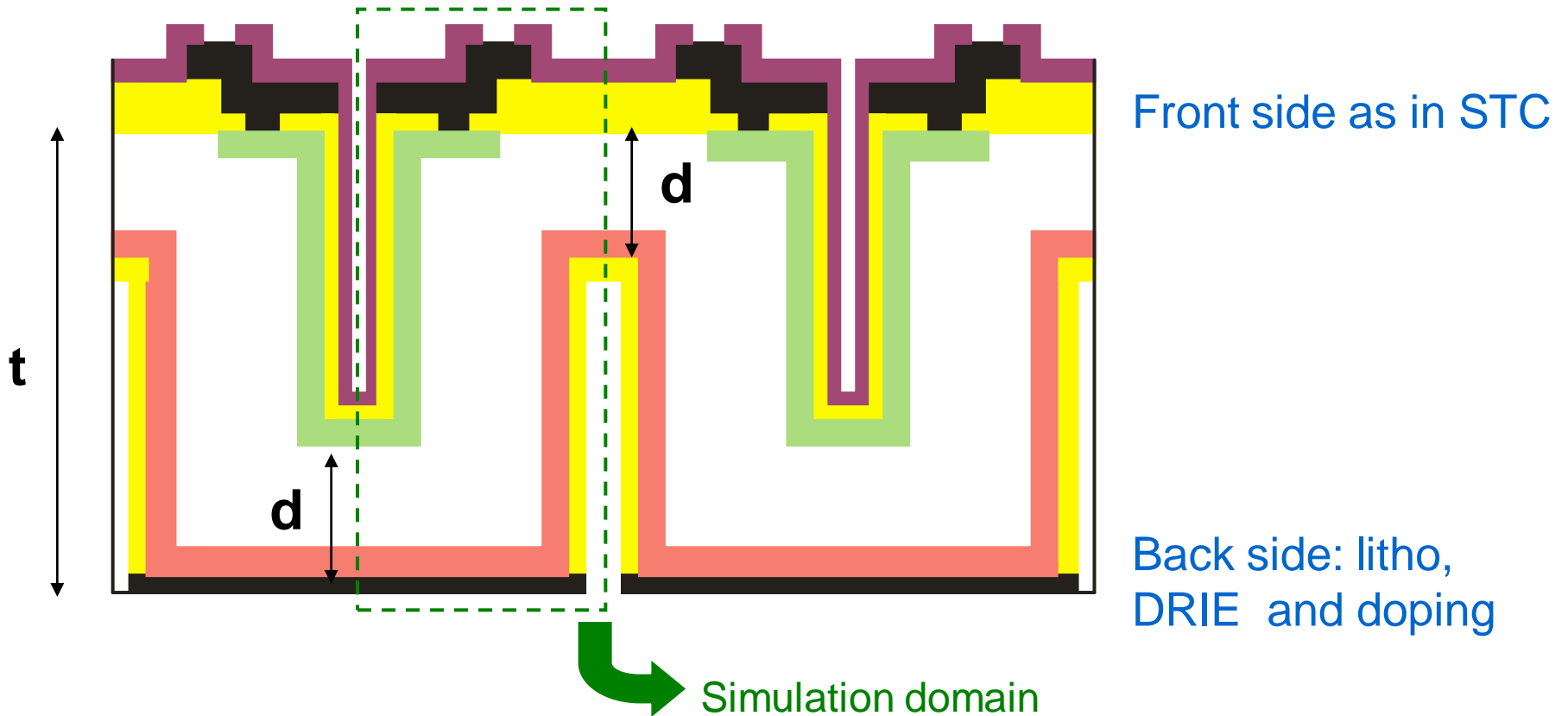


# Update of 3D activity at FBK- rst

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## 3D Double-side Double-Type Column (DDTC) detectors



