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CMS pixel upgrade meeting stud bonding status

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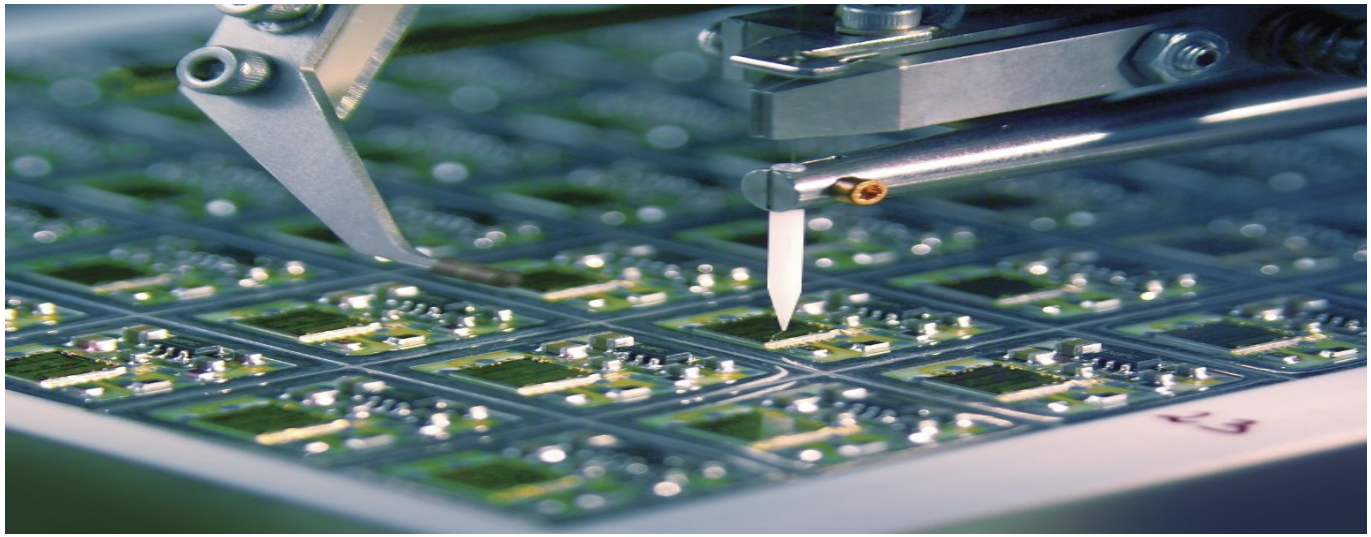
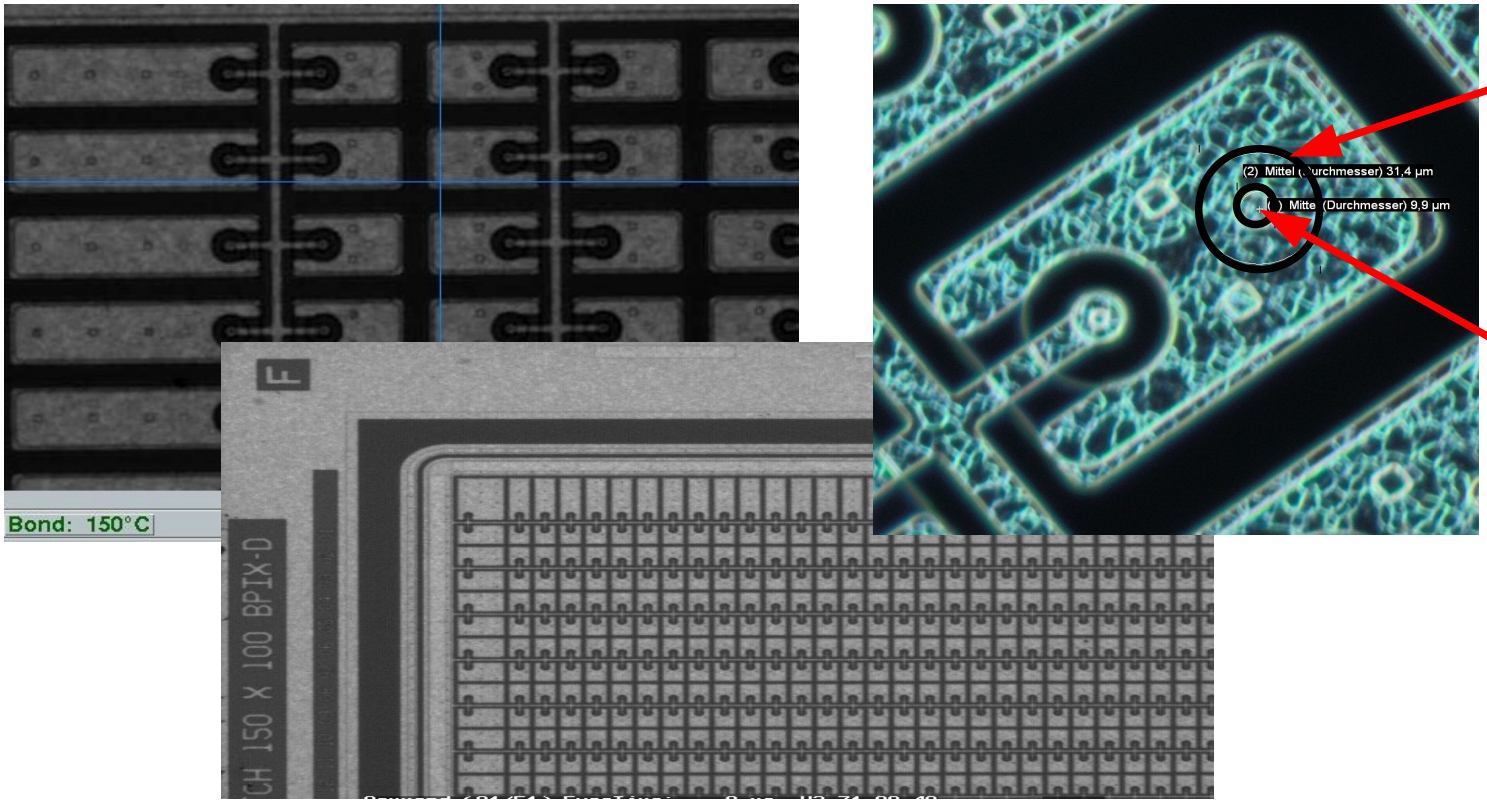


