

ECAL Si sensors status and plans

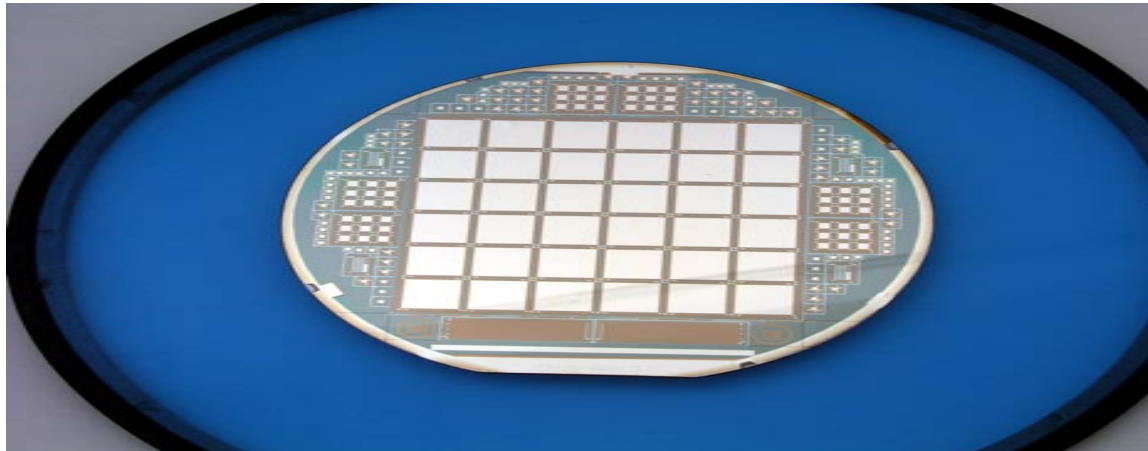
May 2006

V.Vrba

Status

EUDET prototype:

- ❑ end of 2005: production of 20 wafers produced at ON Semiconductor, tested at Prague → good quality;
- ❑ beginning of 2006: wafers delivered to Ecole Polytechnique – no report about any problem;