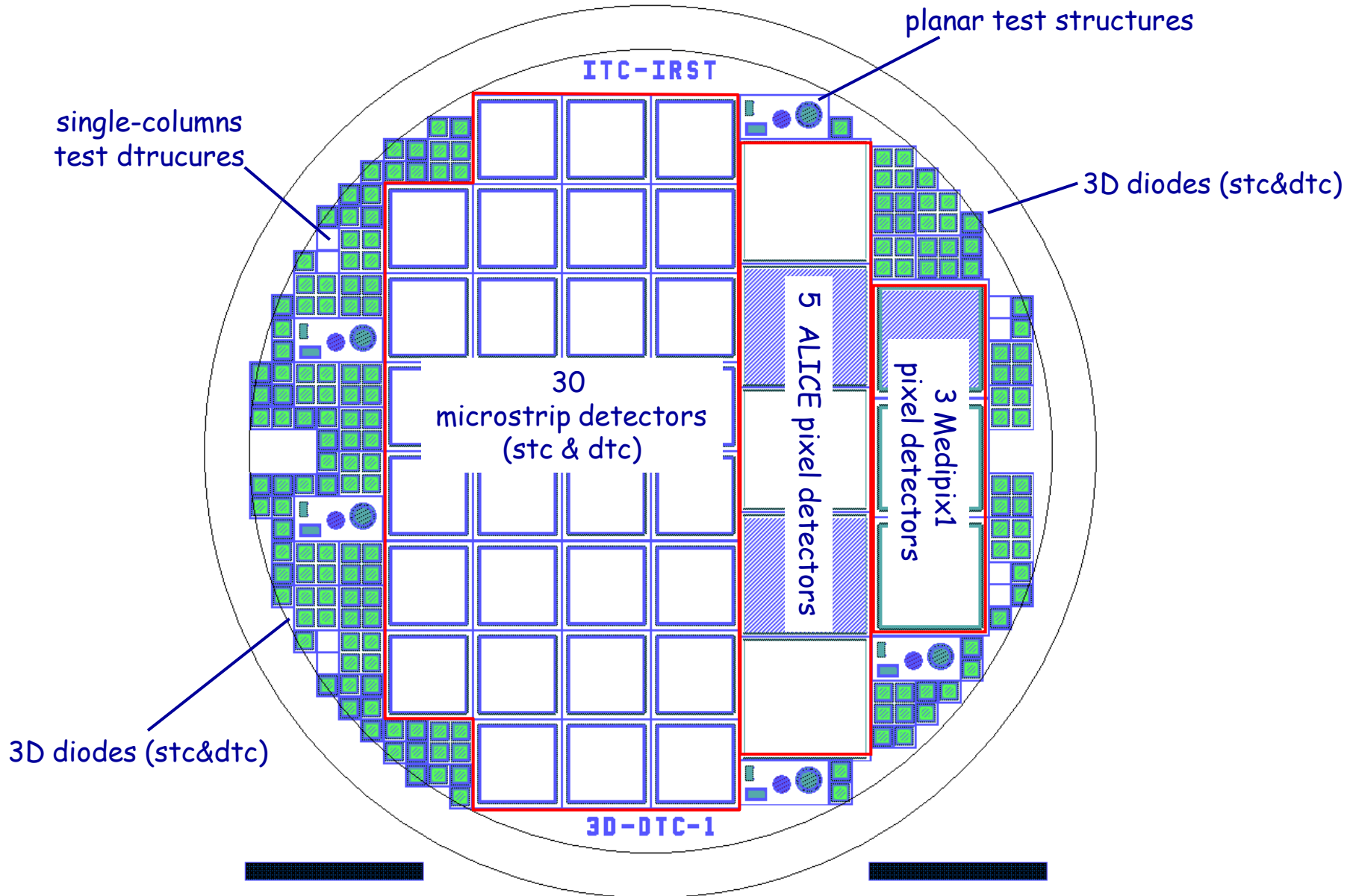
- Detector concept able to ease the fabrication process
- Expected to have performance comparable to standard 3D detectors  
(if  $d$  is much smaller than  $t$ )

