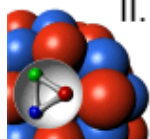
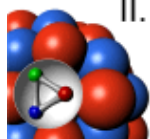


Barrel Strip Sensors Update



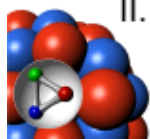
1st Production Batch

- Ordered 4 Lots with 25 wafer each end of 2014
→ 80 wafers to be delivered (assuming 80% yield)
- Status 2015
 - 3 lots delivered in mid 2015:
 - lot 341774
 - lot 341775
 - lot 341776
 - Only sensors that passed the tests are delivered to Giessen
 - So far: low yield



1st Production Batch

- Ordered 4 Lots with 25 wafer each end of 2014
→ 80 wafers to be delivered (assuming 80% yield)
- Status 2015
 - 3 lots delivered in mid 2015:
 - lot 341774
 - lot 341775
 - lot 341776
- Update 2016
 - 3 lots delivered in May 2016:
 - lot 342563
 - lot 341772
 - lot 352157
 - Still low yield – but there is hope ...



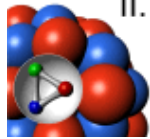
2015 Delivery

- Yield overview first 3 lots

Lot	b65 (S1)	m65 (S2)
341774	5 (20%)	10 (40%)
341775	1 (4%)	2 (8%)
341776	7 (28%)	9 (36%)
total	13 (17%)	21 (28%)

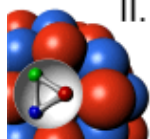
- Reasons for exclusion/failed test

Reason	b65 (S1)	m65 (S2)
IV excluded	24 (32%)	13 (17%)
pin-hole excluded	32 (43%)	20 (27%)
broken/missing	1 (1%)	4 (5%)
"omitted"	5 (7%)	17 (23%)



2016 Delivery

- 3 new lots delivered
- produced 2015 and 2016
- time needed to investigate issues
- Production year
 - lot 342563 - 2015
 - lot 341772 - 2016
 - lot 352157 - 2016 (different wafer material)



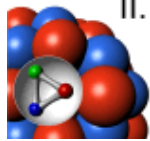
2016 Delivery

- Yield overview new 3 lots

Lot	b65 (S1)	m65 (S2)
342563	8 (32%)	4 (16%)
341772	3 (12%)	2 (8%)
352157	17 (68%)	16 (64%)
total	28 (37%)	22 (29%)

- Reasons for exclusion/failed test

Reason	b65 (S1)	m65 (S2)
IV excluded	3 (4%)	12 (16%)
pin-hole excluded	31 (41%)	8 (11%)
broken/missing	5 (7%)	6 (8%)
"omitted"	8 (11%)	27 (36%)



2016 Delivery

- Characteristics compared qualitatively to first delivery

- Lot 342563

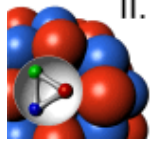
- leakage current very low to intermediate
- breakdown voltage OK (mostly $>300\text{V}$)
- high pin-hole count (mostly n-side)

- Lot 341772

- leakage current low to intermediate
- small breakdown voltage (220-280V)
- very high pin-hole count (mostly n-side)

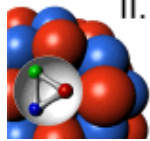
- Lot 352157

- leakage current very low to low ($<1\mu\text{A}$ @100V for S1)
- high breakdown voltage (sometimes not reached at 500V)
- low pin-hole count (several sensors with 0 on p- and n-side)



Outlook (the hope)

- Problems identified: surface of wafer backside (n-side)
- Last lot (352157) looks very promising
- used different wafer material (according to CiS)
- 2 more lots already produced (352155, 352156)
- not fully measured and diced
 - Lot 352155
 - leakage current very low to low
 - high breakdown voltage
 - low pin-hole count (several defect free sensors)
 - Lot 352156
 - leakage current low to intermediate
 - high breakdown voltage
 - only a subset of pin-hole data available until now



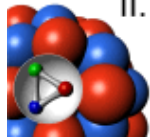
Outlook (the hope)

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- not fully measured and diced

Total Inventory

	b65 (S1)	m65 (S2)
Sum	41	46

- Lot 352155
 - leakage current very low to low
 - high breakdown voltage
 - low pin-hole count (several defect free sensors)
- Lot 352156
 - leakage current low to intermediate
 - high breakdown voltage
 - only a subset of pin-hole data available until now



Thank you for your Attention