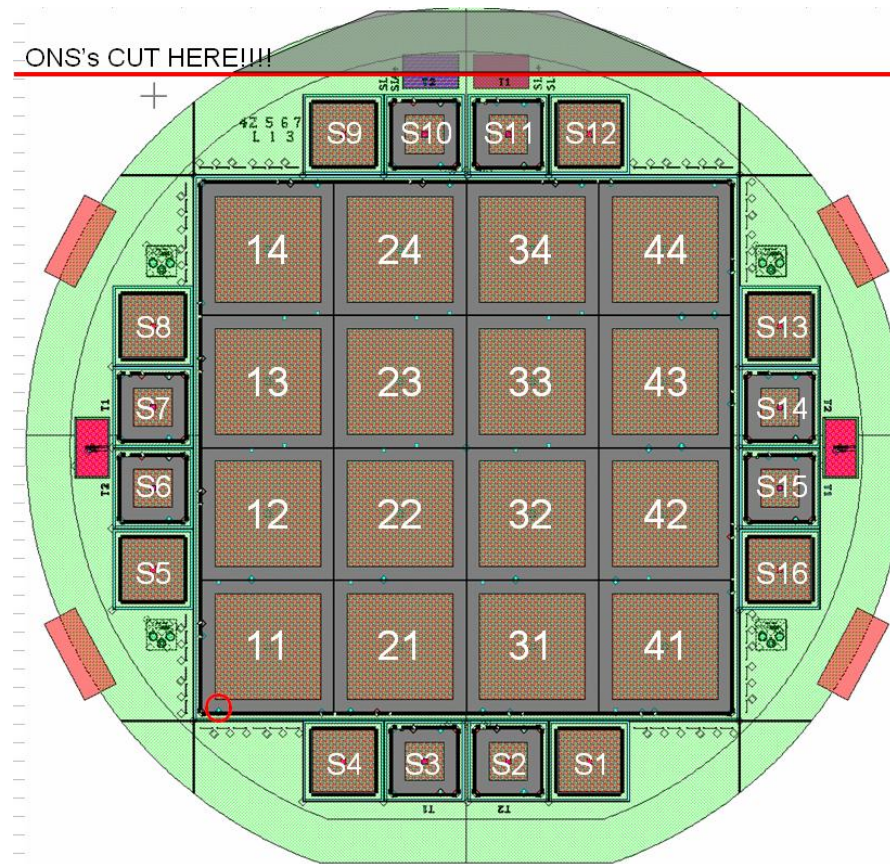


- :
- ❑ April 2006: ordered next batch of about 60 wafers at On Semiconductor to be ready ~ June 5, then measured and delivered to Ecole Polytechnique ~ June 15
- ❑ → waiting for news from news from Ecole Polytechnique;