# Status and schedule

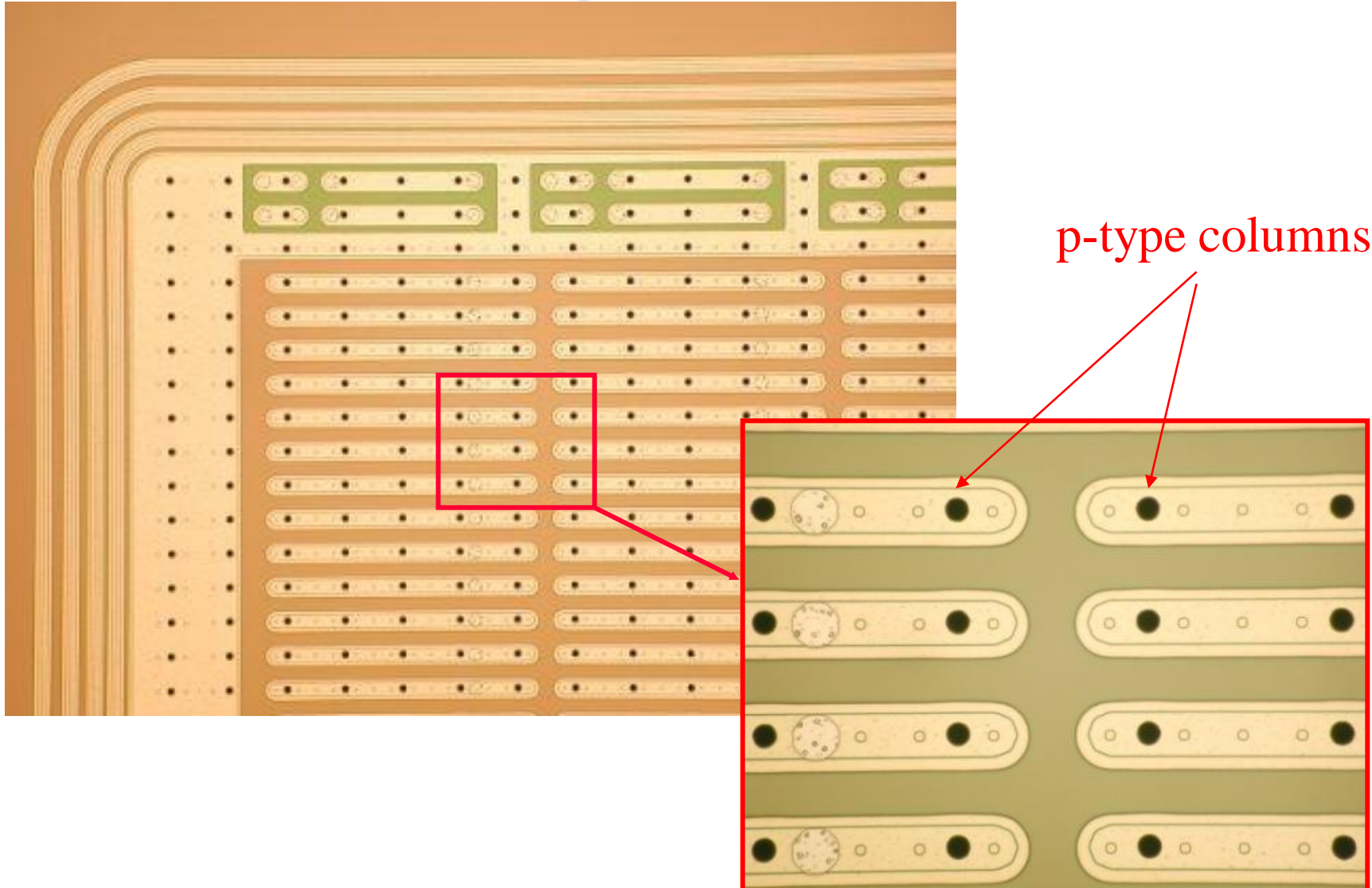
2 batches under fabrication at FBK

Batch	3D-DDTC 1	3D-DDTC 2
Substrate type	n-type	p-type
Substrate thickness ( $\mu\text{m}$ )	300	205 – 255
Column depth ( $\mu\text{m}$ )	180 – 200 (not optimized)	180 – 200 (optimized)
Strip design and pitch ( $\mu\text{m}$ )	AC/DC coupled, 80 – 100	AC/DC coupled, 80 – 100
Pixel design	ALICE MEDIPIX	ATLAS CMS
Currently at step	145 of 145	100 of 165
Due by	October 2007 Just finished !	End of 2007

