leti innovation for industry

CEA Saclay Irfu

Groupe SOFRADIR

Narrow InfraRed_ Large Format Sensor Array _2 Final Presentation (FP2)

Attendees:
V Moreau; O Boulade; (CEA-IRFU/SAp)

C Cervera; O. Gravrand; F Guellec; G Destéfanis; JP Zanatta (CEA-Leti)
N Nelms; L Duvet (ESA-ESTEC)

2nd April 2014 @ CEA-IRFU/SAp Saclay

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FP_2 NIR_LFSA_2 AGENDA

- 9h30 → 9h45 *JP Zanatta* → Introduction
- 9h45 → 10h45 *O. Gravrand* → Leti tests report
  - Phase 1 results
  - Phase 2 technological studies (including brief experiment on thinned CdTe samples
  - Phase 2 tests results: TAP; C(V) ; Spot-Scan; Spectral response – QE
- 10h45 → 12h00 *O. Boulade* → IRFU/SAp tests report
  - Nir_LFSA_2 detectors tests results
  - Synthesis , conclusion and comparison with Nir_lfsa_1 tests results
- 12h00 → 12h15 Slides from *P Chorier*
  - SOFRADIR position
- 12h15 → 12h30 → Discussion
- 12h30 → 14h00 → Lunch
- 14h00 → 14h30 *JP Zanatta* → CCN4 of NIR_LFSA_2
  - Leti CCN4 proposal
  - Discussion

NIR_LFSA_2 Summary report

- To be sent next during April

NIR_LFSA_2 project

- *to (négociated at KO Meeting)* ➔ ***1st déc 2011***

  Period (négociated at KO Meeting) ➔ ***18 mois***

  (31st May 2013)

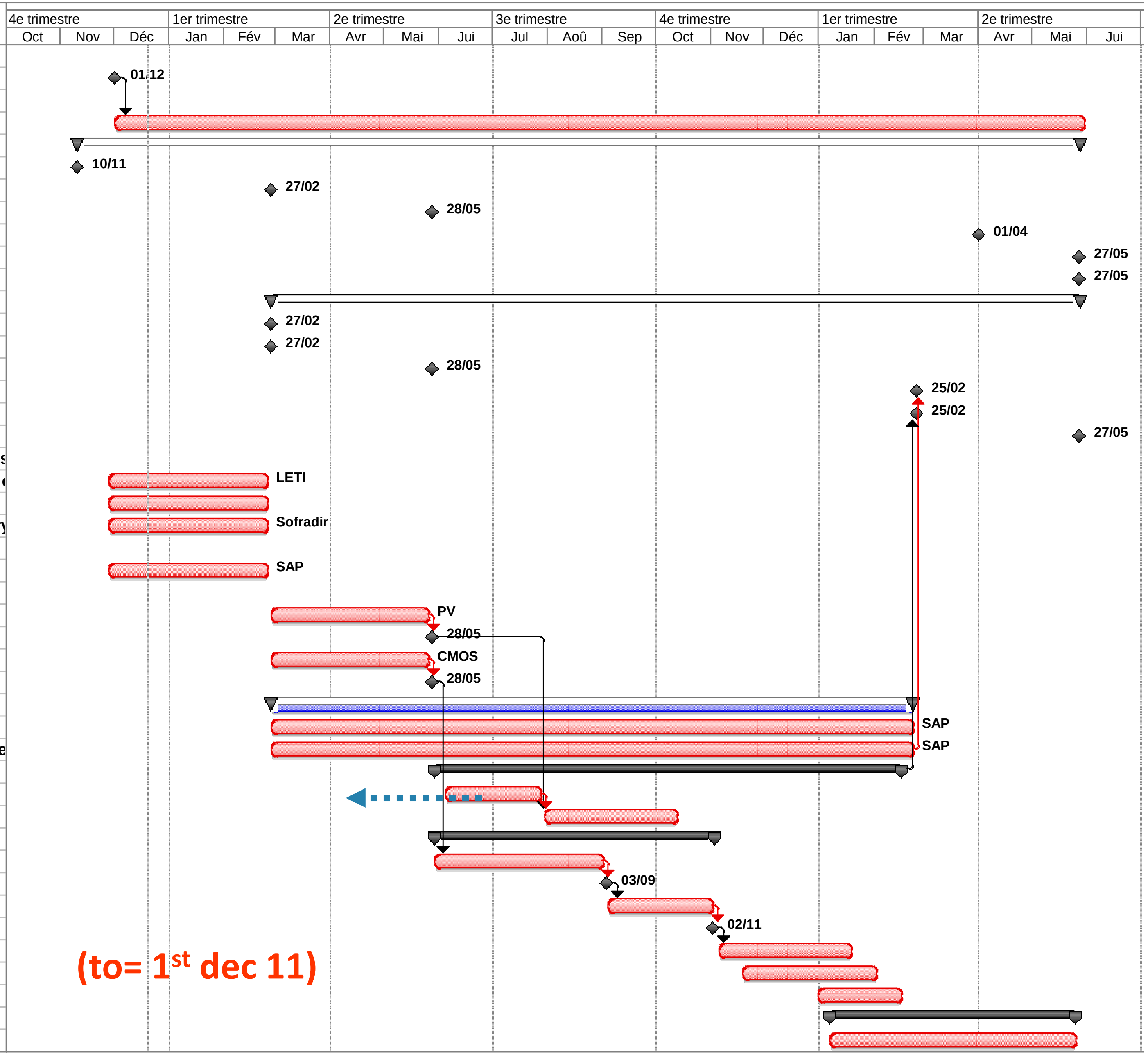
- *Technological problem during fabrication of 2nd level of metalization & Indium bump*
  - ➔ *new CMOS batch fabrication and 2nd level metal*

- ***CCN2 +CCN3*** *new final date* ➔ ***28 Feb 2014***

- *Final delay due to difficulties to start ROIC and to measure Idark detectors* ➔ ***31 March 2014***

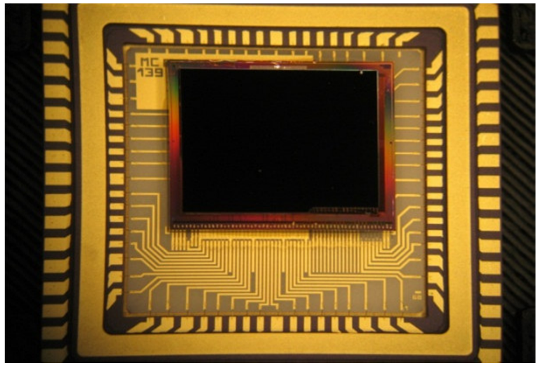
Initial planning phase 2 (KO Meeting)

N°	Nom de la tâche
1	NIR lfsa
2	Jalon to contrat
3	Task 2.0 Management
4	WP2.0 Management
5	Meetings
6	KOM phase 2
7	PDR
8	DDR
9	TRR
10	TRB
11	FP2
12	Documentation
13	TN5 preliminary detector design report
14	TN6 Detector test plan
15	TN7 detailed detector design report
16	TN8 detector test bench description
17	TN9 detector manufacturing report
18	TN10detector test report
19	Task 2.1 Preliminary detector design and trade off s
20	WP2.1.1 MCT techno littérature review & trade o
21	WP2.1.2 ROIC littérature review
22	WP2.1.3 IRFPA littérature review & manufactury
23	Task 2.2 Tests plan & test bench design
24	WP2.2.1 Test plan & test bench design
25	Task 2.3 detailed detector design
26	WP2.3.1 MCT array design
27	PV mask available
28	WP2.3.1 MCT array design
29	Layout available
30	Task 2.4 Tests bench preparation
31	WP 2.4.1 Tests electronic design &procuments
32	WP 2.4.2 Optical test benchdesign & procureme
33	Task 2.5 Detector manufacture
34	WP 2.5.1 MCT material manufacturing
35	WP 2.5.2 PV Technology_1 batch
36	WP 2.5.3 ROIC supplying
37	ROIC supplying
38	ROIC available
39	FPH process
40	ROIC + FPH available
41	WP 2.5.4 IRFPA manufacturing
42	WP 2.5.5 IRFPA preliminary tests & selection
43	WP 2.5.6 IRFPA mounting
44	Task 2.6 Detectors test & charac charac
45	WP 2.6.1 Detectors test & charac charac



Test of IRFPA @ Leti and @ IRFU SAp

PV MCT:In p/n hybridized to « source follower » ROIC with TV format, 15 µm pitch

→ 

- **8 detectors fabricated and tested @ Leti for Idark measurements @ IRFU/SAp**

Components	Dark current estimation	Median Photonic Response (Tbb=30°C)	Comments
1308	8,63e/s	36,5mV	Fully functional, Large response, Delivered to SAp
1309	7,8e/s	42,2mV	Fully fonctional, Large response, Delivered to SAp
1310	15,5e/s	15,5mV	Low response, Large number of hot points, Not Delivered
1311	13,7e/s	13,4mV	Low response, Large number of hot points, Not Delivered
1314	Depends of variation	Depends of variation	Fully fonctional,Technological variations, Delivered to Sap
1316	7,75e/s	45,1mV	Fully fonctional, Technological variations, Delivered to Sap
1318	10,5e/s	41,3mV	Fully fonctional, Technological variations, Delivered to Sap
1319	Depends of variation	Depends of variation	Fully fonctional, Technological variations, Delivered to Sap

Narrow **I**nfra**R**ed_ **L**arge **F**ormat **S**ensor **A**rray _2

NIRLFSA ϕ2
LETI EO caracterizations

O. Gravrand, C. Cervera, M. Cavelier, L. Bonnefond, L.

2^{nd} April 2014 @ CEA-IRFU/SAp Saclay

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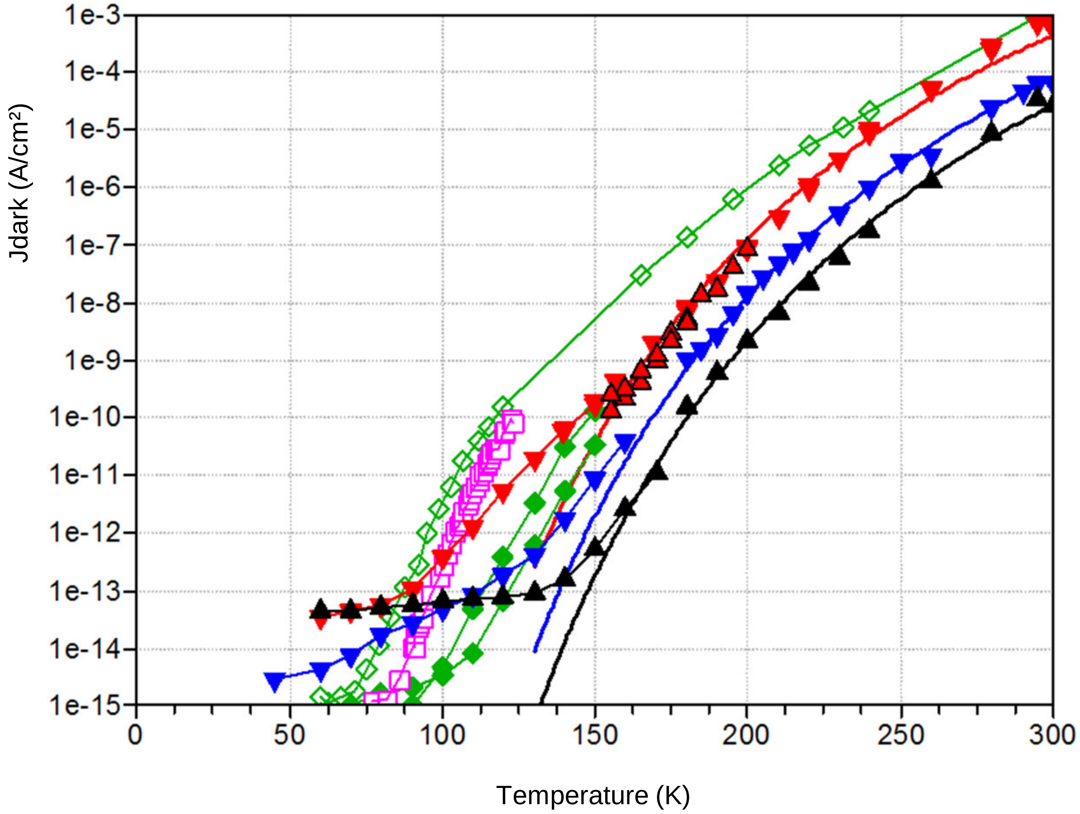
Outlook