- ❑ → looking forward for new delivery from ON Semiconductor.

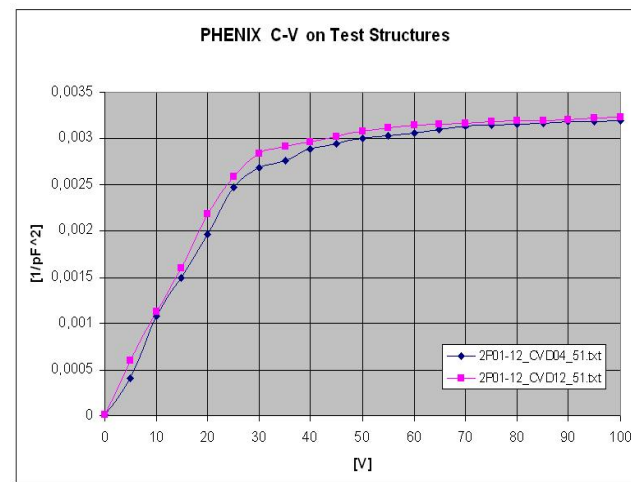
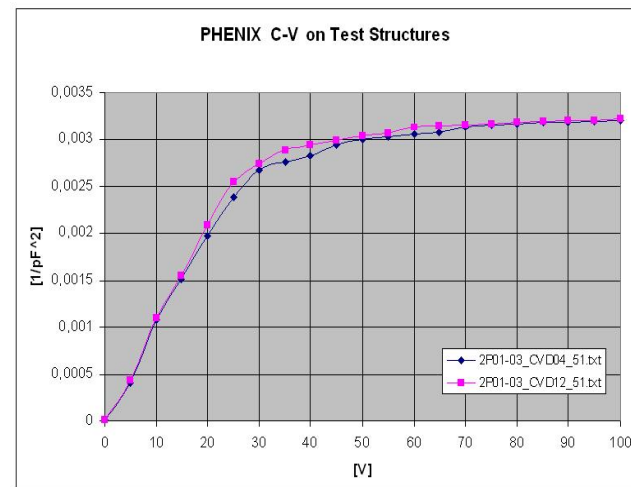
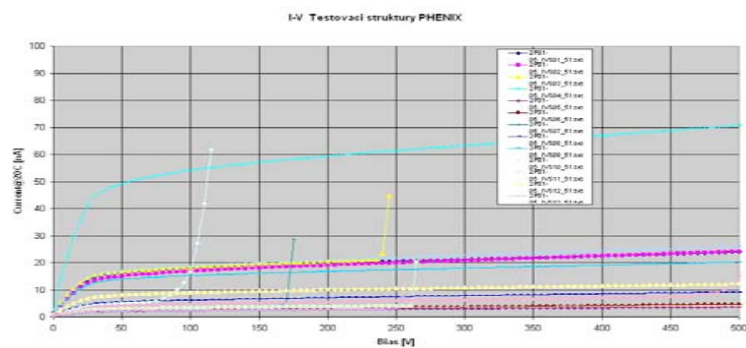
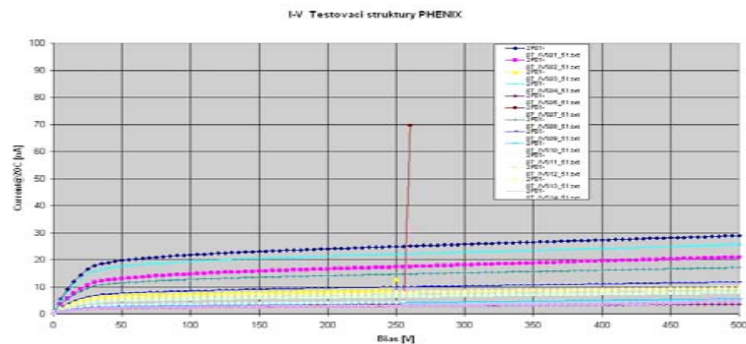
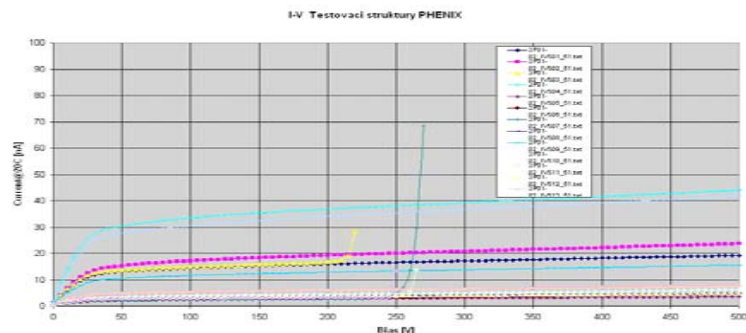
Recent developments