Datacon resolution problem

- Images of current Bpix: K&S Bonder, Datacon and microscope



- We would like to use the Fpix sensor for this study
- Preliminary studies done on dummy structure present in IPE

Gold stud bonding on dummy structure

- First Free Air Ball (FAB) tuning using the standard capillary & 25µm gold wire (already available in IPE)

- First check ball quality by microscope optical inspection
- Parameter variation has been done (EFO Fire Time, EFO Current,...)

  → see next slide

  - E.g. increasing the EFO Fire Time causes rounder shapes but larger diameter
  - Balls need to be checked by shear test
  - Capsule for shear test is too rough → shear test not possible

- What's next
  - SPT ultra-fine pitch capillary (bonded size average 23.8µm) → in house
  - Tanaka 12.5µm gold wire → quotation received

Gold stud bonding parameters

Two classes of parameters have been identified

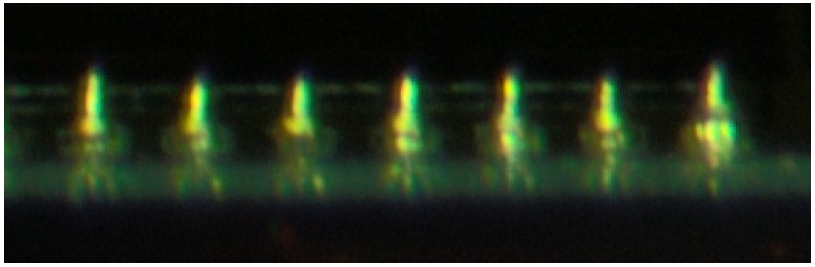
FAB Parameter	Bond 1 Parameter	Bond 2 Parameter	Loop Parameter
Wire diameter	USG Current		
EFO Fire Time	Force		
EFO Current	Temperature		
EFO Gap	Time		
Tail Extension			

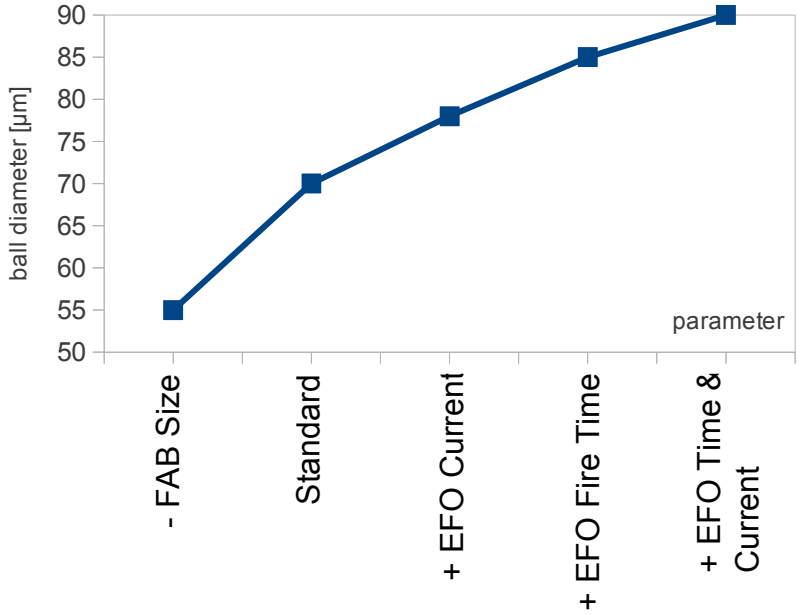
Not necessary

Parameter variation

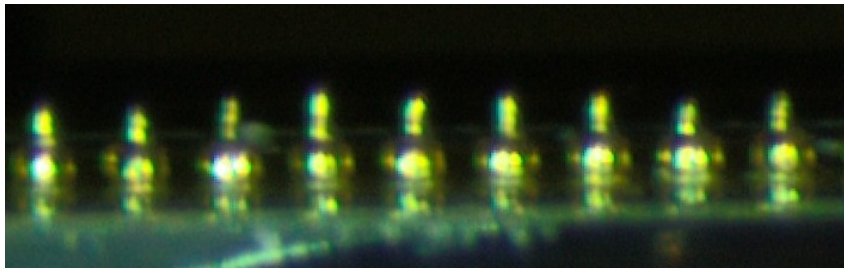
Thorns not understood yet
→ trying to eliminate them