- Summary of Phase 1 results
- Phase 2 Technological study
  - Substrate thinning experiments
  - Pv technological batch presentation
- Auto Tip test
- C(V) MIS caracterisations
- Cryostat caracterisation on diode from test chips
  - I(V)
  - C(V)
  - spotscan
  - R(λ)
  - BB response

Introduction: low dark current issue



Rockwell 2002
2.5µm p/n planar LPE/AL_2O_3
SPIE Astro 2002

Teledyne 2008 H2RG
2.5µm p/n planar MBE/CZT
SPIE 7021-28

Raytheon 2005 VIRGO
2.5µm p/n Mesa LPE/CZT
SPIE 59020O

Sofradir 2009
2.5µm n/p planar LPE/CZT
CTIA p15

LETI-SAp 2012
2.5µm p/n planar MBE/CZT
NIRLFSA phase 1
E_a=419.6meV / λ_a= 2.96µm
⇔ λ_c=2.5µm

LETI-SAp 2012
2,03µm p/n planar MBE/CZT
NIRLFSA phase 1
E_a=452.6meV / λ_a= 2.74µm
⇔ λ_c=2.03µm

LETI-SAp 2012
1.96µm n/p planar LPE/CZT
NIRLFSA phase 1
E_a=485.9meV / λ_a= 2.55µm
⇔ λ_c=1.96µm

W. E. Tennant et al, *JEM*37(9)p1406 (2008)

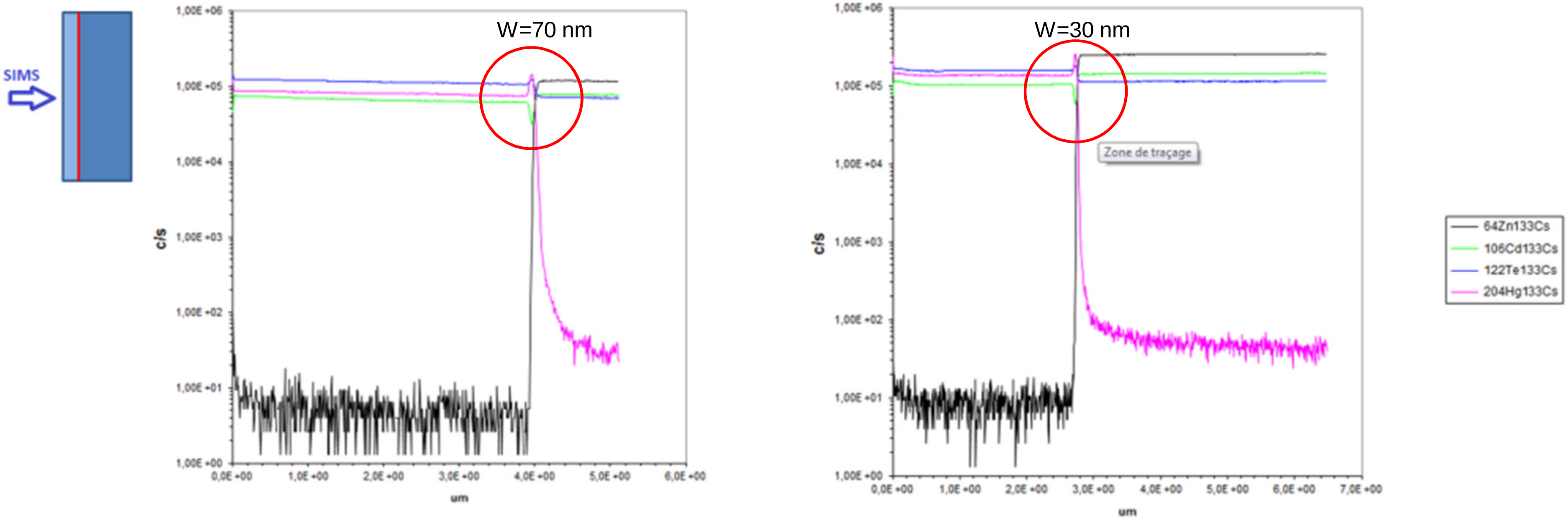
$$\lambda_e = \lambda_{cut-off} \text{ for } \lambda_{cut-off} \geq \lambda_{threshold}$$

$$= \lambda_{cut-off} \Bigg/ \left[1 - \left(\frac{\lambda_{scale}}{\lambda_{cut-off}} - \frac{\lambda_{scale}}{\lambda_{threshold}}\right)^{Pwr}\right] \text{ for } \lambda_{cut-off} < \lambda_{threshold}$$

The substrate thinning issue

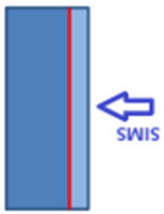
- Process in production at sofradir for tactical bands (4000 devices/year)
- Thinning process suffers from low yield in NIR bands

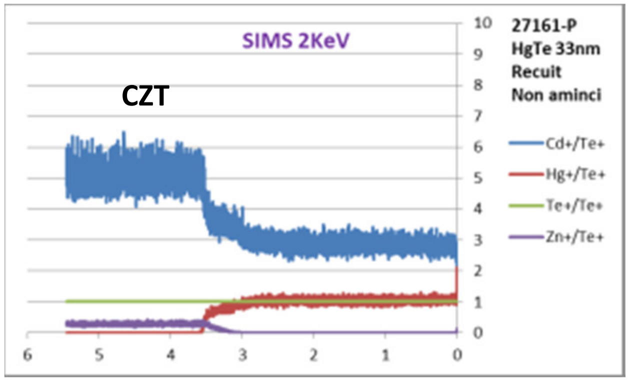
- Not the volume in NIRLFA to fully address this issue
- Small side study revisiting the thinning process to improve thinning yield
  - use of MBE stop layers
  - 2 layers grown

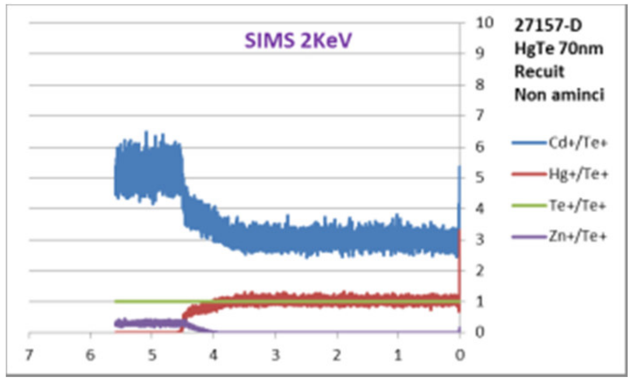


The substrate thinning test

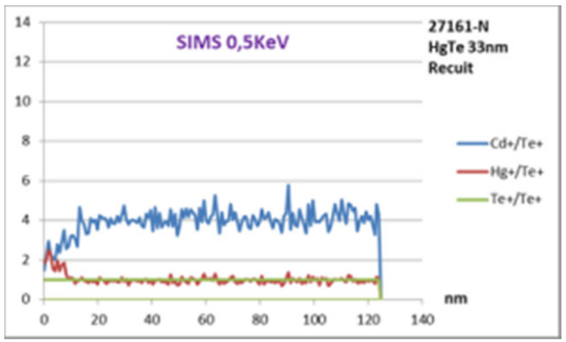
- After PV technological bake, the stop barrier vanished (diffusion)