□ 4x4 pad sensor array produced @ONSemiconductor *with poly-silicon resistors*

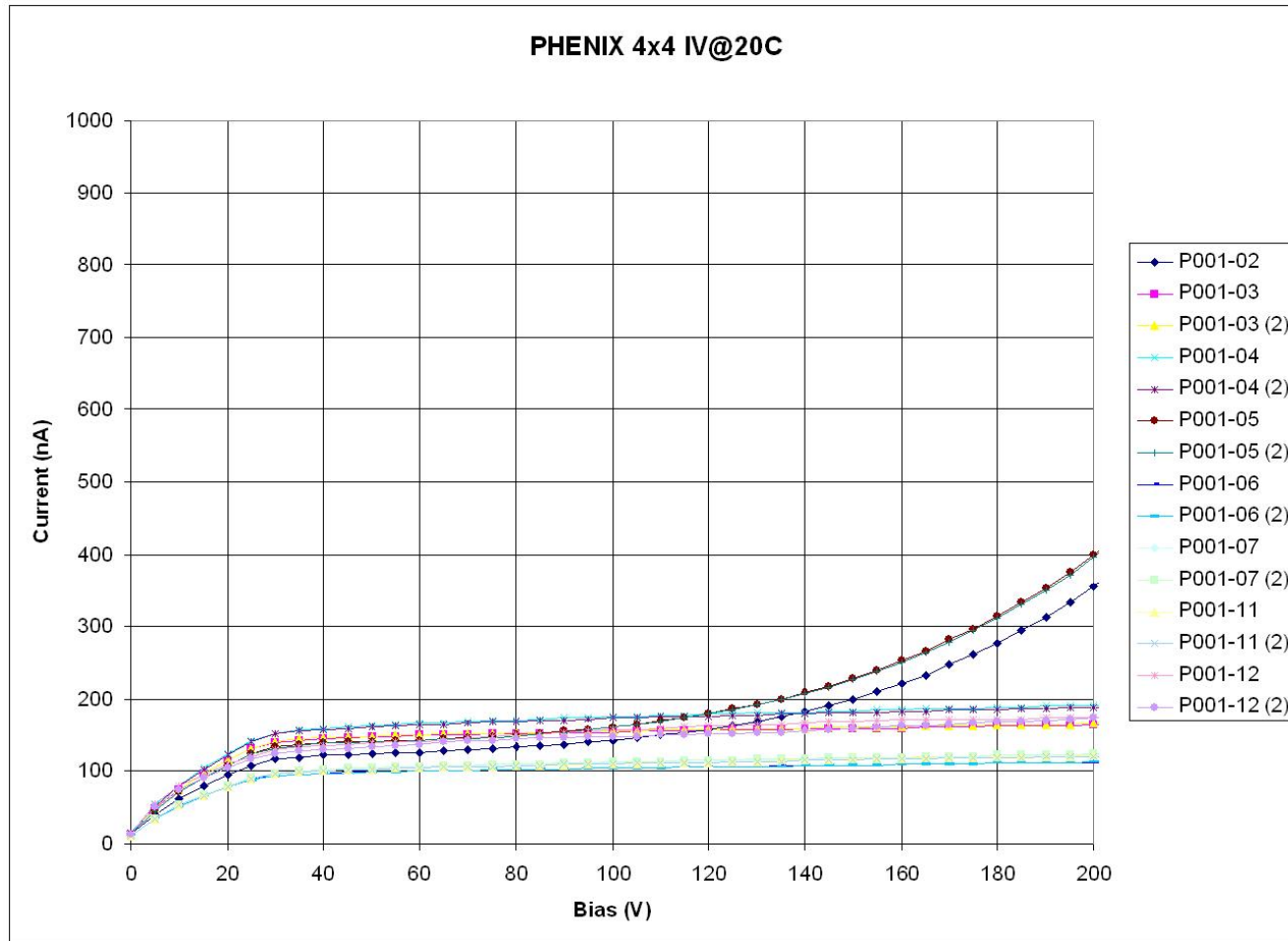
Layout of components on the wafer :



