medipix type devices. Processing in progress

Tuning of AMS 200 ISPEEDER “IPROD” for next SINTEF 3D – run

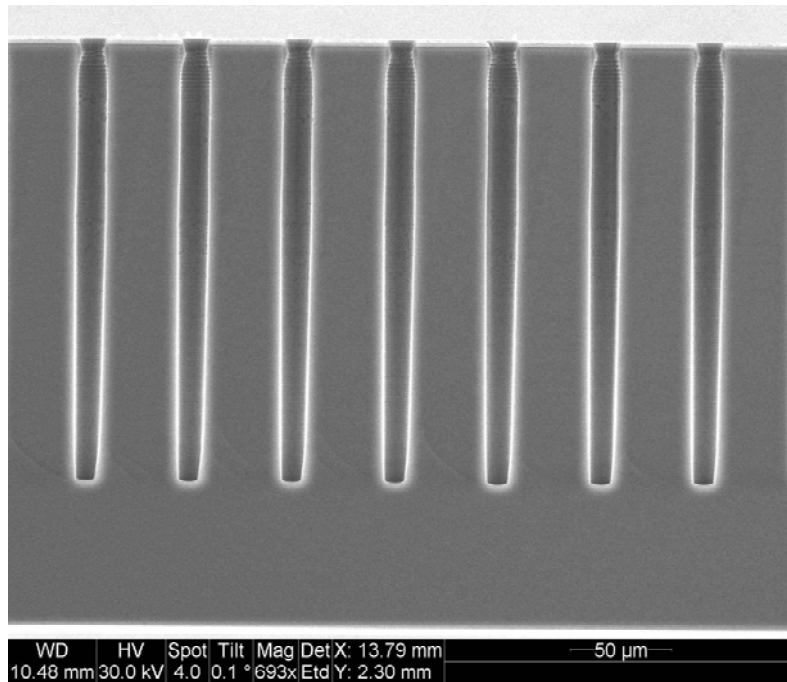
14 μm holes through 320 μm thick wafer bonded to support wafer in 40 min etch time

Etch stop against oxide with no notching

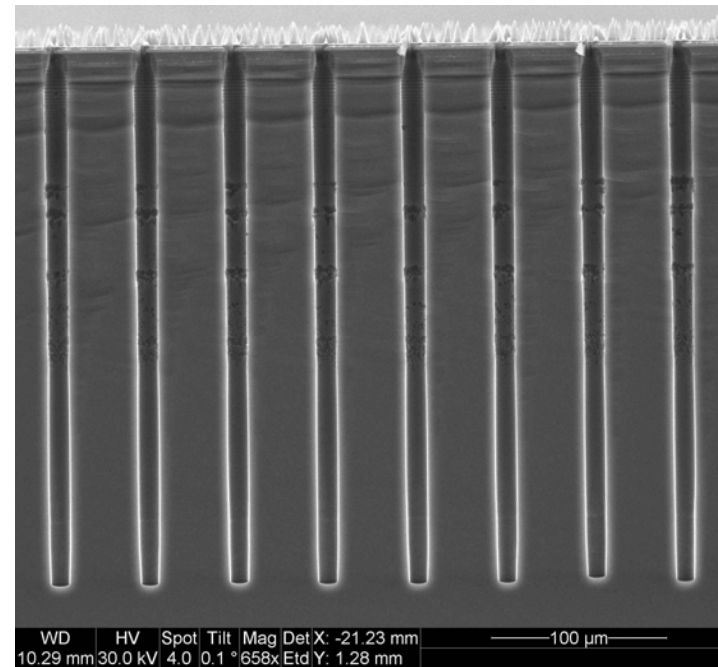


Further tuning of AMS 200 ISPEEDER “IPROD” after installing high selectivity kit Etching Si with ≈ 1000 selectivity to SiO_2

14 μm holes, 200 and 320 μm deep



200 μm deep hole
No problem at wafer edge due
to high Si to SiO_2 selectivity



320 μm deep hole
Still need manual protection
with photo resist to keep Al mask at
edge for protection.

MASK LAYOUT FOR 2nd RUN

Photo masks ordered November 12, 2008