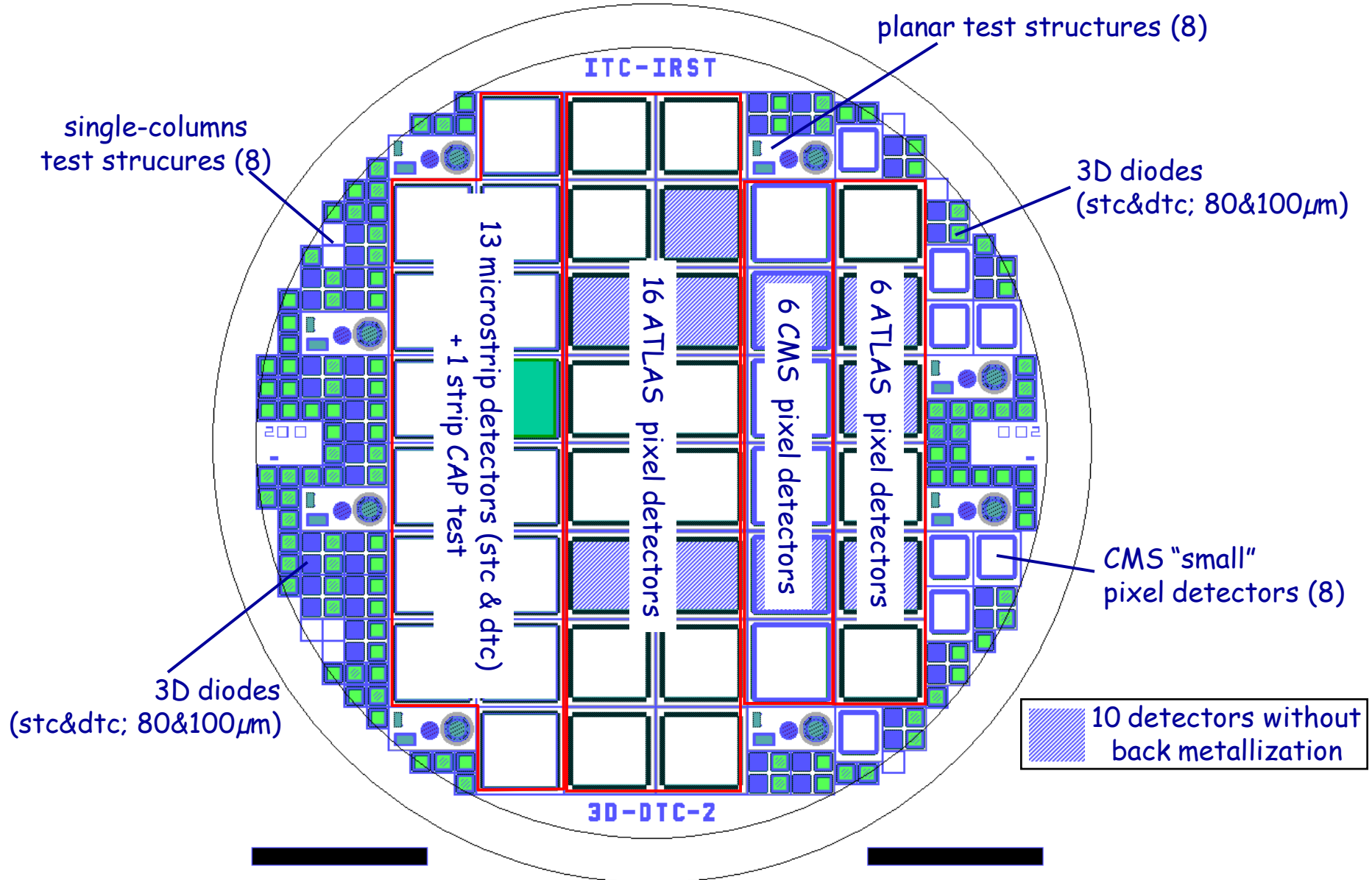
# 3D - dtc1



# ALICE pixel detectors