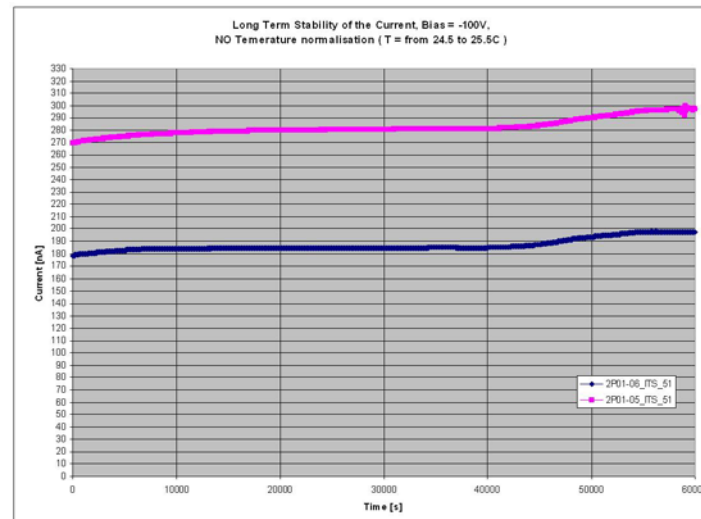
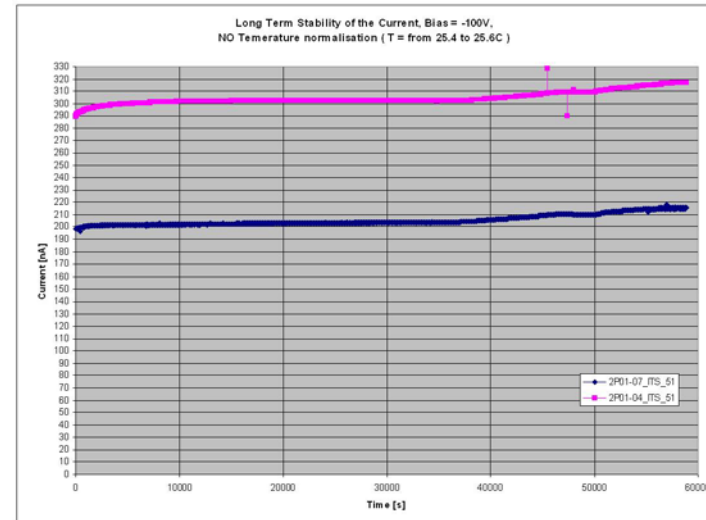
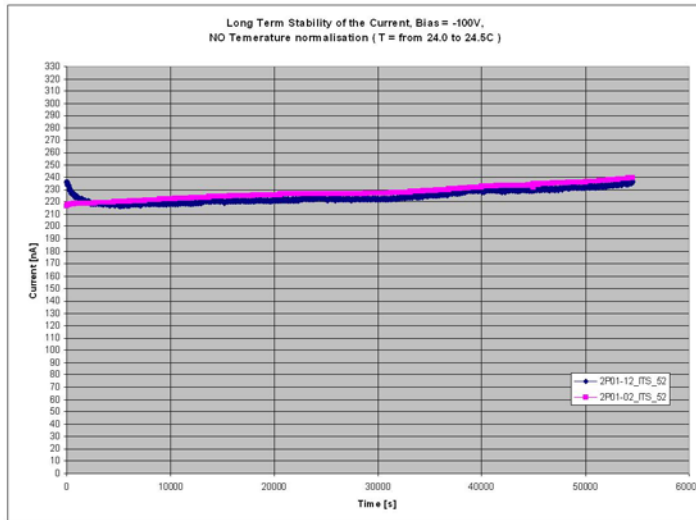
I-V and C-V on single diodes



