

PXD21

-- Module/Ladder Overview --

Sensor production status

Two batches in production

- 12 wafers PXD9-20 → to be finished early 2020, first sub-batch done
- 12 wafers PXD9-21 → on hold before metal deposition

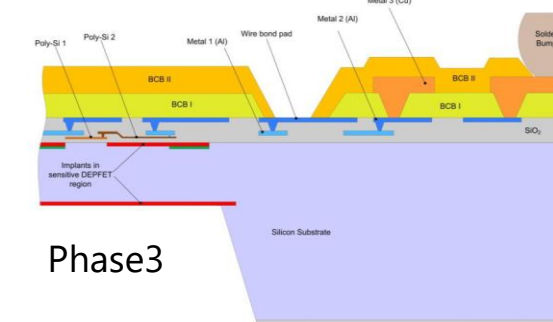
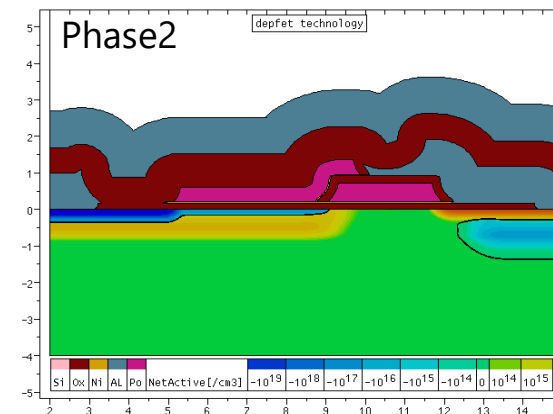
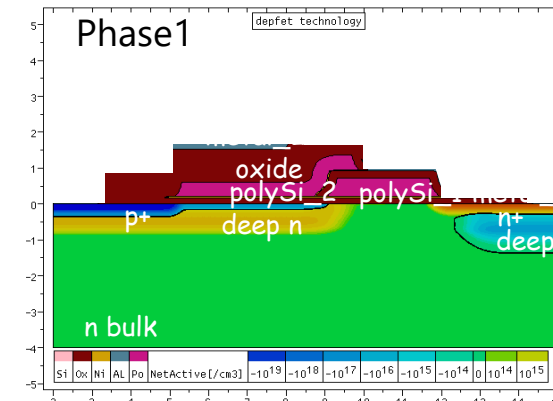
| | PXD9-20 (12 wafers) | | | | | | | | | | | |
|------------------|---------------------|-----|------|------|------|------|------|------|------|------|------|------|
| | W50 | W51 | W52 | W53 | W54 | W55 | W56 | W57 | W58 | W59 | W60 | W61 |
| Inner Forward | NA | 0 | 100 | 100 | 100 | 99.8 | 99.8 | 100 | 100 | 100 | 0 | 100 |
| Outer Forward 1 | NA | NA | NA | 99.9 | NA | 100 | 100 | 100 | 0 | 100 | 100 | 100 |
| Outer Forward 2 | NA | NA | NA | NA | NA | 0 | 100 | 100 | 100 | 99.6 | 100 | 0 |
| Outer Backward 1 | 100 | 100 | 99.5 | 100 | 100 | 99.8 | 100 | 100 | 99.5 | 100 | 99.4 | 0 |
| Outer Backward 2 | 0 | 100 | 100 | 100 | 99.5 | 100 | 99.5 | 98.9 | 0 | 100 | 0 | 0 |
| Inner Backward | 0 | 100 | 99.8 | 99.5 | 100 | 100 | 100 | 100 | 99.3 | 100 | 100 | 99.5 |

PXD9-20a: Production accomplished
→ Module assembly

PXD9-20b: Production phase3 (thinning and copper)

1. Handle wafer removal
2. Oxide removal on the back side
3. sputter Ti:W barrier and Cu seed layer
4. lithography for electro-plating
5. Cu electro-plating
6. removal of the seed layer and barrier layer
7. Cu conditioning (wet etching, thermal)
8. tests on flying needle probe station
9. final passivation BCB
10. cut lithography, cutting

This week →



Phase3

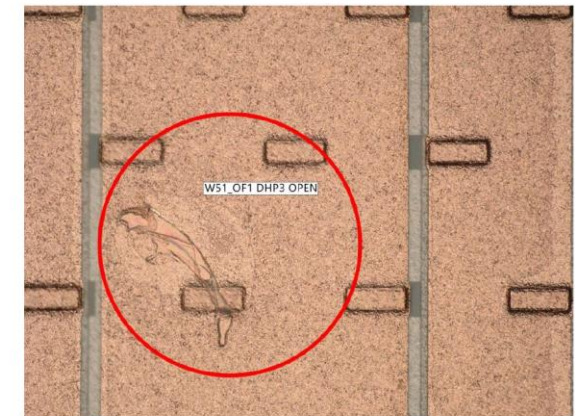
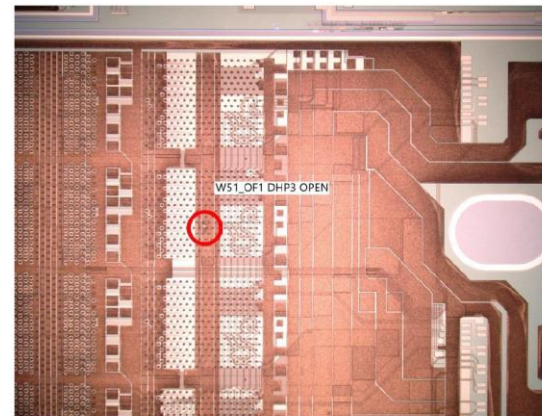
PXD9-20a: ATG testing and singulation