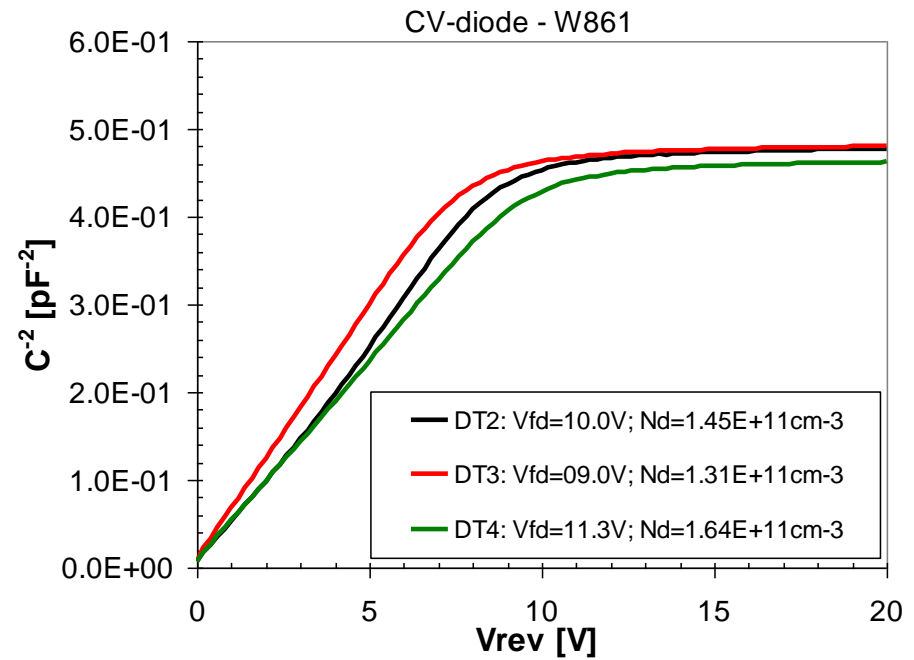
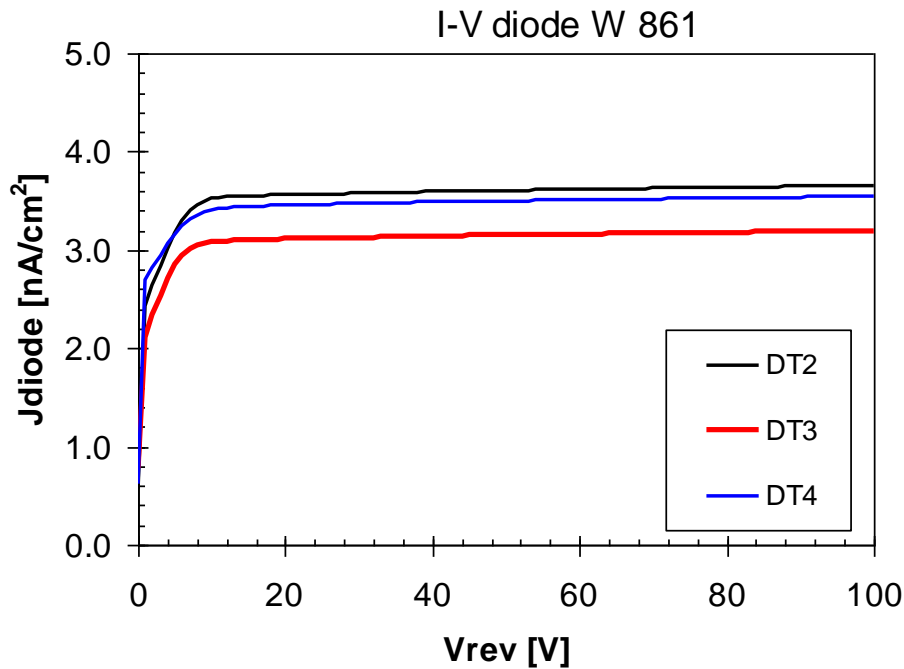