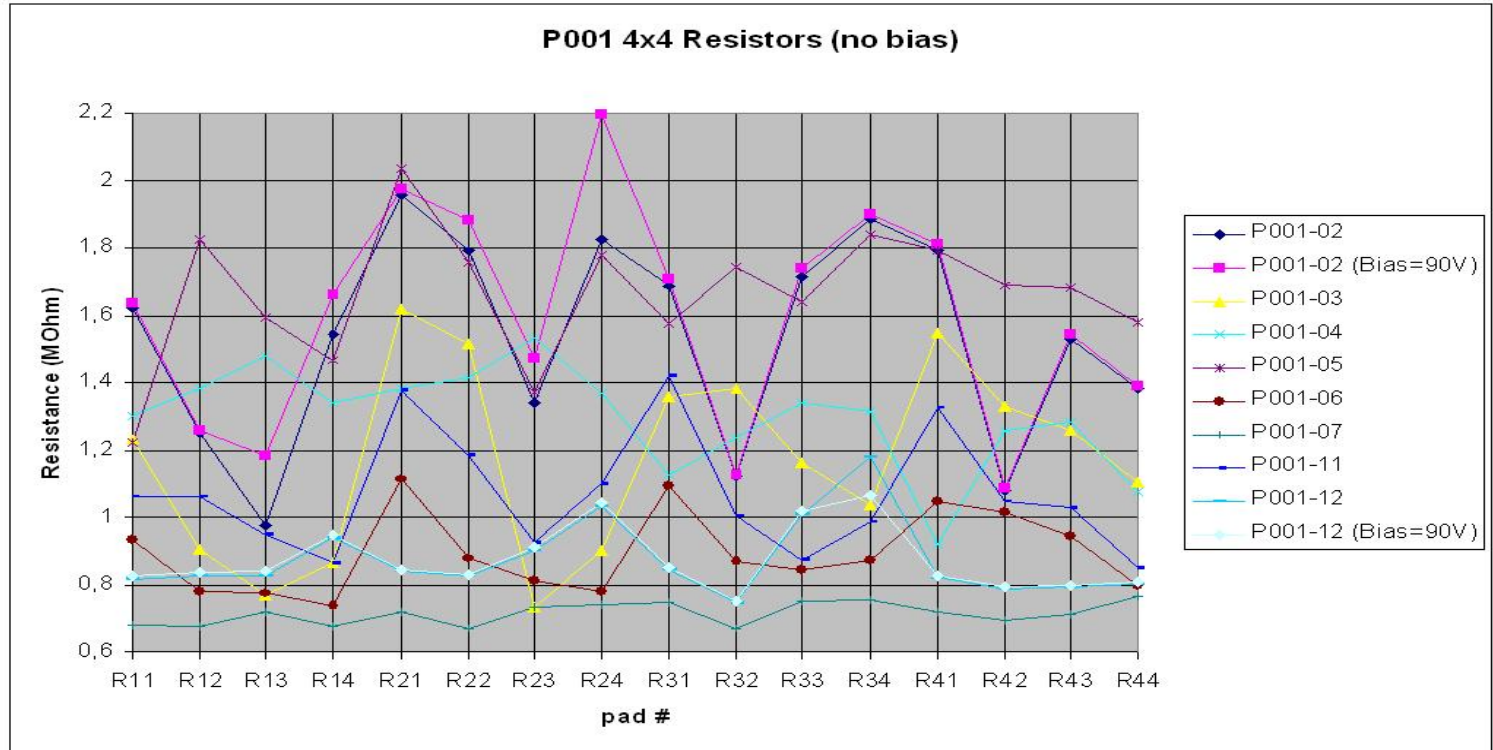
I-V curves for 4x4 pad array



Reverse current long term stability



Polysilicon resistors



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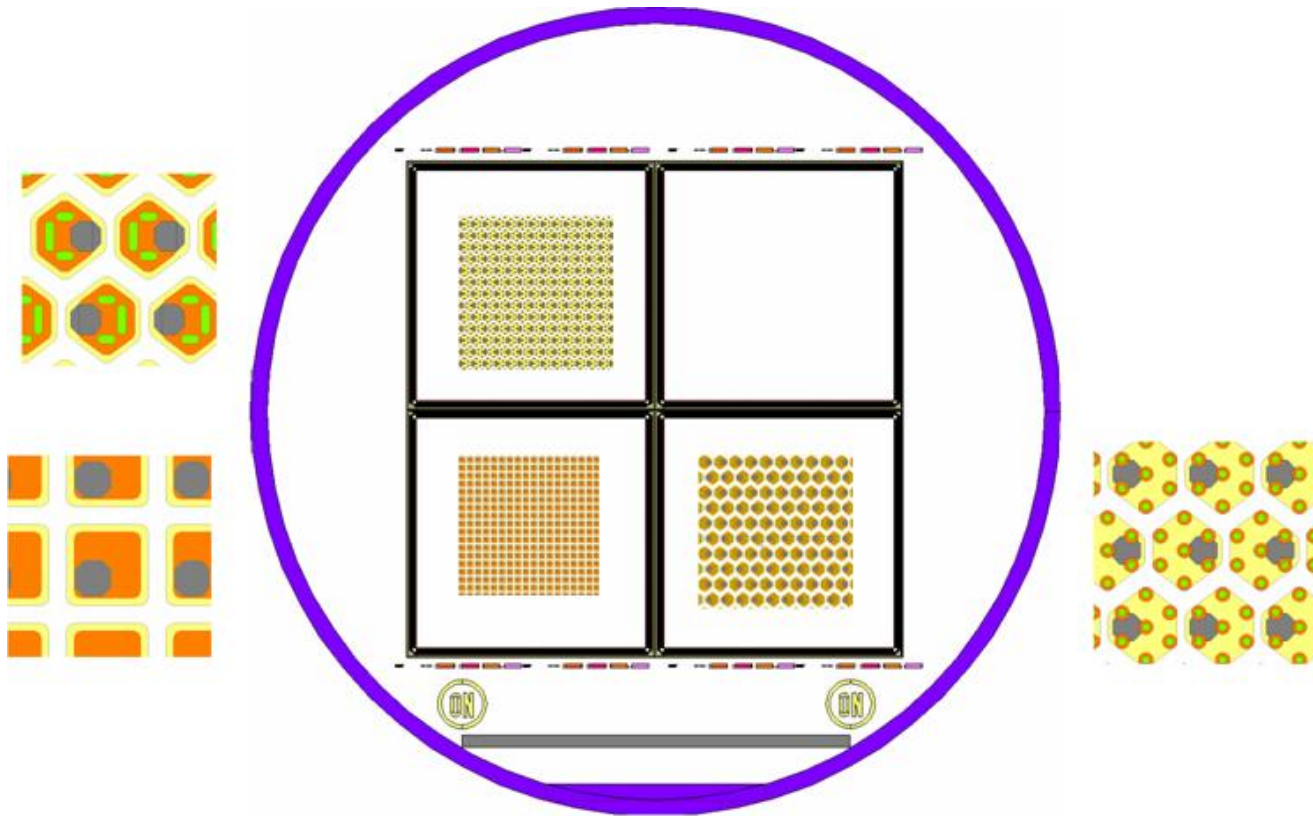
❑ Polysilicon resistors $\sim 1.2\text{MOhm} \pm \sim 30\%$