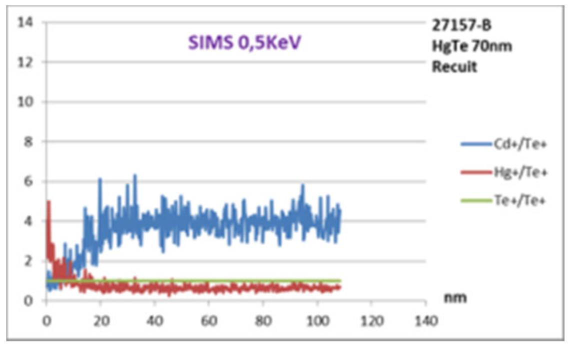






- After thinning : good interface but no thickness management

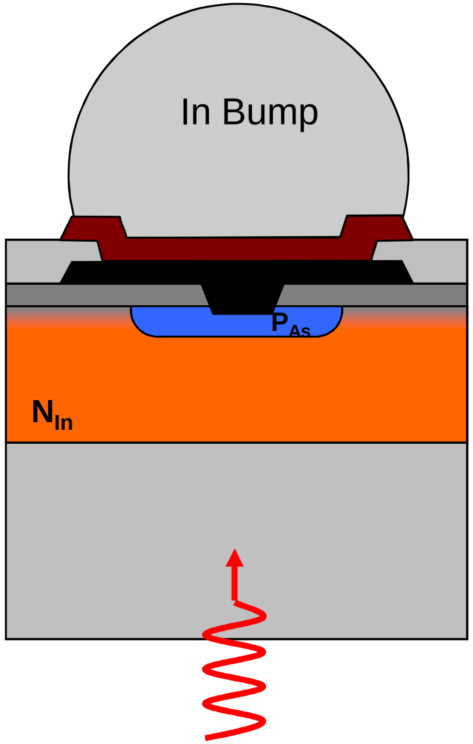


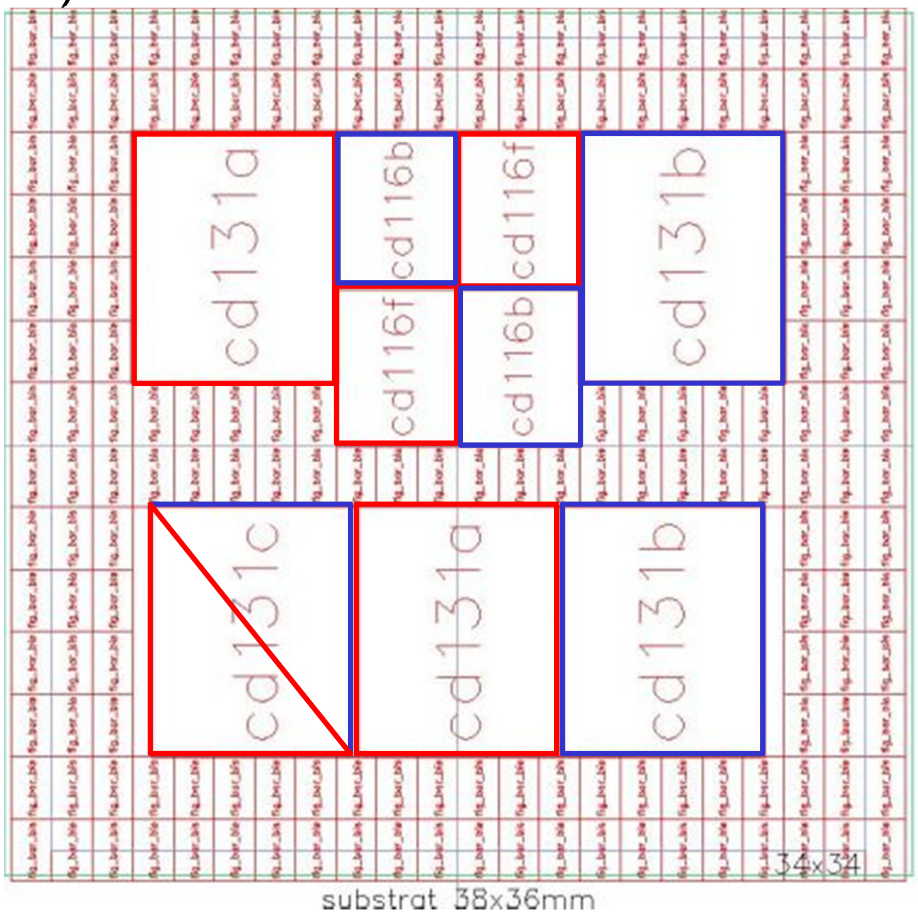


- Further studies would be necessary to really conclude…

PV process general layout & process variants

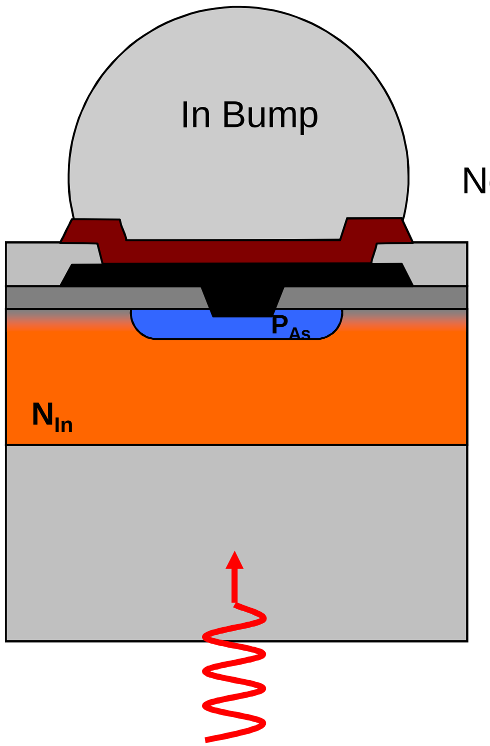
- P/N ion-implanted diode in MBE grown material
  - 2 ≠ diode passivation, passivation A or passivation B (PA, PB)
  - 2 ≠ metalisation geometries (MA < MB)
  - ≠ Diode geometries (D1 > D2 > D3)





PV process general layout & process variants

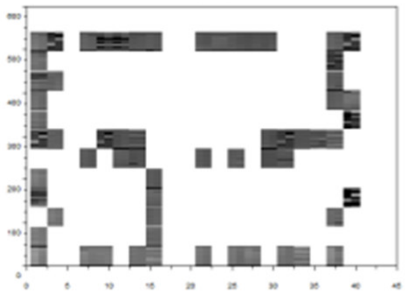
- P/N ion-implanted diode in MBE grown material
  - 2 ≠ passivation diode (passivation A or passivation B)
  - ≠ Diode geometries
  - 2 ≠ doping levels investigated
  - 2 ≠ MBE cap layers investigated



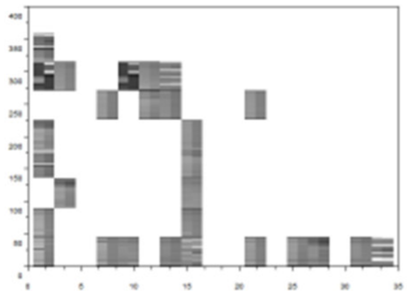
Doping In ~ 1e16 | In ~ 1e15

No cap layer

3261, V=200mV, 200K

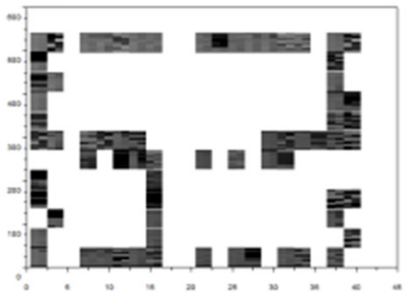


3262, V=200mV, 200K

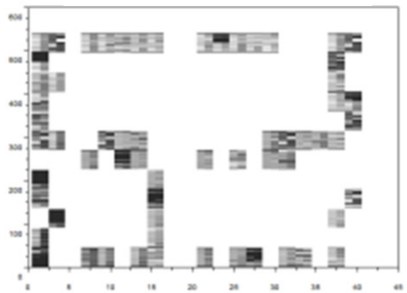


Cap layer

3263, V=300mV, **300K**

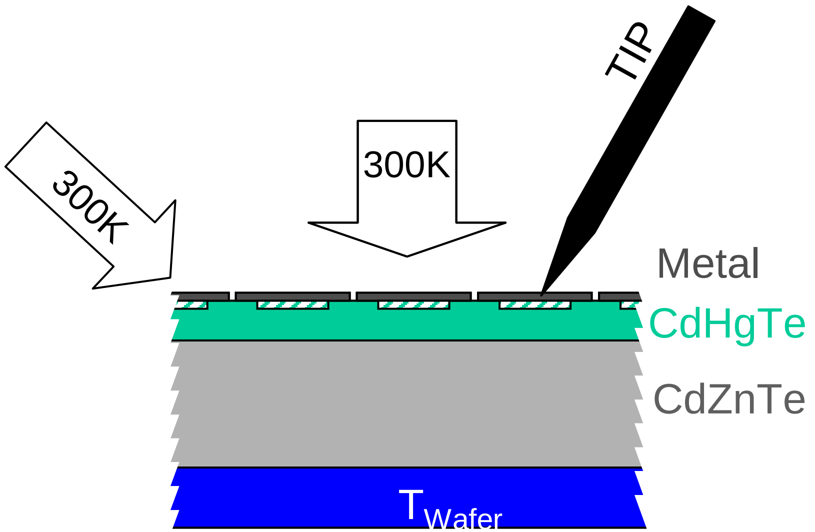


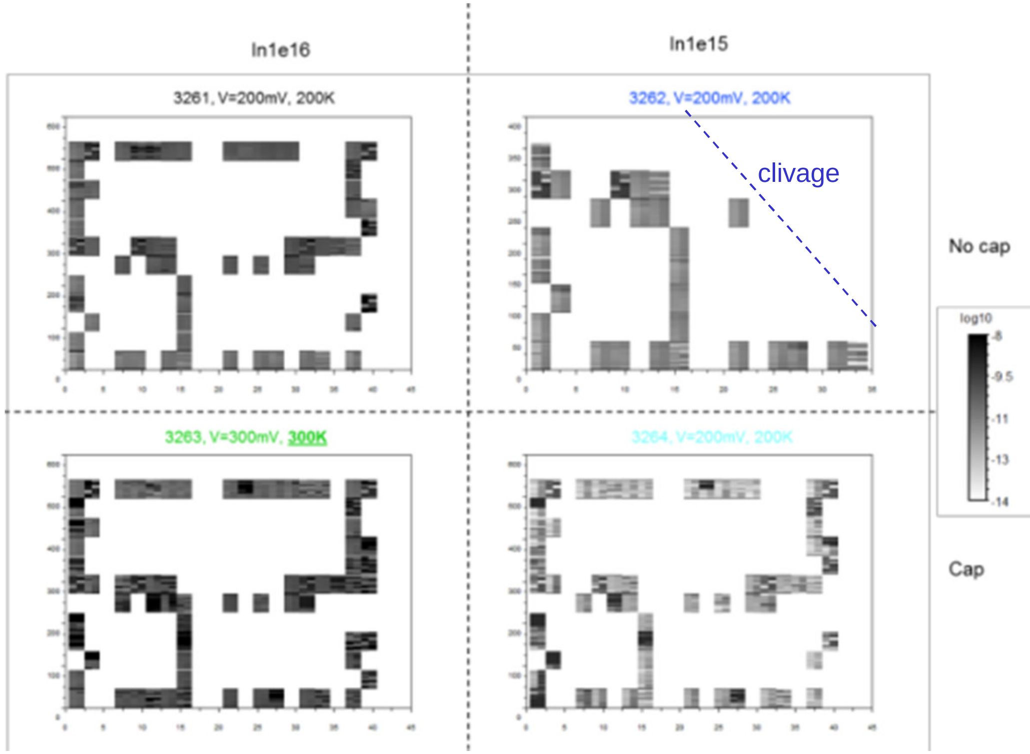
3264, V=200mV, 200K



Auto tip test

- Wafer level test, before dicing

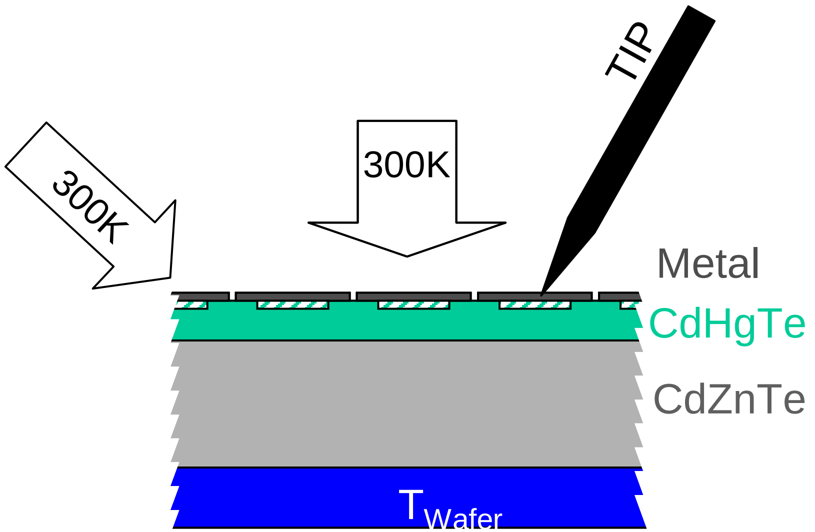


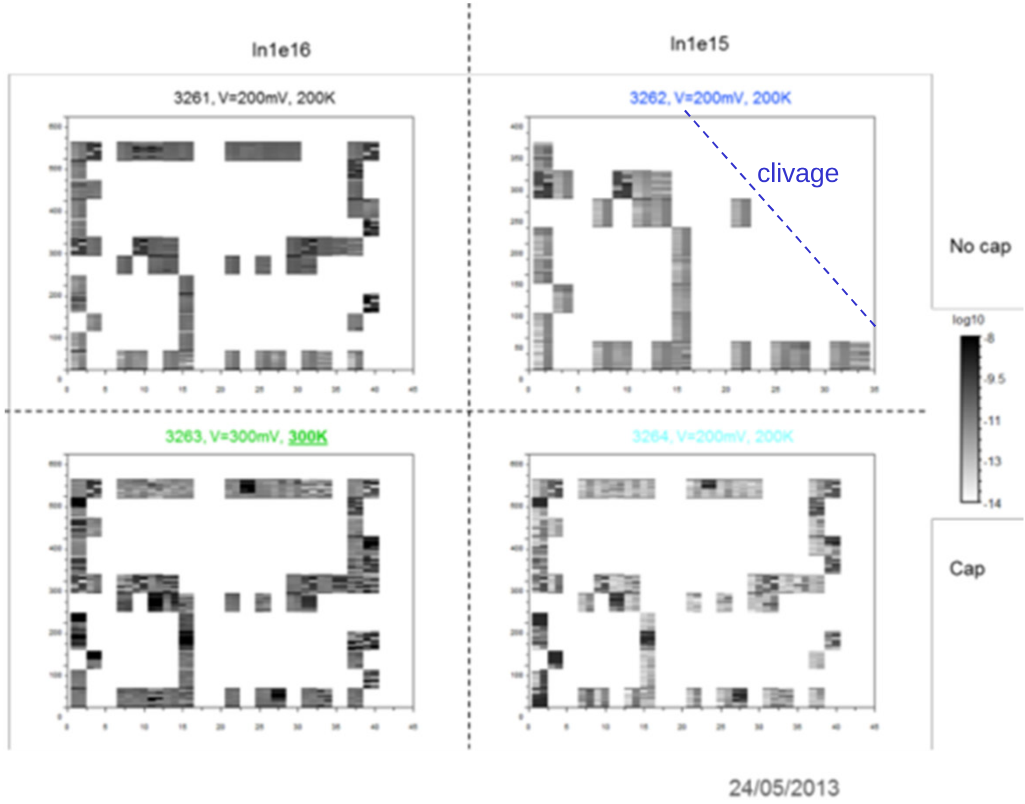


wafer	temperature	V1	V0	V2	total stat
3261	200K	0.2±5	0.0±0.05	1±5	N=5544
3262	200K	0.2±5	0.0±0.25	2±5	N=2552
3263	300K	0.3±5	0.0±0.02	1±5	N=6336
3264	200K	0.2±5	0.0±0.05	1±5	N=5544