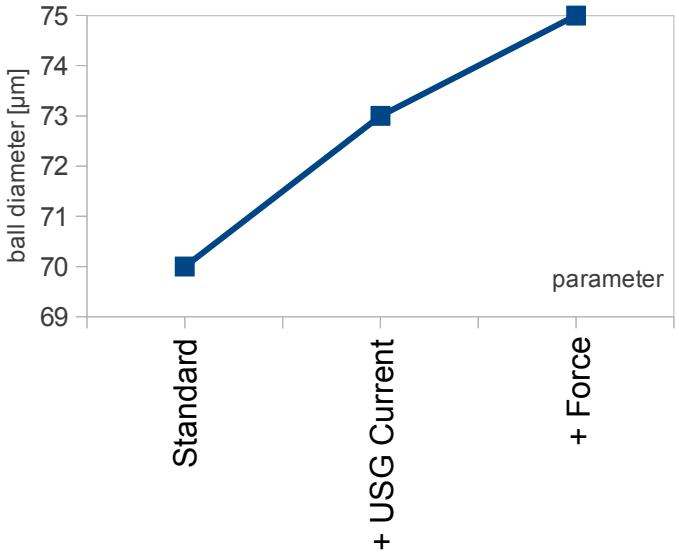
Standard parameter set





EFO Fire Time +50%



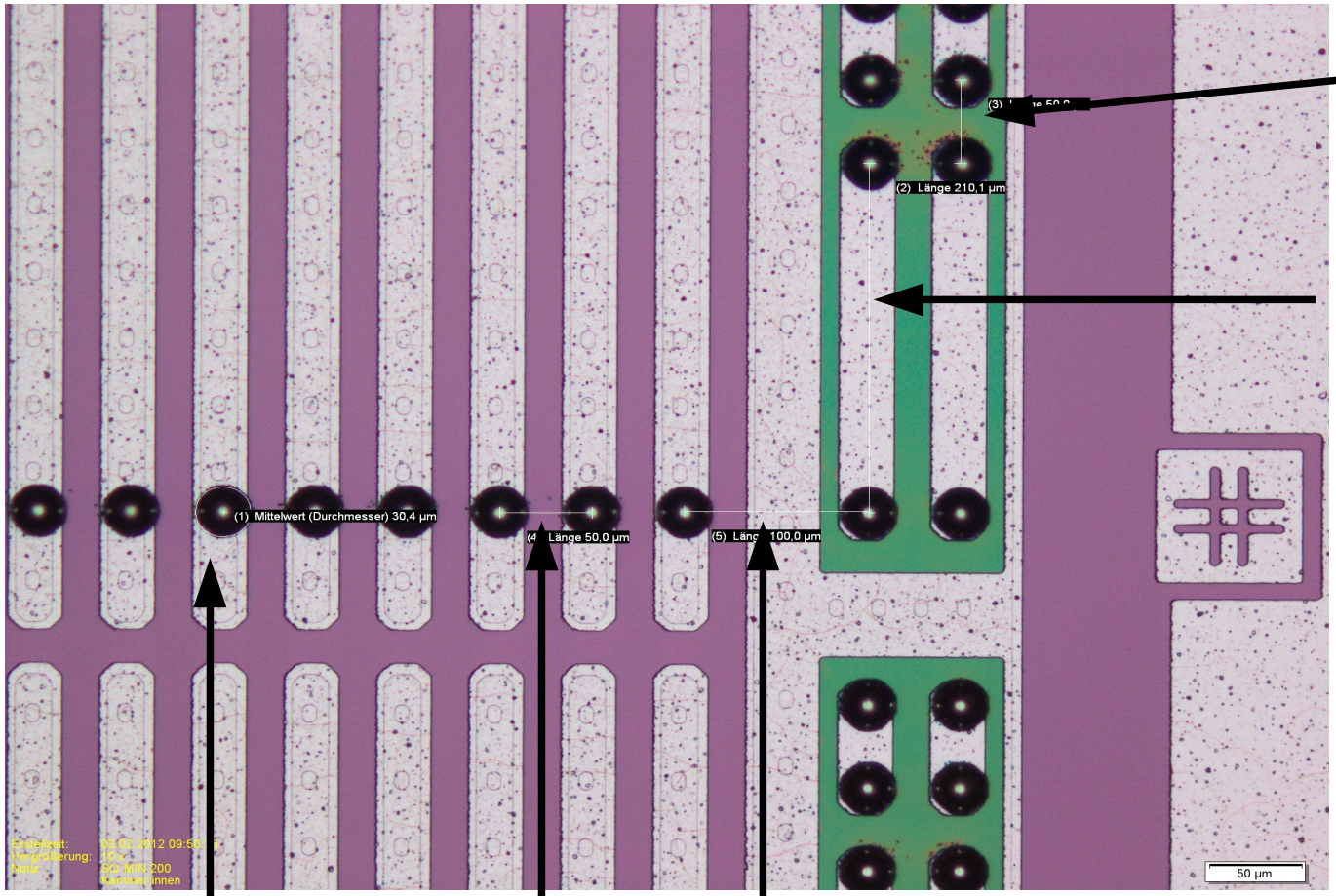


+ means increase value, - means decrease value

Alice1LHCb – sensors and ROCs from VTT

- sensors & ROCs arrived (10 of each)
- resolution of Datacon is not very good → markers can be seen
  - flip-chip process is not possible
- Ball diameter → 30µm
- Ball height → 9µm
- Bond pad pitch → 50µm