❑ ➔ can be improved by optimization of resistor shape (minimize fluctuation due to etching), better tuning of lithography etc.

Plans (1)

New design:

- ❑ smaller size: from 10 mm pitch → to ~ 5 mm pitch;
- ❑ different shapes: hexagonal shape gives better two-dimensional resolution then square shape (by approx 30%) – or – the same resolution with less number of electronic channels;

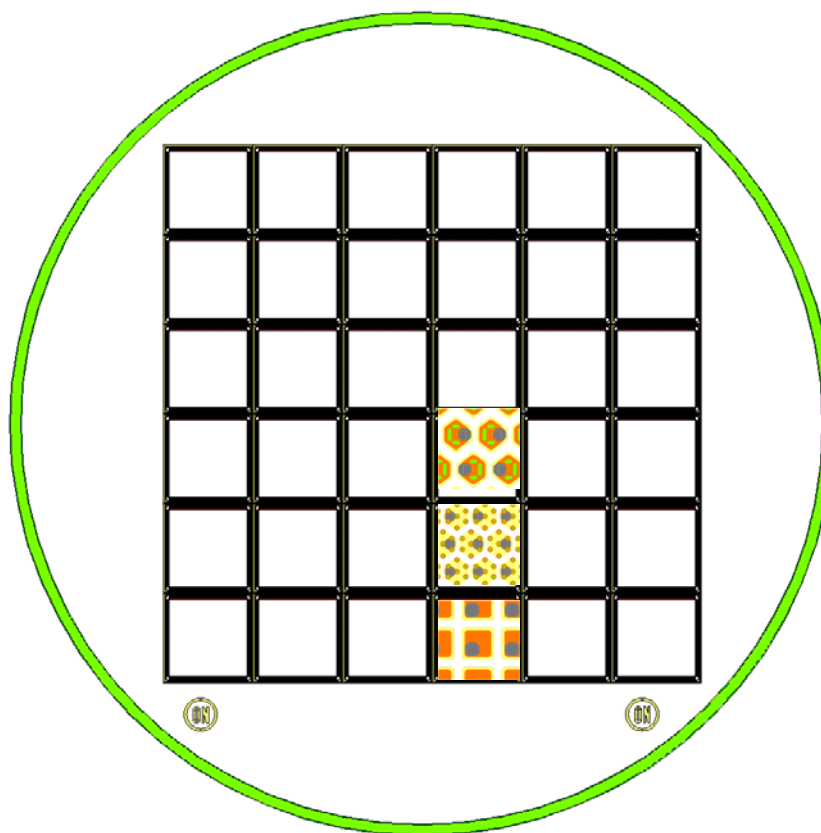


Plans (2)

Precision layer (s ?):

- ☐ better determination of the shower position, shower disentangling etc;
- ☐ pre-shower layer?
- ☐ → needs simulation for optimal position and cell size for the given detector spatial configuration.