Auto tip test

- Wafer level electrical test, before dicing





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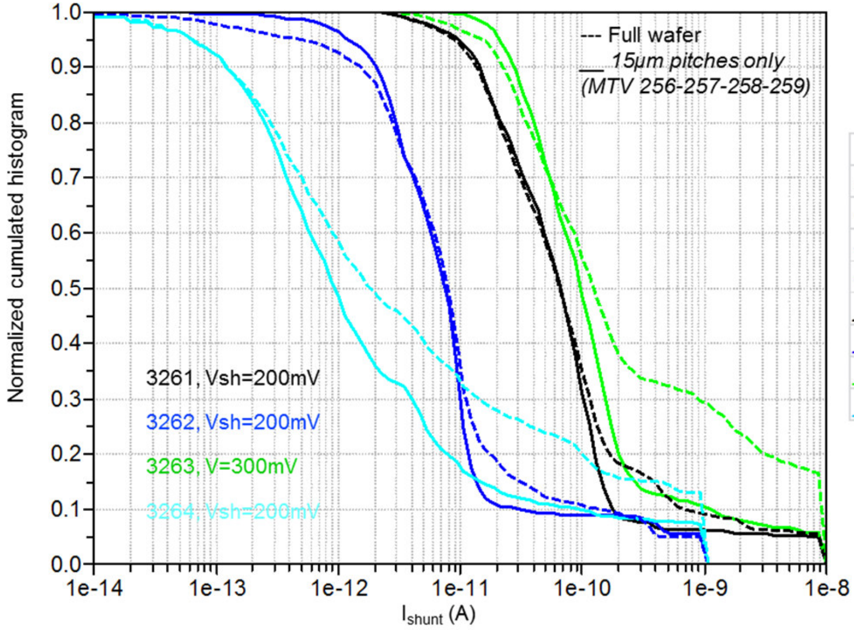

	wafer	med	sig%	N
----	3261	4.9E-11	61.0	3024
----	3262	6.4E-12	53.0	1428
----	3263	6.8E-11	58.6	3024
----	3264	4.5E-13	69.8	3019
___	*3261*	*4.2E-11*	*64.5*	*5208*
___	*3262*	*6.6E-12*	*54.0*	*2346*
___	*3263*	*6.4E-11*	*67.8*	*5964*
___	*3264*	*5.9E-13*	*78.5*	*5196*

wafer	temperature	V1	V0	V2	total stat
3261	200K	0.2±5	0.0±0.05	1±5	N=5544
3262	200K	0.2±5	0.0±0.25	2±5	N=2552
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Auto tip test

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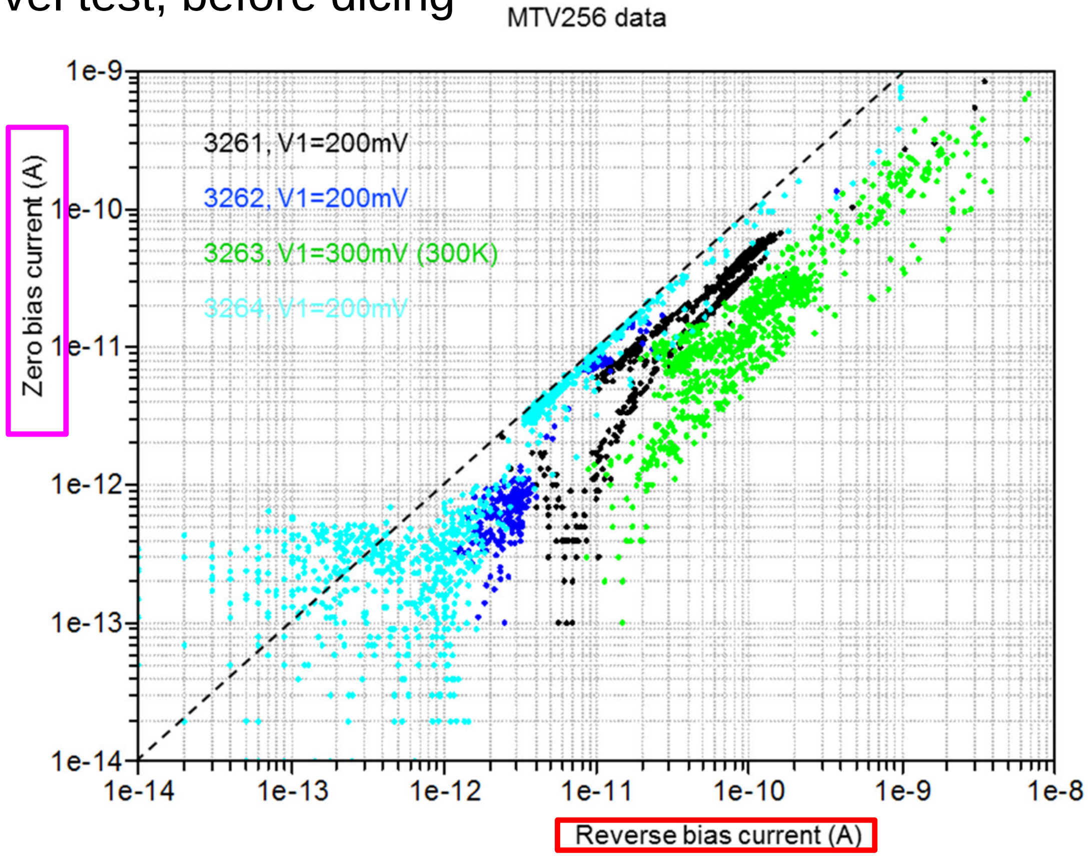

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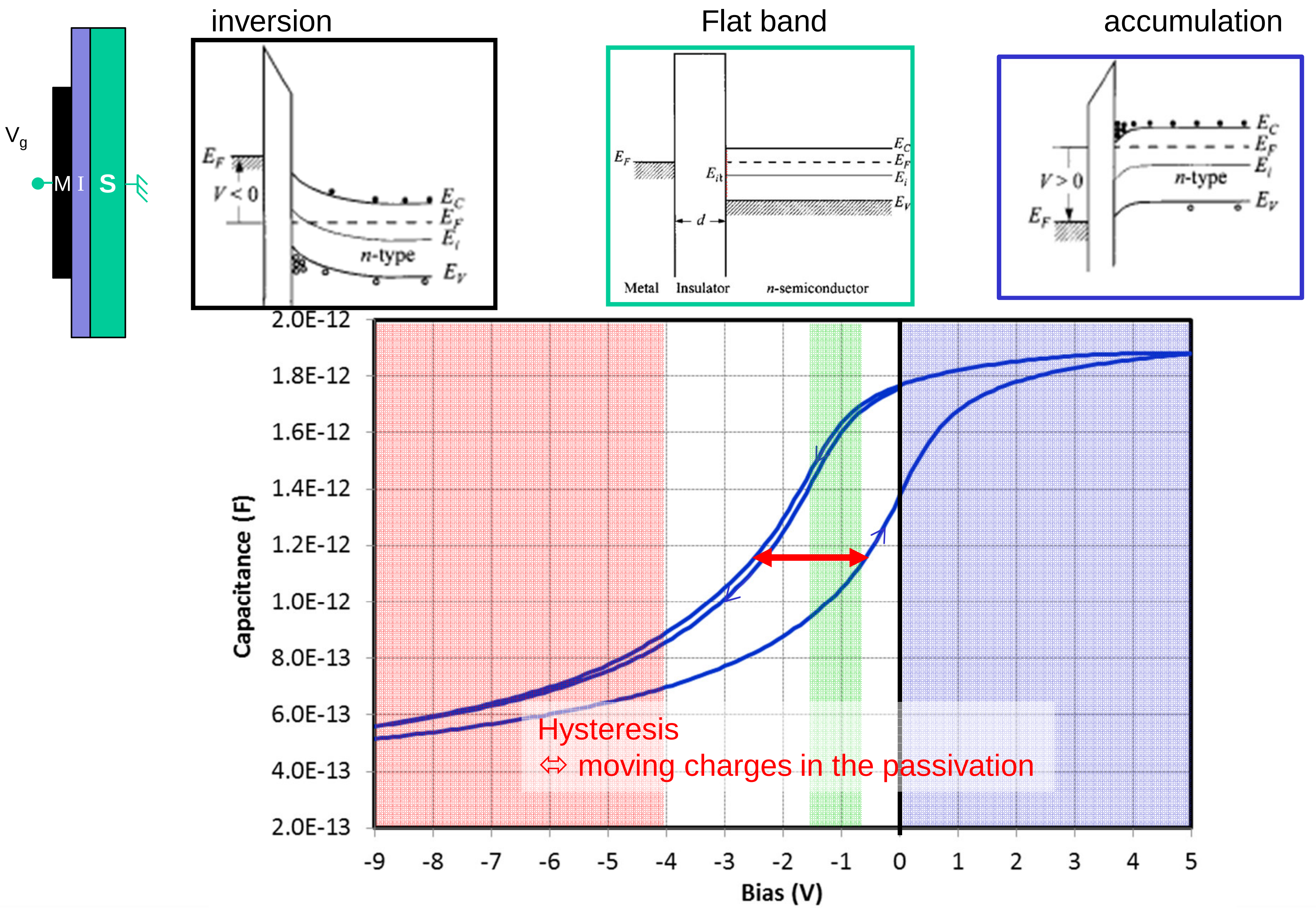
MIS C(V) measurements