| | W50 | W51 | W52 | W53 | W54 | W55 |
|-----|------|-----------|------|------|------|------|
| IF | pass | pass | pass | pass | pass | pass |
| OF1 | pass | 1 x OPEN | pass | pass | pass | pass |
| OF2 | Pass | pass | pass | pass | pass | pass |
| OB1 | pass | 1 x SHORT | pass | pass | pass | pass |
| OB2 | pass | pass | pass | pass | pass | pass |
| IB | pass | pass | pass | pass | pass | pass |

- ▷ On Wafer 51 one L2 sensor not usable
 - ↳ IF has short in sensitive region anyway
- ▷ Sadly, this wafer was destroyed at laser cutting
 - ↳ Vacuum failure, wafer moved during cutting procedure, **one IB lost!**

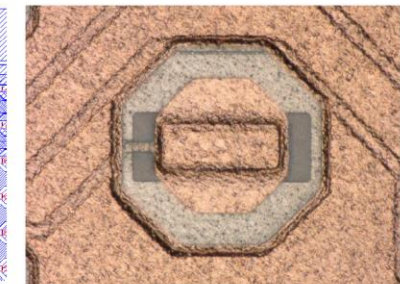
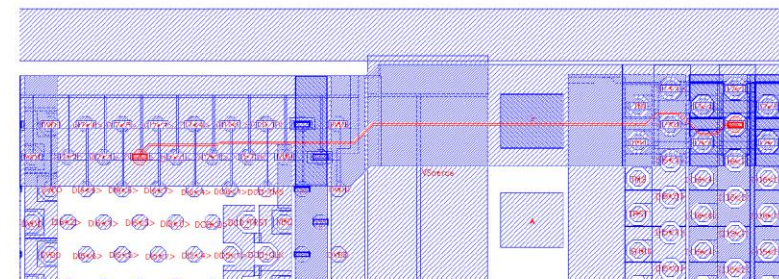
→ 4 L1 pairs + IF for module assembly

PXD9-20 Wafer #51, OF1 – 1 x OPEN



- DHP3 – one GND contact is covered with some resist
- Module can be used without re-work

PXD9-20 Wafer #51, OB1 – 1 x SHORT



- DCD1 DO7<3> shorted to GND
- short is not visible

ASIC inventory and module batch PXD21-2

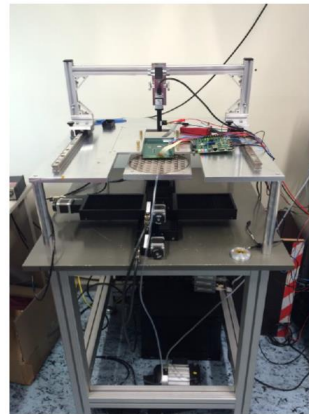
- ▷ DCD, DHPT okay
- ▷ SWB2.1: 240 bumped at IZM, 120 tested at KIT
 - ↳ Still 120 left untested at KIT
 - ↳ Tested chips at HLL: **75 SWB2.1, 30 DCDs, 35 DHPTs**

Test Setup at the Institute for Data Processing and Electronics, December 2019

Number of tested switcher chips: 120

Main tests:

- Read JTAG ID
- JTAG User Register
 - Default Bias Current
 - Boost Bias Current
- Current Consumption (1.8V and HV)
- 64 HV-channels tested with 16-to-1 MUX
- SerOut



| Switcher Chips | Read JTAG ID | Current Consumption (1.8V) | Current Consumption (HV) | 64 HV-Channels | Bias Current | Boost Current |
|----------------|--------------|----------------------------|--------------------------|----------------|--------------|---------------|
| 120 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |



- ▷ 4 L1 pairs, 1 single IF
- ▷ Current status: SMD assembly started
 - ↳ About 8 working days for flip-chip at HLL
 - ↳ Expect SMD to be finished end of January

- ▷ 3 L1 pairs (batch PXD21-1) from old sensor production
 - ↳ Replacement of SWB2.2 successful, passed all probe card tests
 - ↳ Now at MPP for kapton attachment
 - ↳ 2 already done and characterized, 4 still in the queue
- ▷ 4 new L1 pairs on the way (batch PXD21-2) from PXD9-20a under way
- ▷ Depending on yield have to decide how many modules from PXD9-20b to assemble
 - ↳ Have two ladders ready (one at KEK, one at DESY)
- ▷ L2 Modules, partly still to be characterized
 - ↳ At MPP: 3 L2_bwd + 1 L2_bwd from phase 2, 4 L2_fwd
 - ↳ At Bonn: 1 L2_fwd from phase 2
 - ↳ → four more ladders possible (have already 10), need more L2 modules, how many??
- ▷ Please see google spread sheet for current inventory, check, comment and keep it up-to-date:

<https://docs.google.com/spreadsheets/d/1ZU3I-t2vJgVT7OAx2ySn7hb0Rbm1TCBZlbcnbgNEwl4/edit?usp=sharing>

Schedule shown at BPAC