Investigation of possibility of use of 6" wafers



Summary

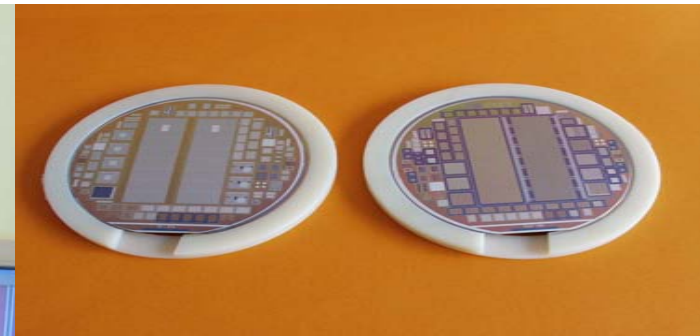
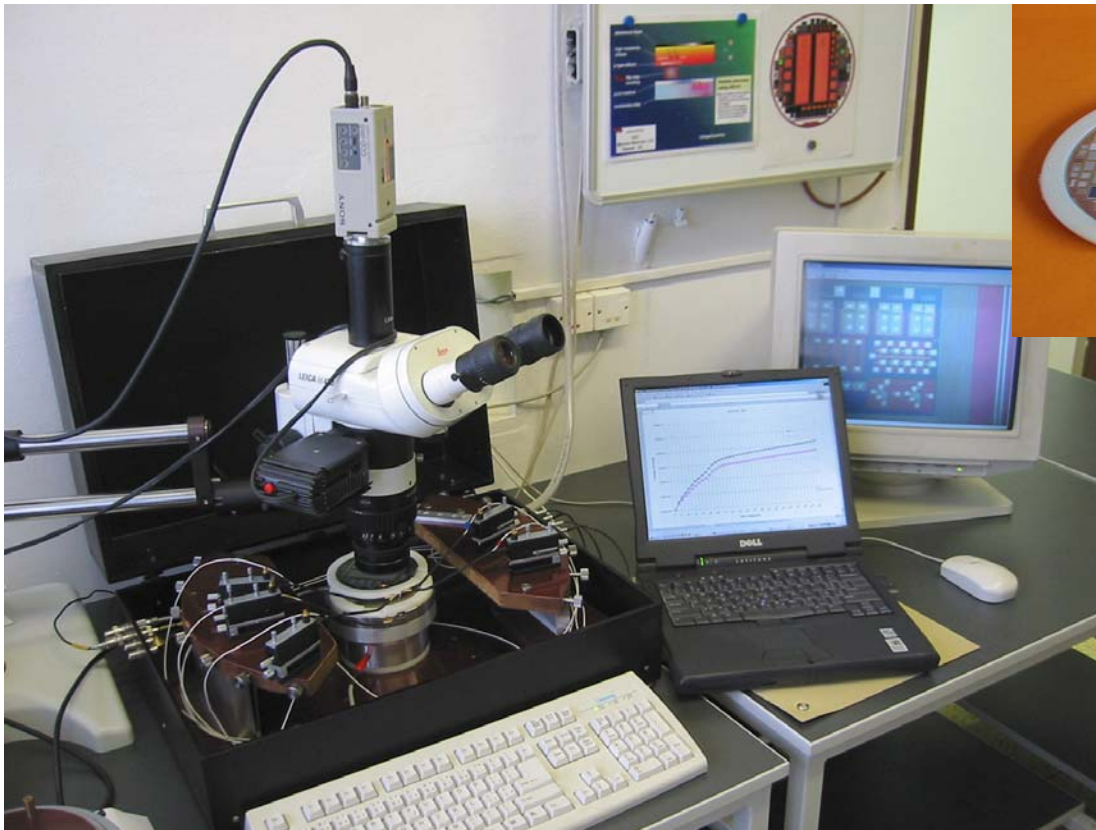
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- ❑ production of wafers for EUDET module in progress → shall be in time;
- ❑ proved possibility of fabrication of integrated bias resistors → no visible reduction of production yield;
- ❑ studies of fine granularity, different pad shape, precision layer, pre-shower layer are in progress;
- ❑ possibility of the use of 6" wafers is also investigated.

Sensor probing @ Institute of Physics

- ❖ V r. 2006: testování cca 30-40% dodatečné produkce senzorů.

Pracoviště pro měření pixelových detektorů ve Fyzikálním ústavu



Senzory vyrobené v *ON Semiconductor*
CR (dříve TESLA Sezam)