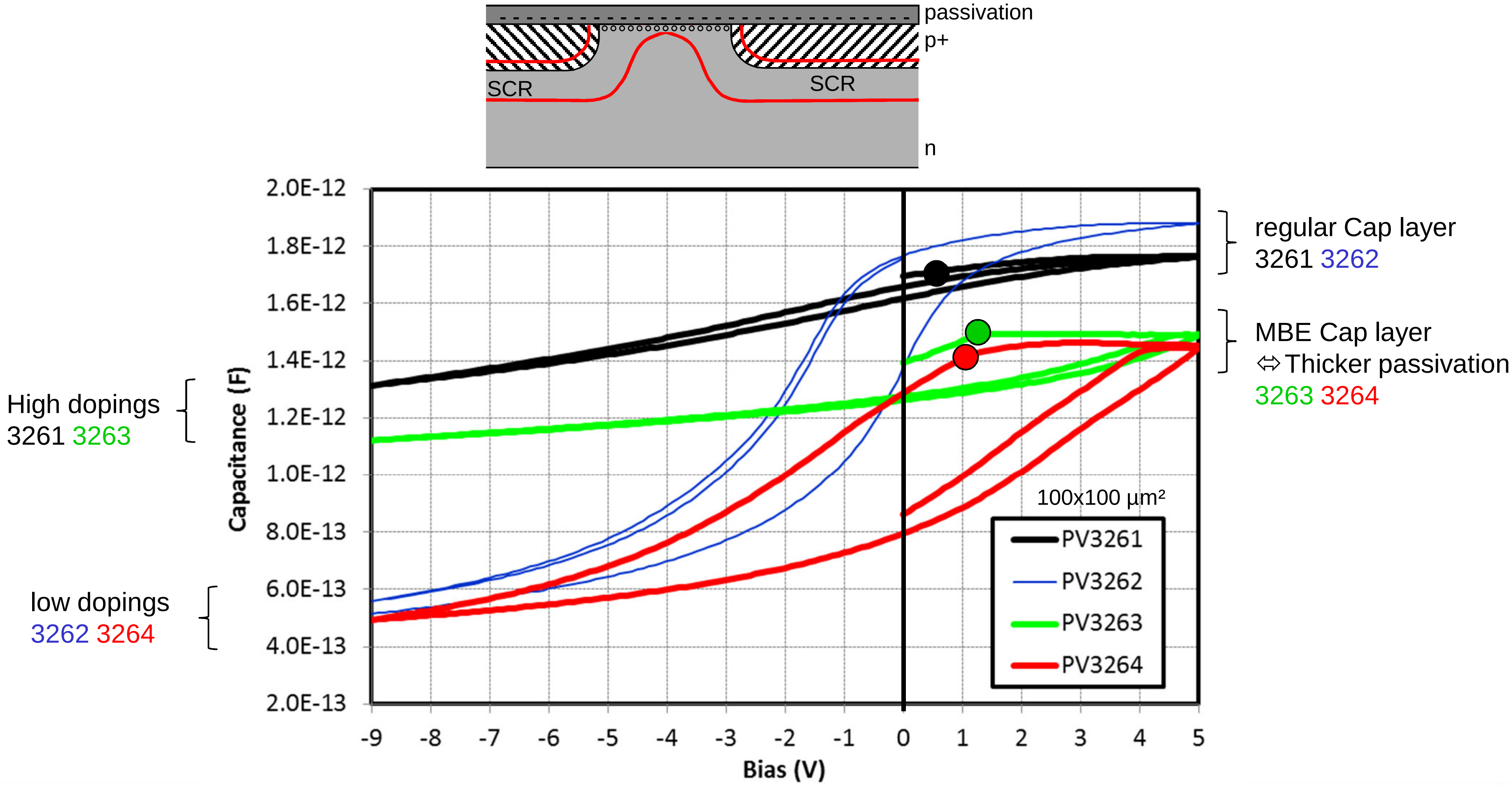
- MIS C(V) allows the observation of interface states into the passivation



MIS C(V) measurements

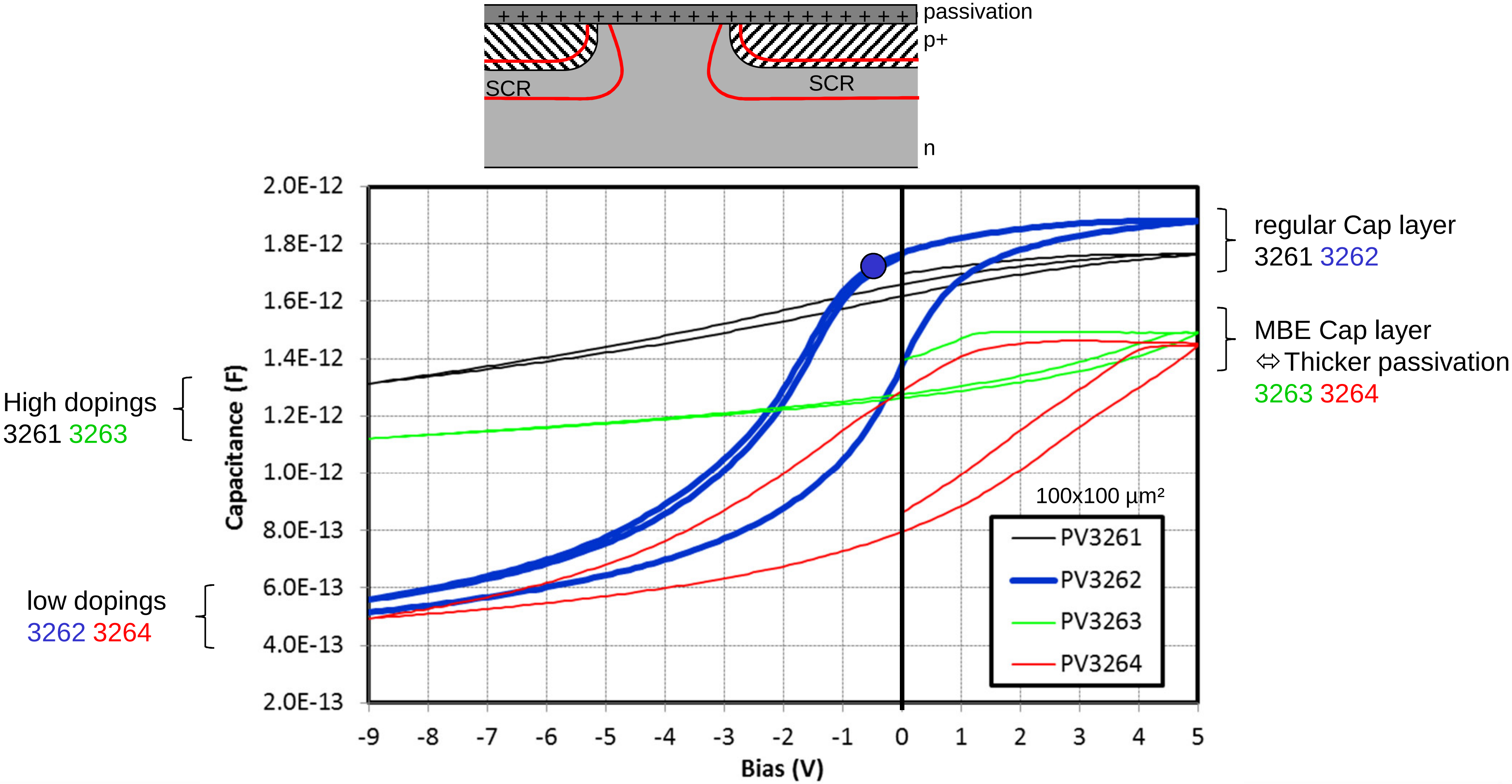
- MIS C(V) allows the observation of interface states into the passivation
- PV3261, 3263 and 3264 appear inverted (V_{fb}>0,)

  →suspicion of surface leakages between neighboring diodes



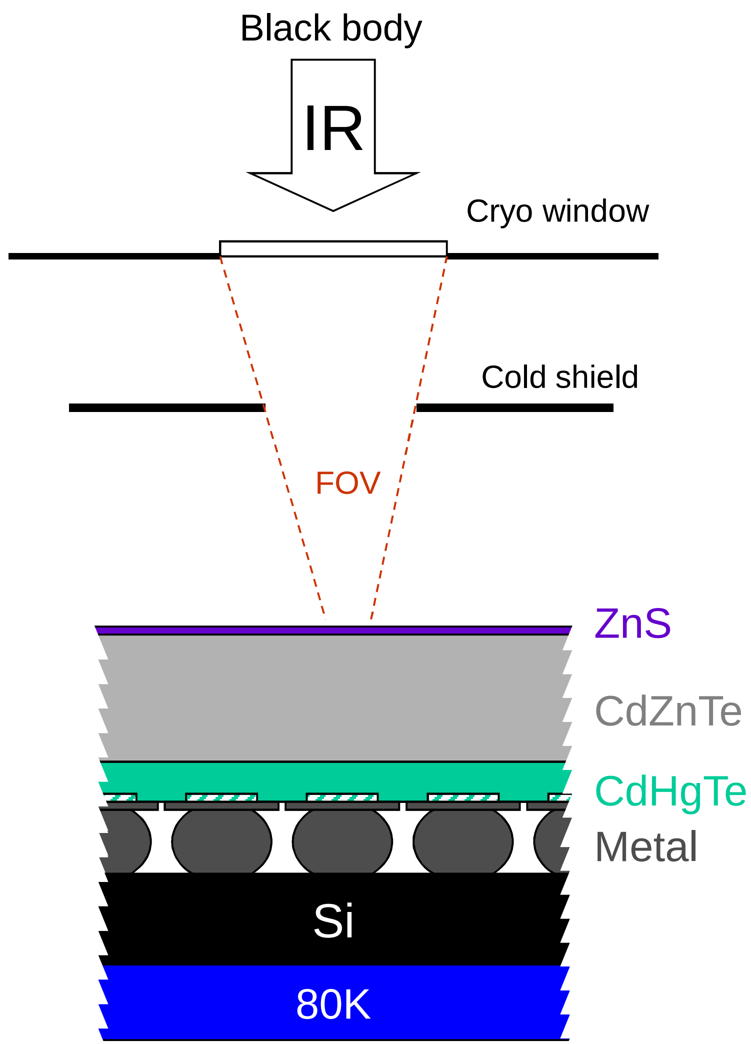
MIS C(V) measurements

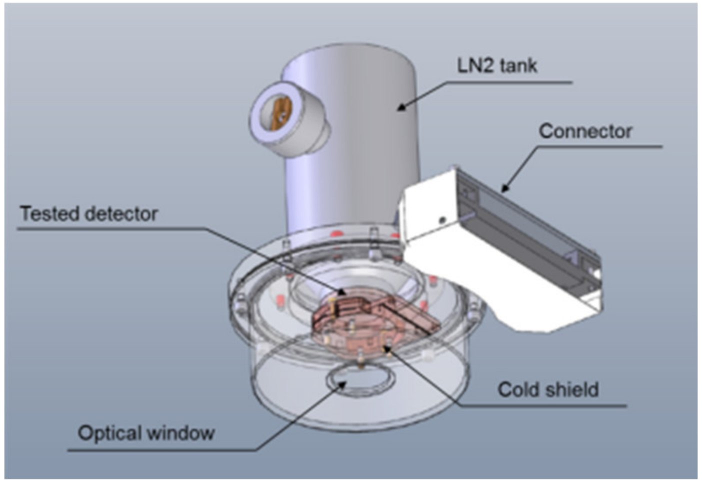
- MIS C(V) allows the observation of interface states into the passivation
- PV3262 is in good charge state (slightly accumulated, $V_{fb}<0$)
  - Light SCR pinching at the surface