# 3D - dtc2



# 3D-DDTC1: preliminary results (1)

## Planar test diodes (4mm<sup>2</sup>)



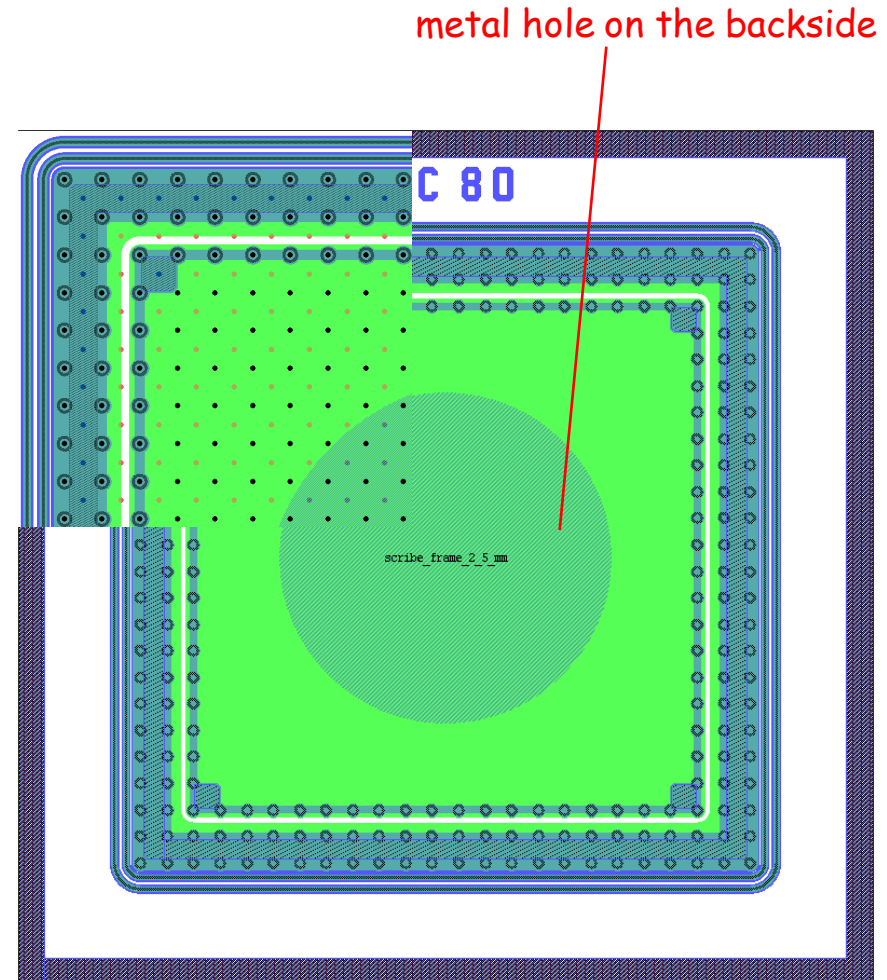
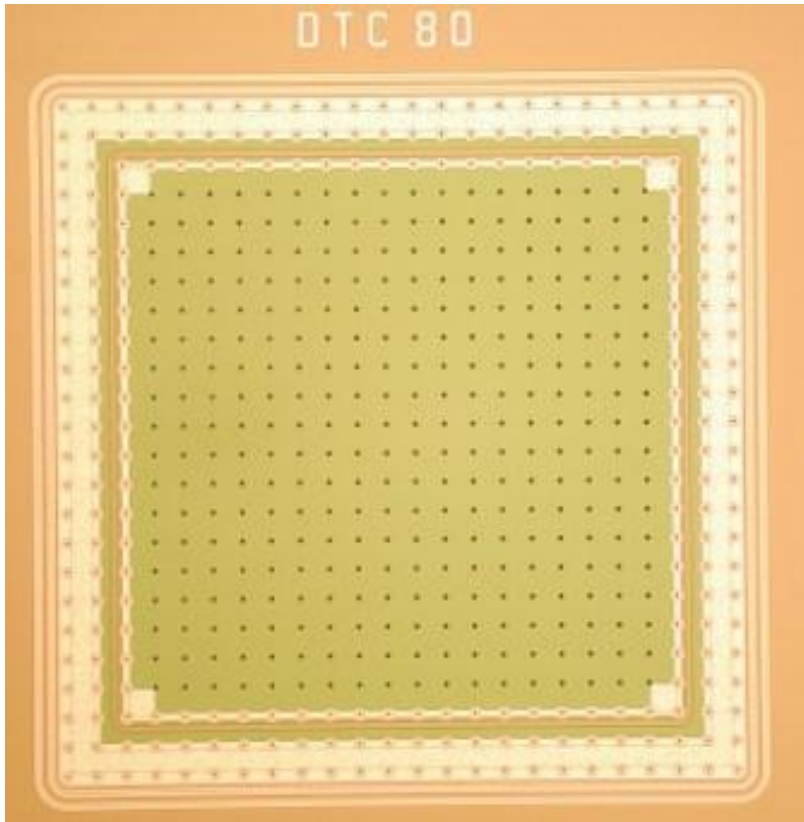
- Good leakage current (no degradation from DRIE)
- Very low doping concentration ( $\sim 1.5 \times 10^{11} \text{ cm}^{-3}$ ) and full depletion voltage