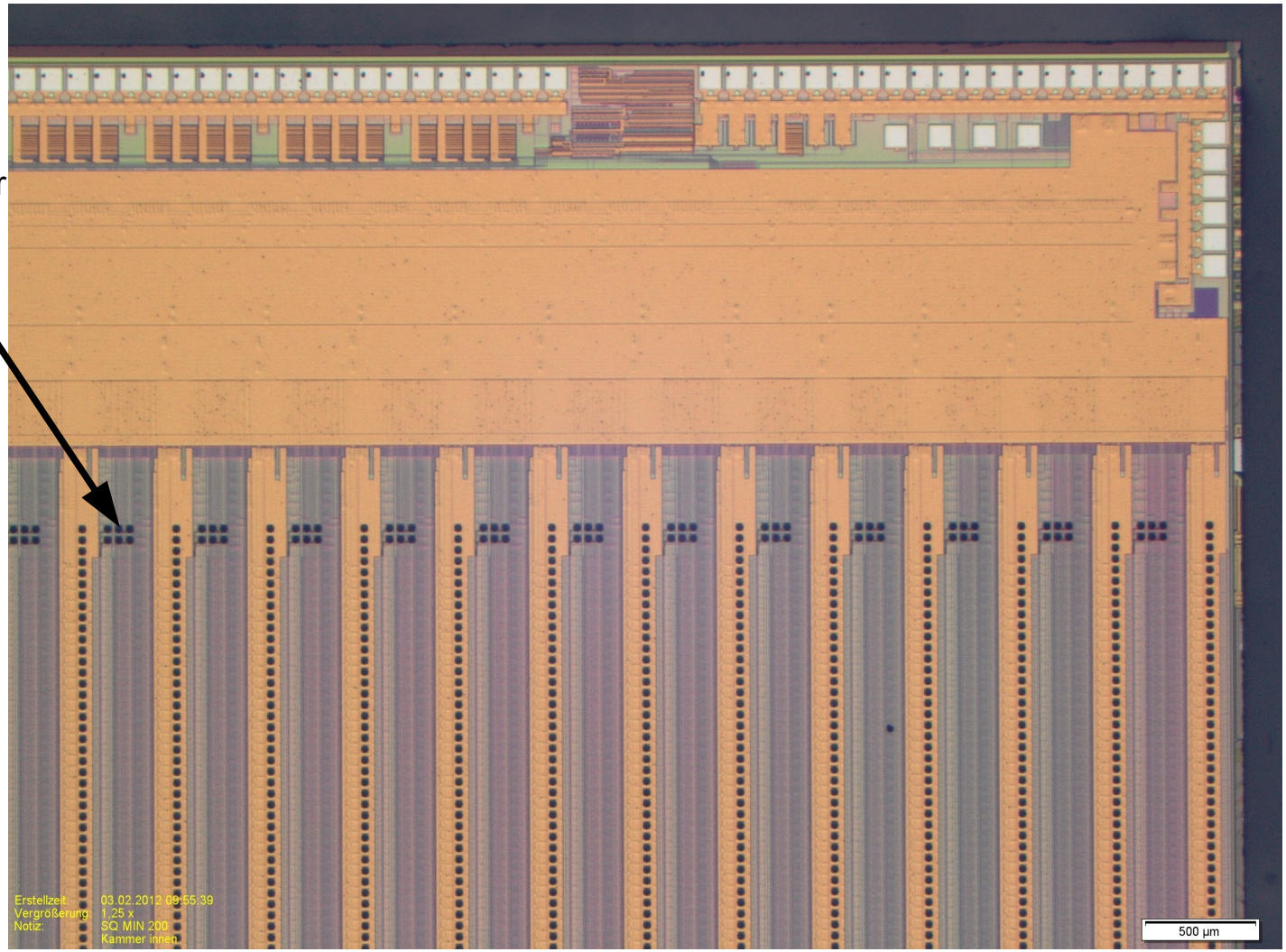
Alice1LHCb sensor



Alice1LHCb ROC

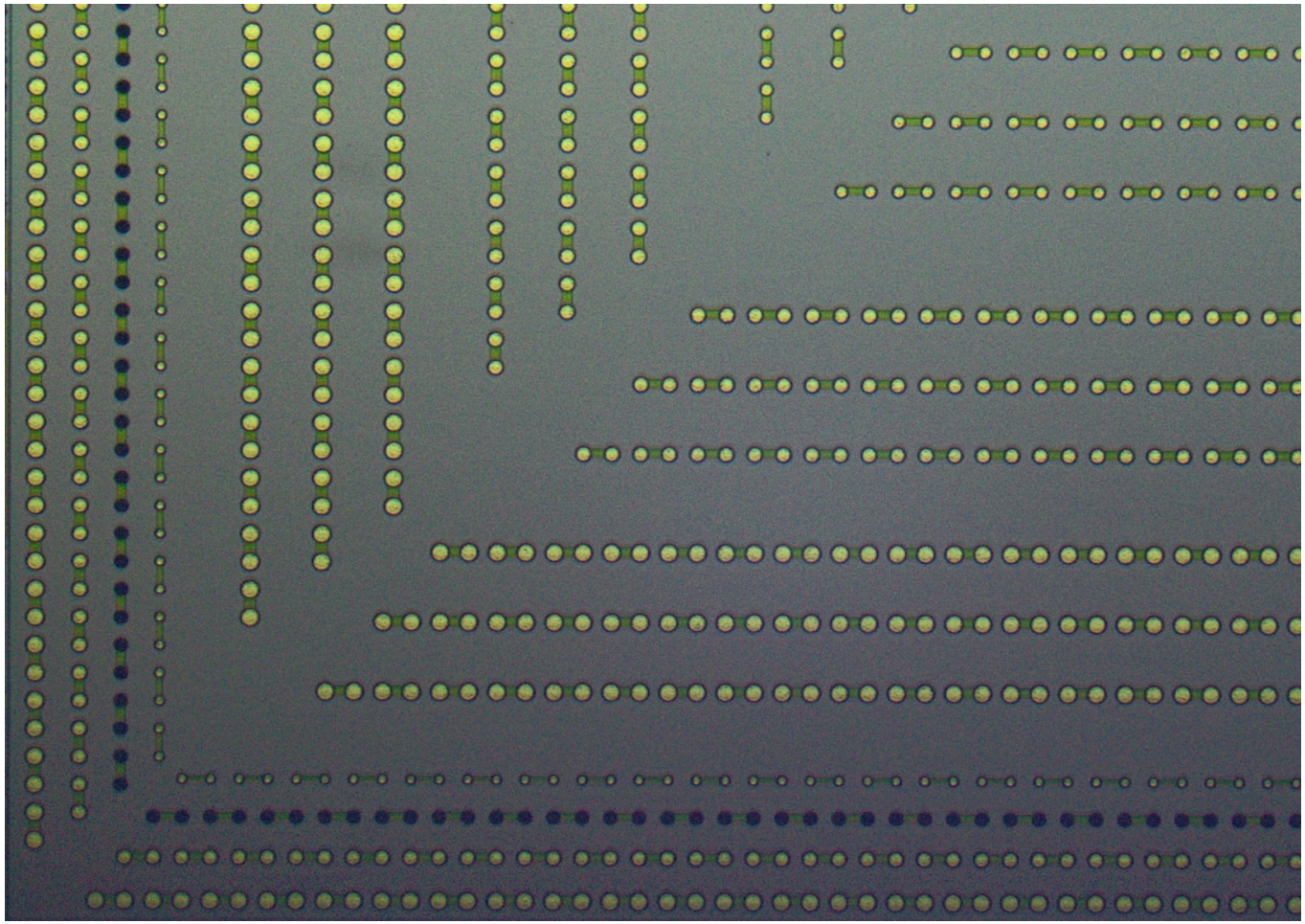