Cryostat EO caracterisation on test chips

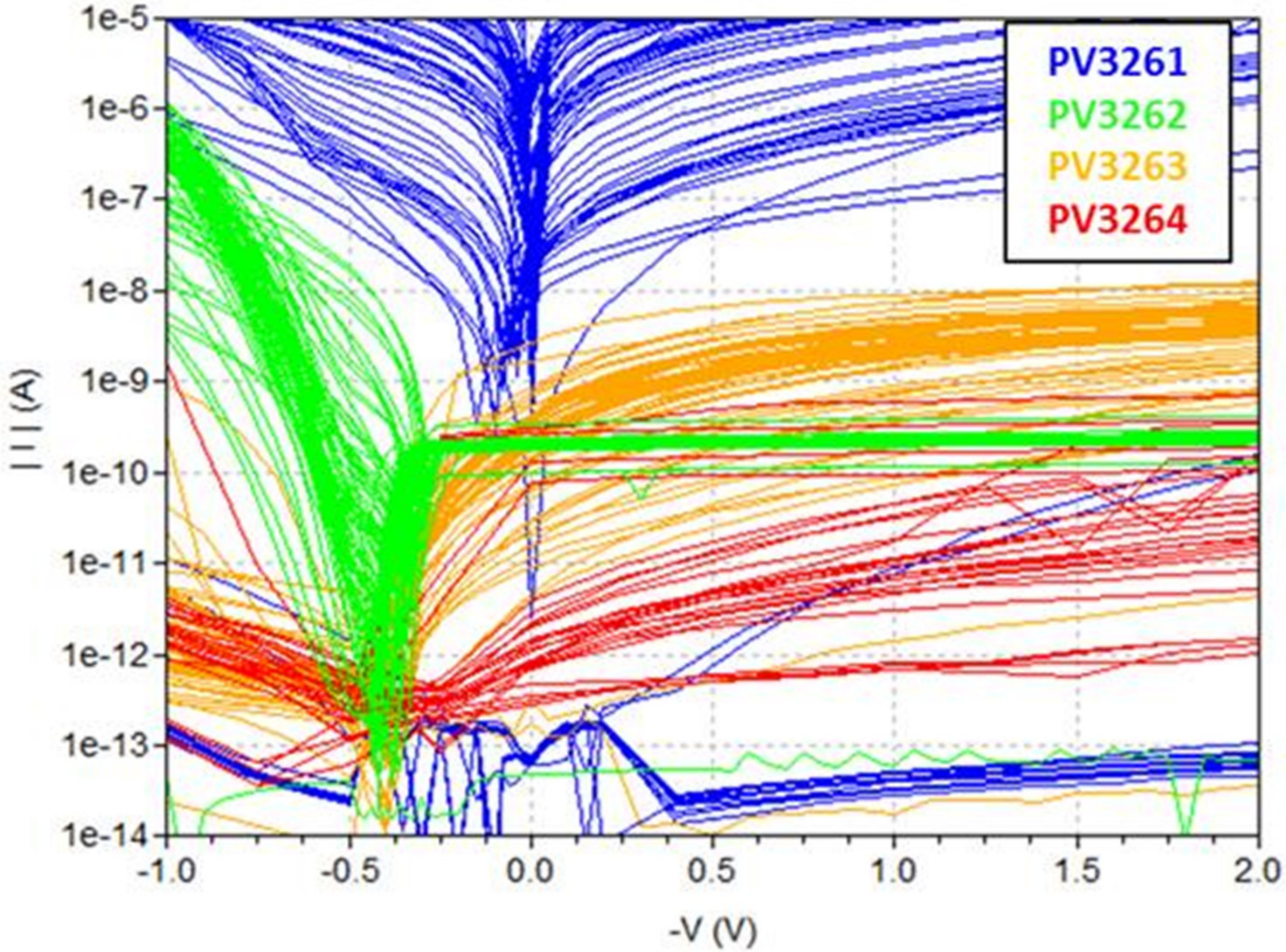
- T=77K (LN2)
- 45° FOV
- 84 x (15µm pitch diodes)
- Test pattern mimics array environement





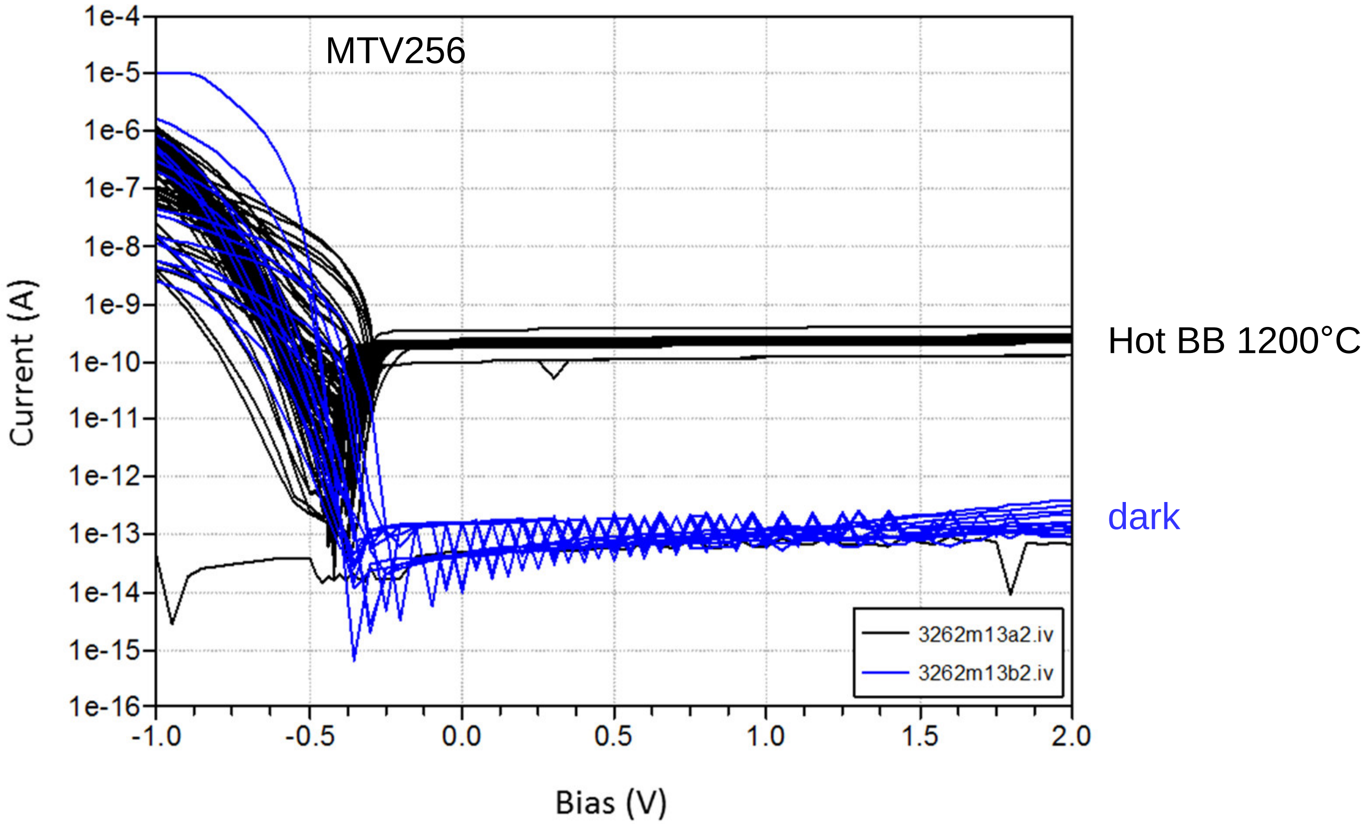
Cryostat EO caracterisation on test chips

- T=77K (LN2)
- 45° FOV + 1200°C BB cavity
- 84 x (15µm pitch diodes)



PV3262: I(V)s

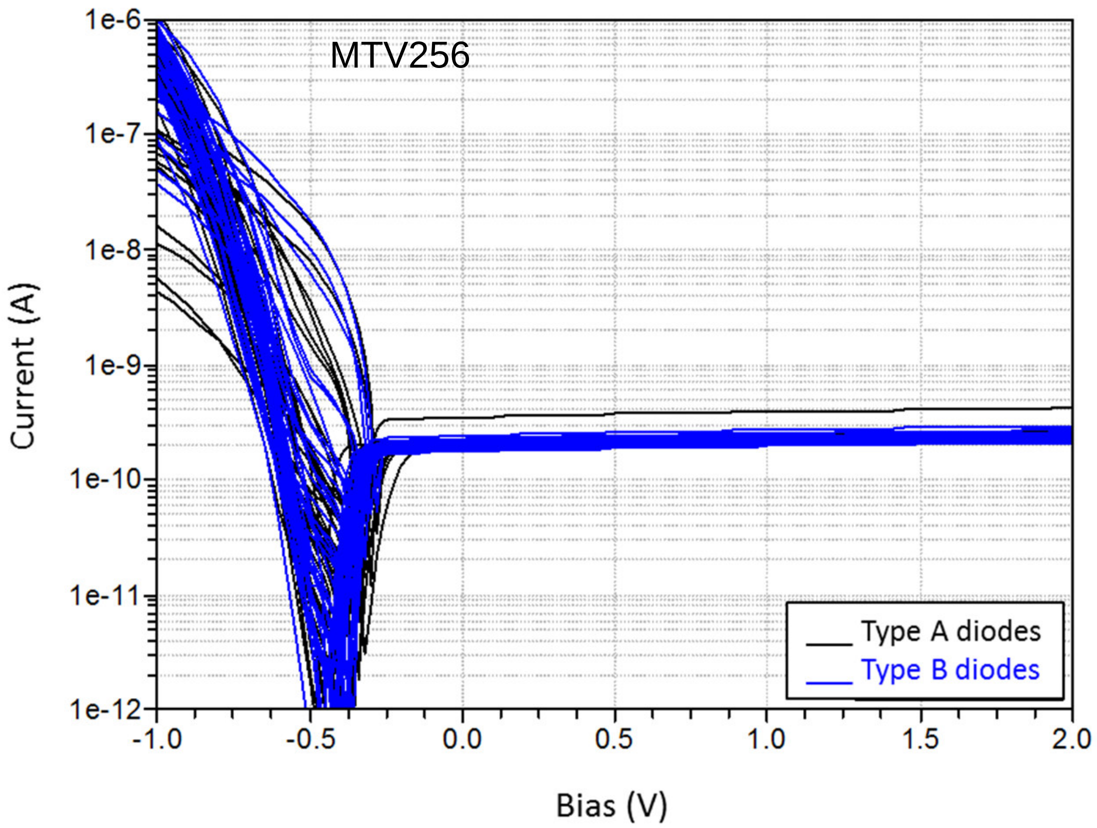
Dark current not measureable with our experimental setup



PV3262: I(V)s

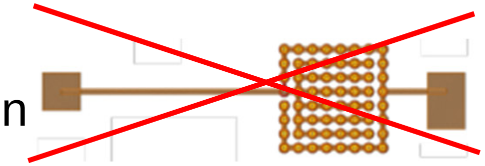
Different diode types available:

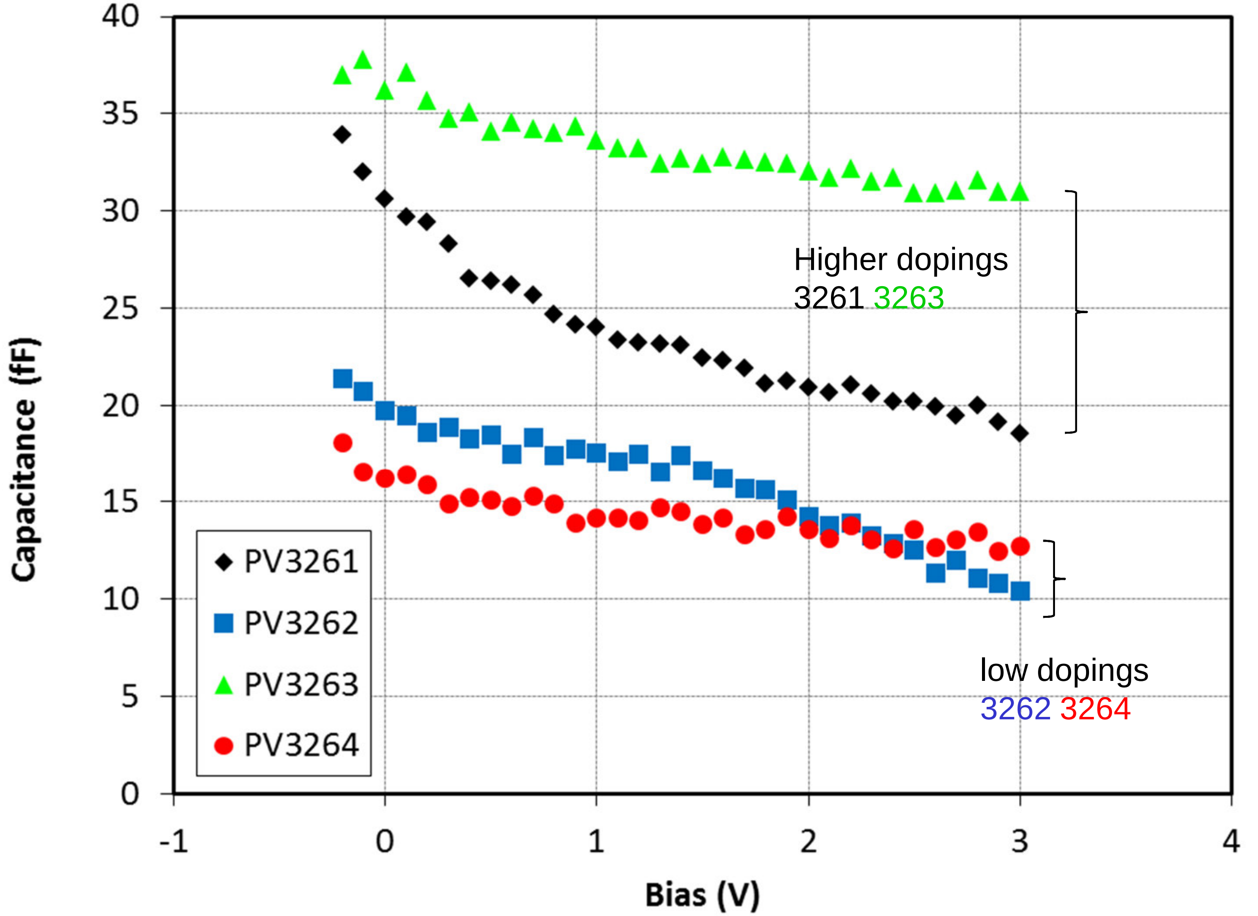
- Passivation type A/B: non noticeable difference on photonic current