## 3D - dtc1

### single 3D diodes - 80 $\mu$ m pitch

- plain diode implant;
- 20x20 column matrix (frontside);
- dtc

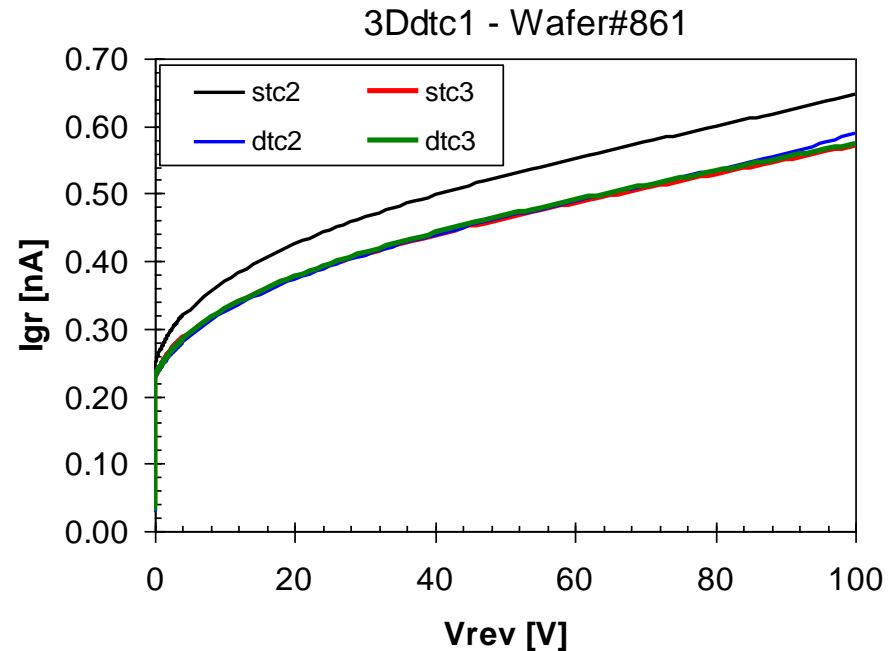
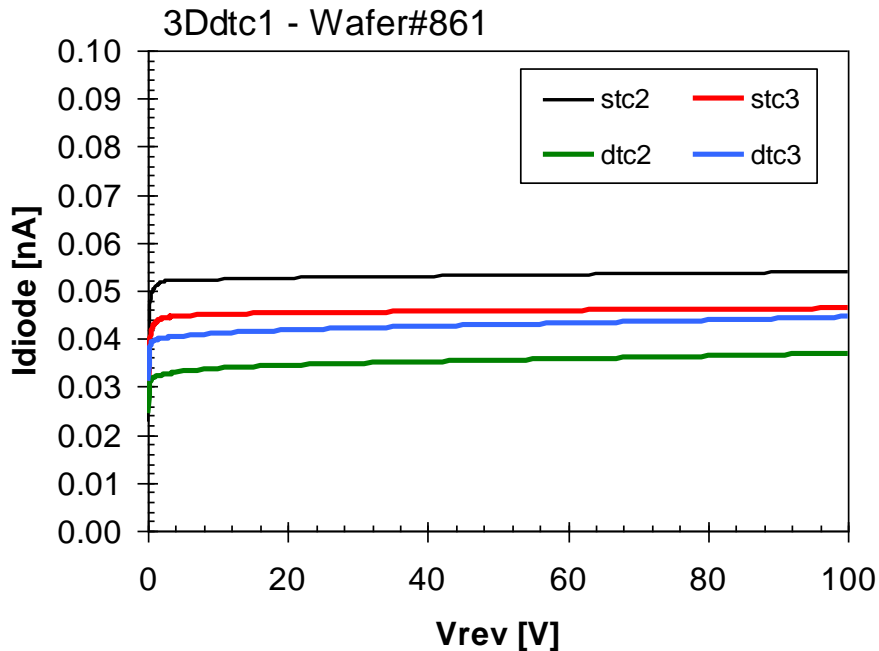
33 devices/wafer