Ball diameter 30µm

Bond pad pitch 50µm

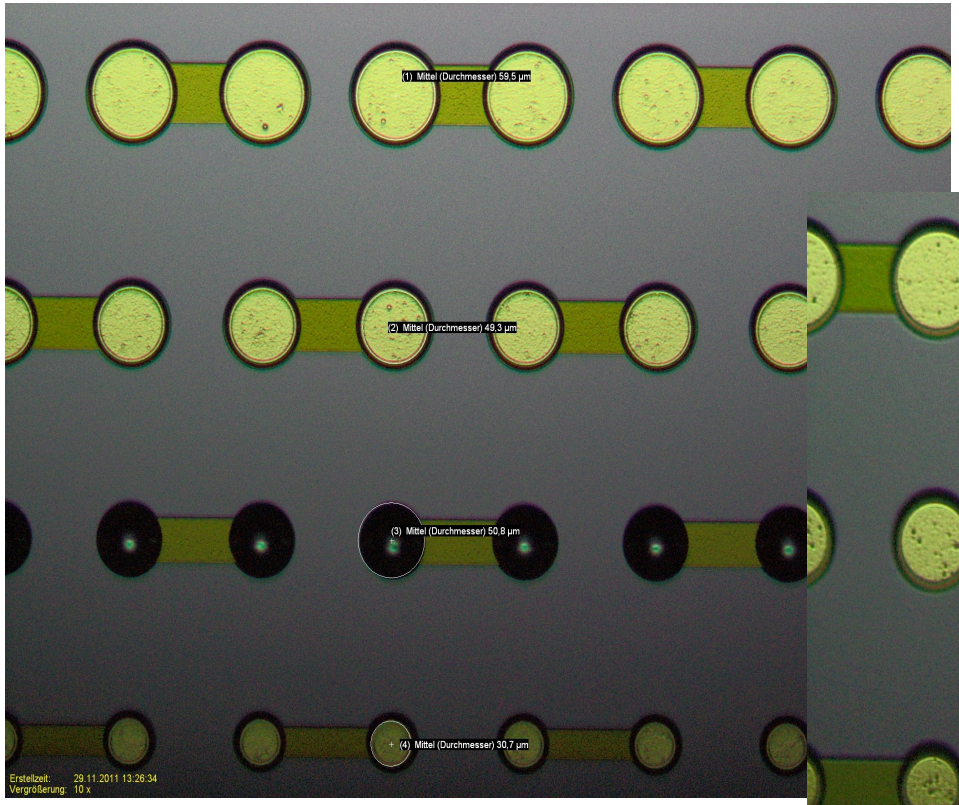


DESY dummy chips

- 10 with solder balls, 10 without them



Dimensions



Diameters top down:
60µm, 50µm, 50µm (with balls), 30µm

Diameters top down:
60µm, 50µm, 40µm, 30µm