Diode capacitance direct measurement @ 80K

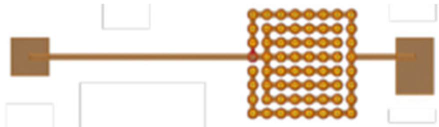
- Surface leakage on PV3261 – 3263 – 3264
  - No measurement possible in array configuration
  - Only single diodes D2

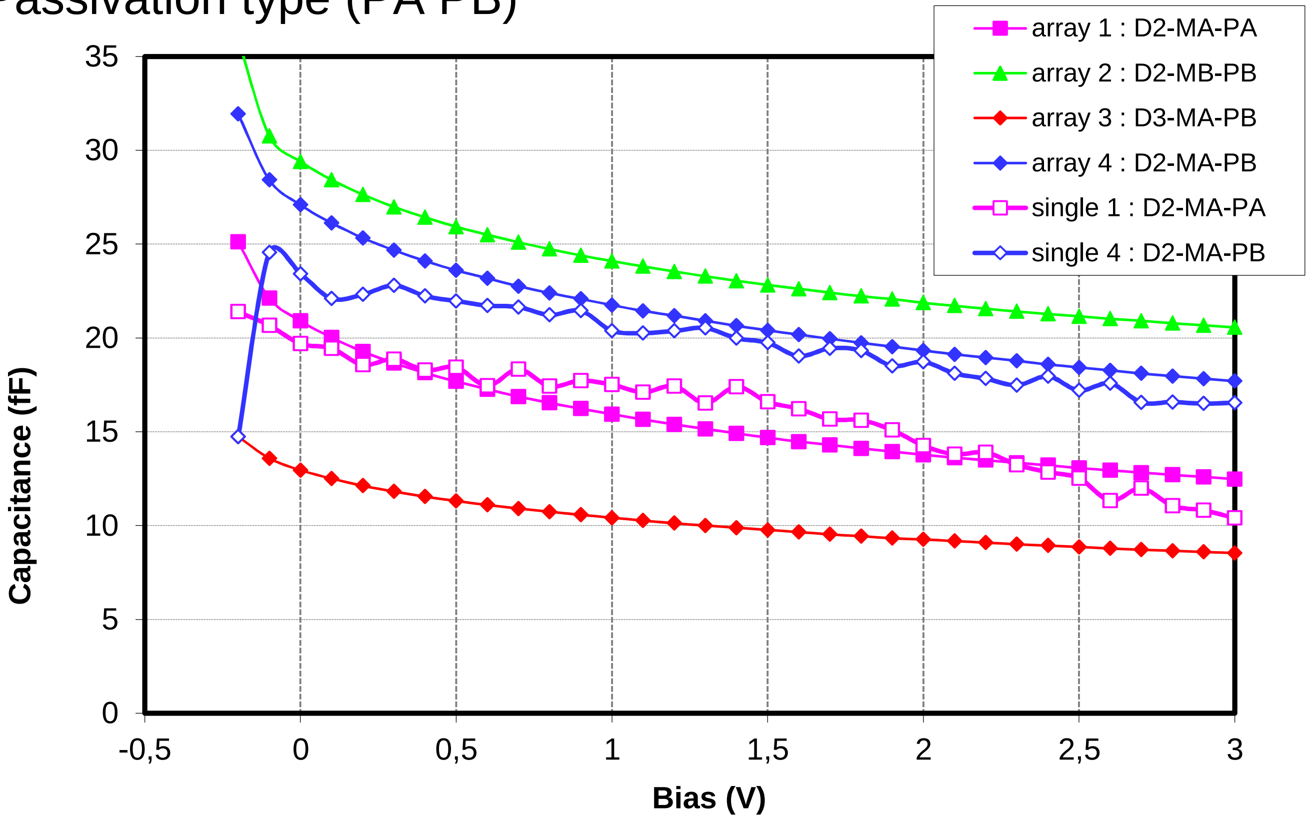




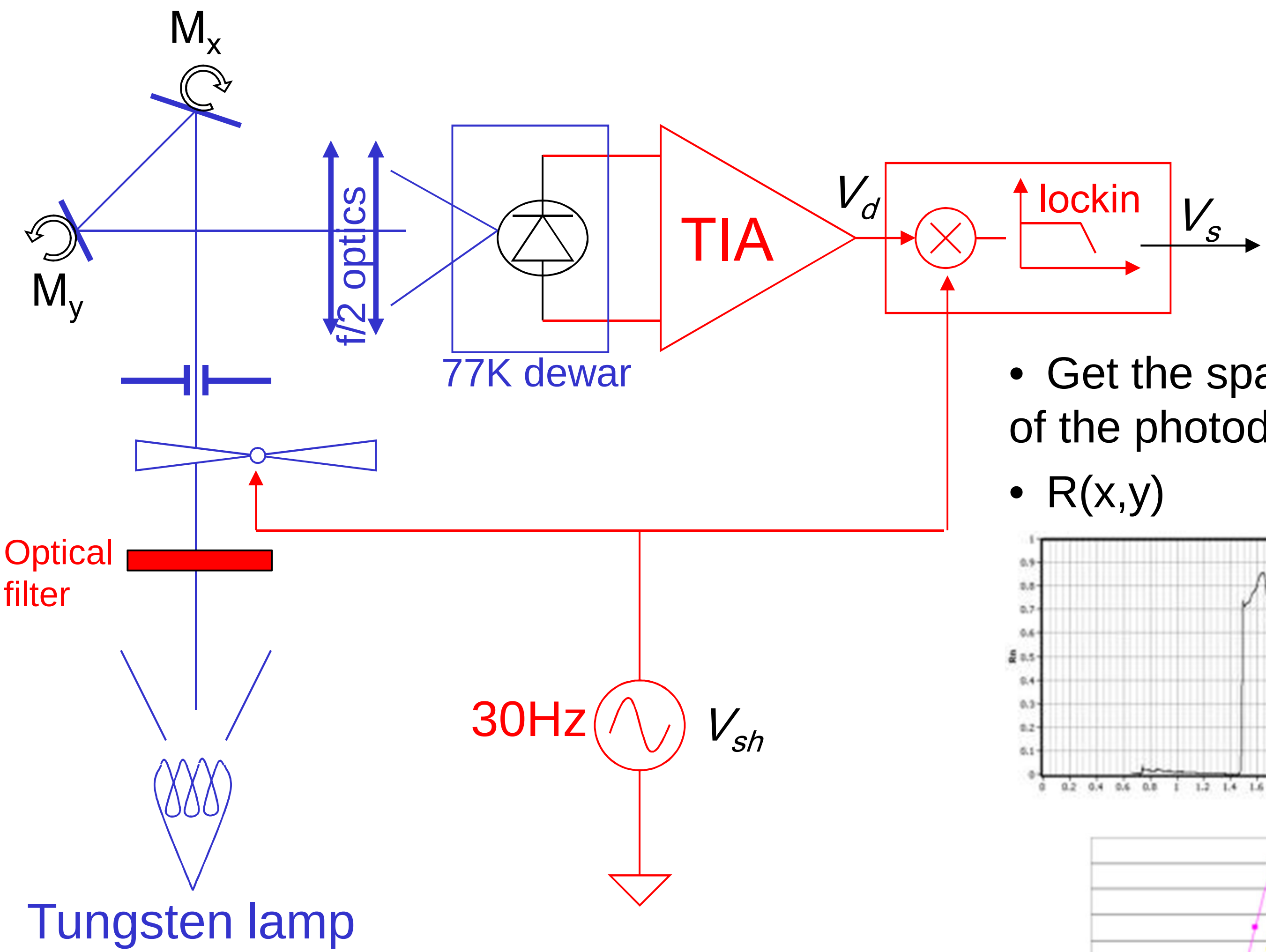
Diode capacitance for PV3262

- Measurement in array configuration
- Different diode types
  - Junction geometry (D2 D3)
  - Metal geometry (MA MB)
  - Passivation type (PA PB)

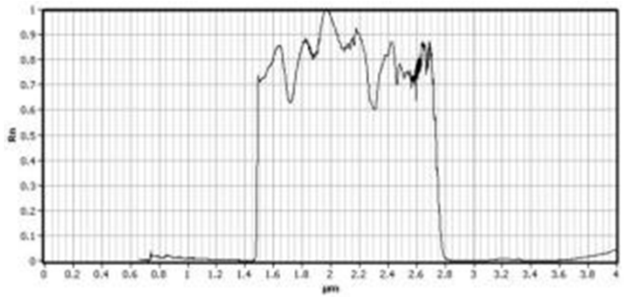


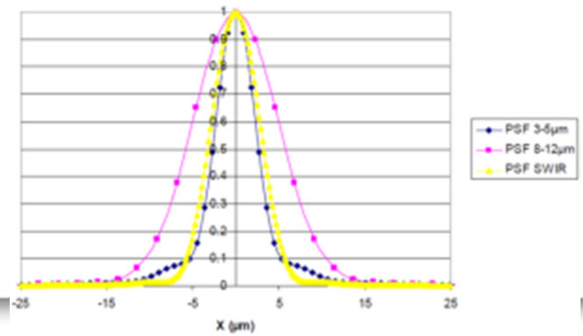


Spatial response: spotscan bench



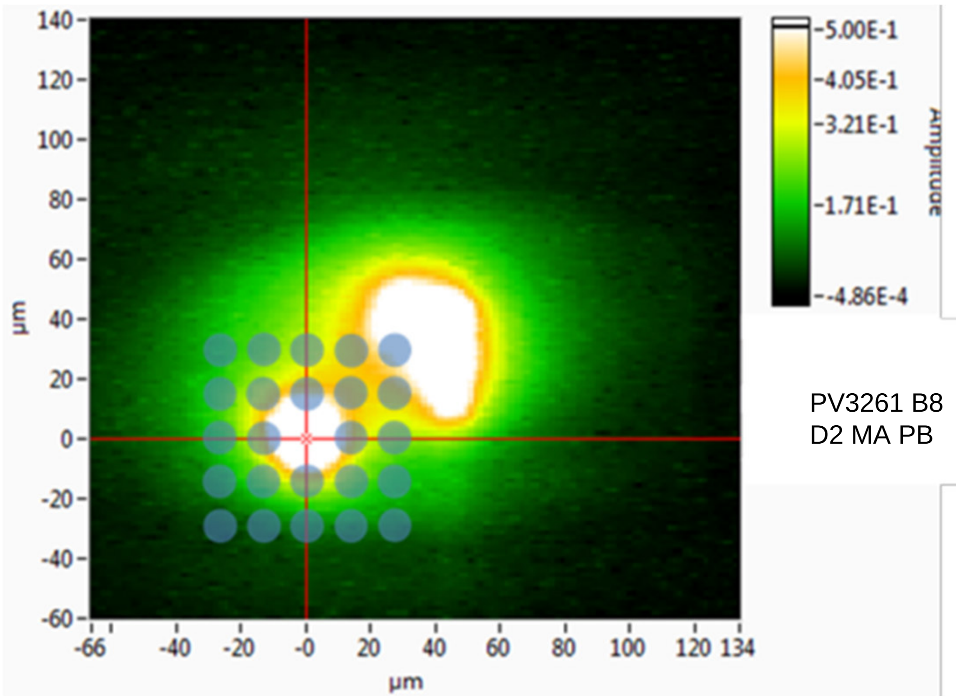
- Get the spatial response of the photodiode:
- R(x,y)