# 3D-DDTC1: preliminary results (2)

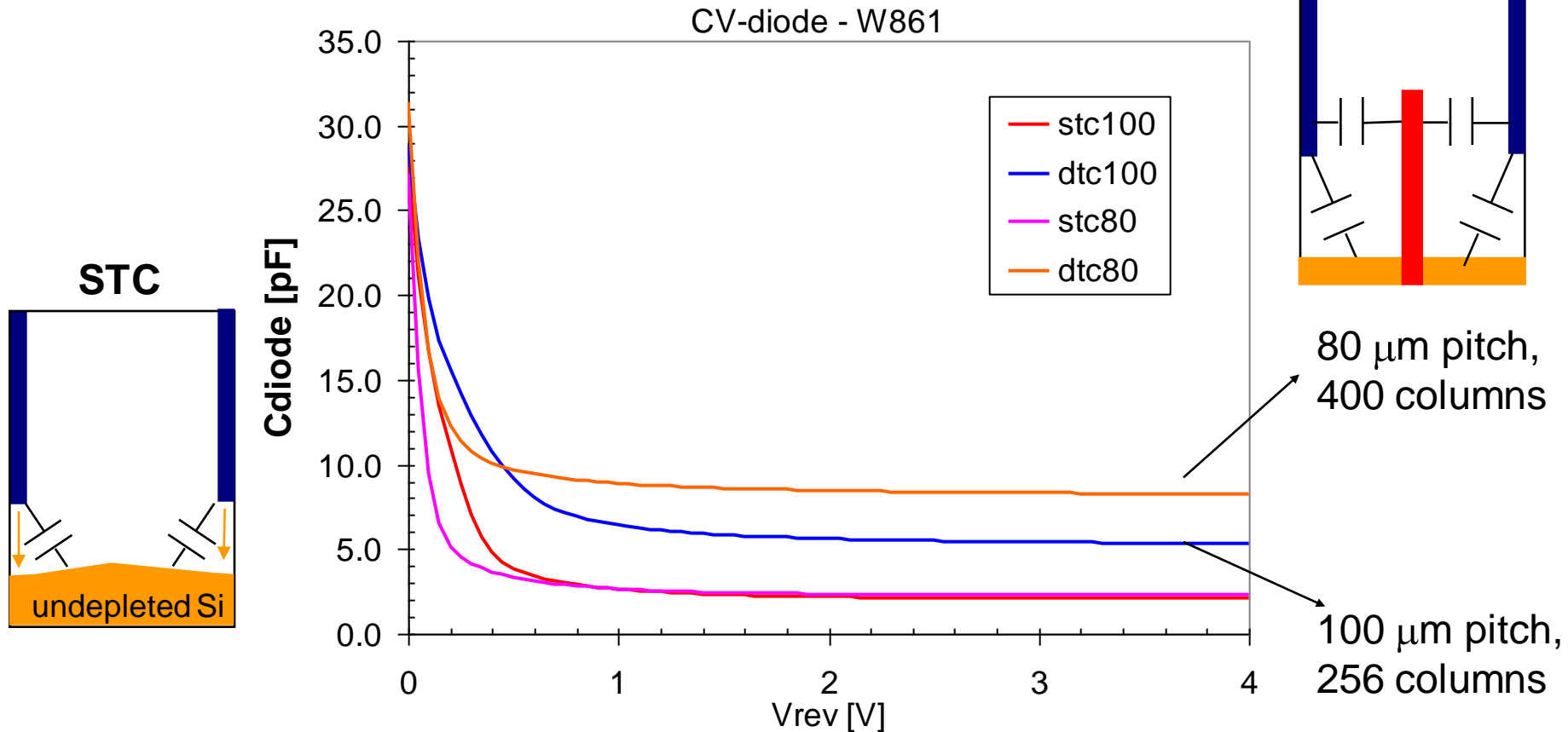
## 3D-diodes (2.56mm<sup>2</sup>), I-V measurements



- Very low depletion voltage
- Good leakage current, no sign of early breakdown

# 3D-DDTC1: preliminary results (3)

## 3d-diodes, C-V measurements



- STC: same saturation values regardless of pitch (area dependence)
- DTC: higher saturation values and pitch dependence

## Conclusions

- FBK is developing the technology for the production of 3D detectors with encouraging results.
- Important lessons learnt from Single Type Column detectors, both for the technology and the 3D operation
- Performance enhancement with acceptable process complication: **3D-DDTC detector**
- Two batches under way: preliminary results from first prototypes (p-on-n) quite promising, n-on-p available soon
- DRIE equipment will be available at FBK by Dec. 2007