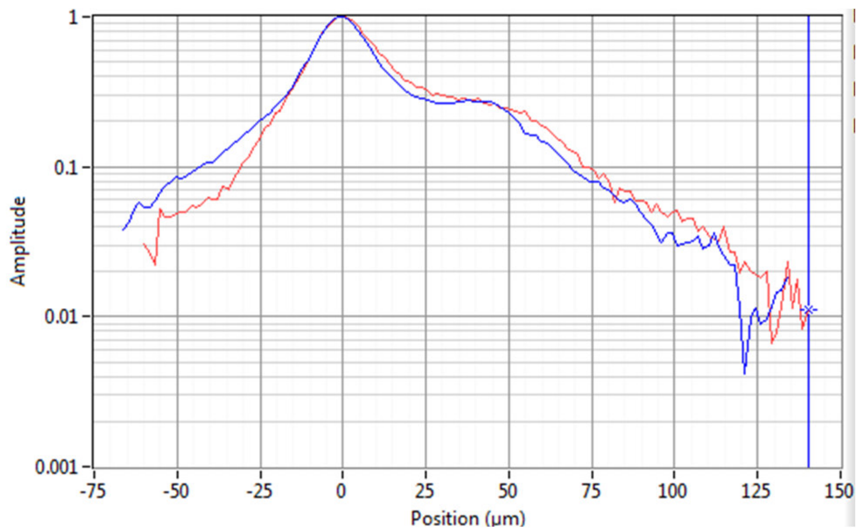


Spotscan mapping

- PV3261 – 3263 – 3264
  - Surface leakage isvisible onto response mappings

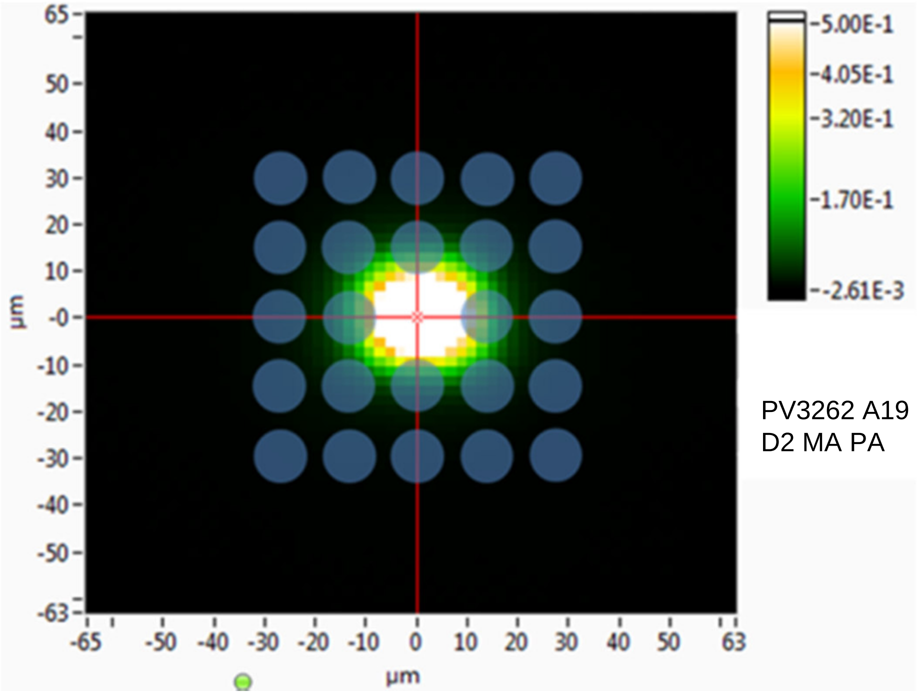


PV3261 B8
D2 MA PB

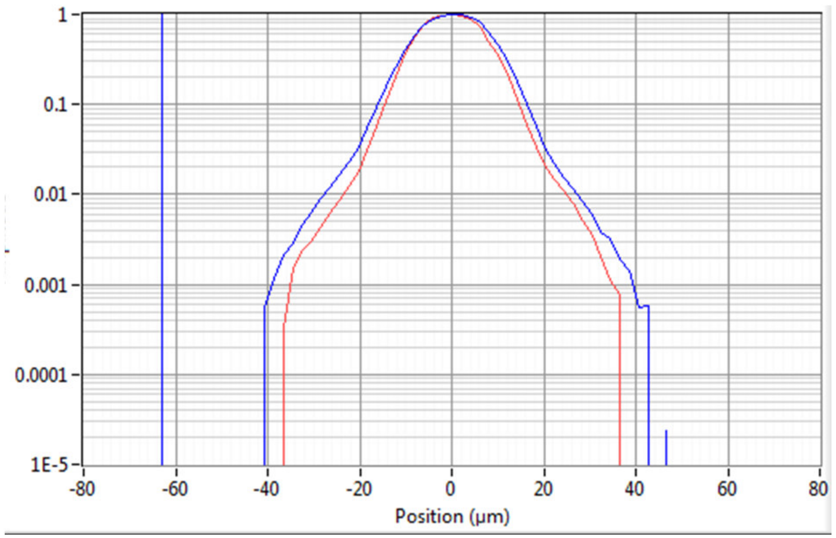


Spotscan mapping

- PV3262
  - Regular response mappings
  - Self confinement by neighboring diode
  - FWHM ∊ [16-18µm] for raw data
  - Deconvolution should give FWHM ∊ [14-16µm] with $FWHM_{PSF}$~8µm
  - Optical FF close to unity

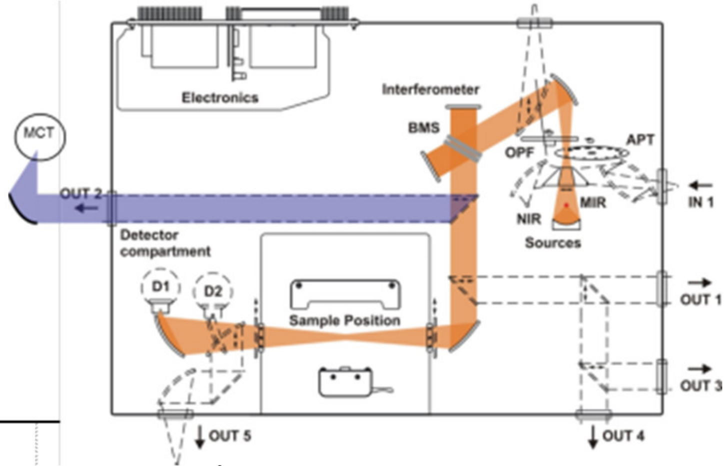


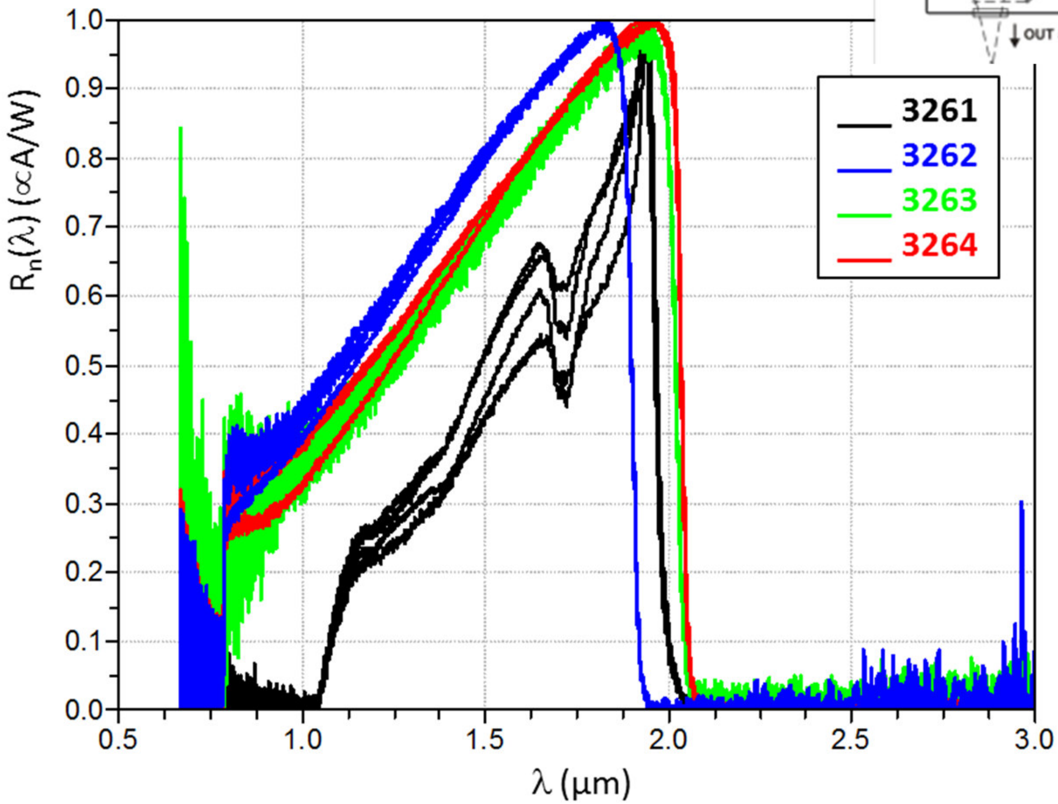
PV3262 A19
D2 MA PA



FTIR spectral responses

- $R \propto \frac{I_\phi}{DTGS}$ [∝ A/W]

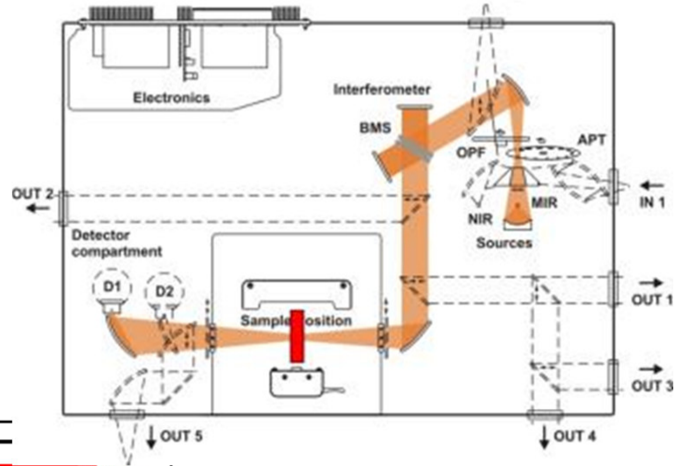


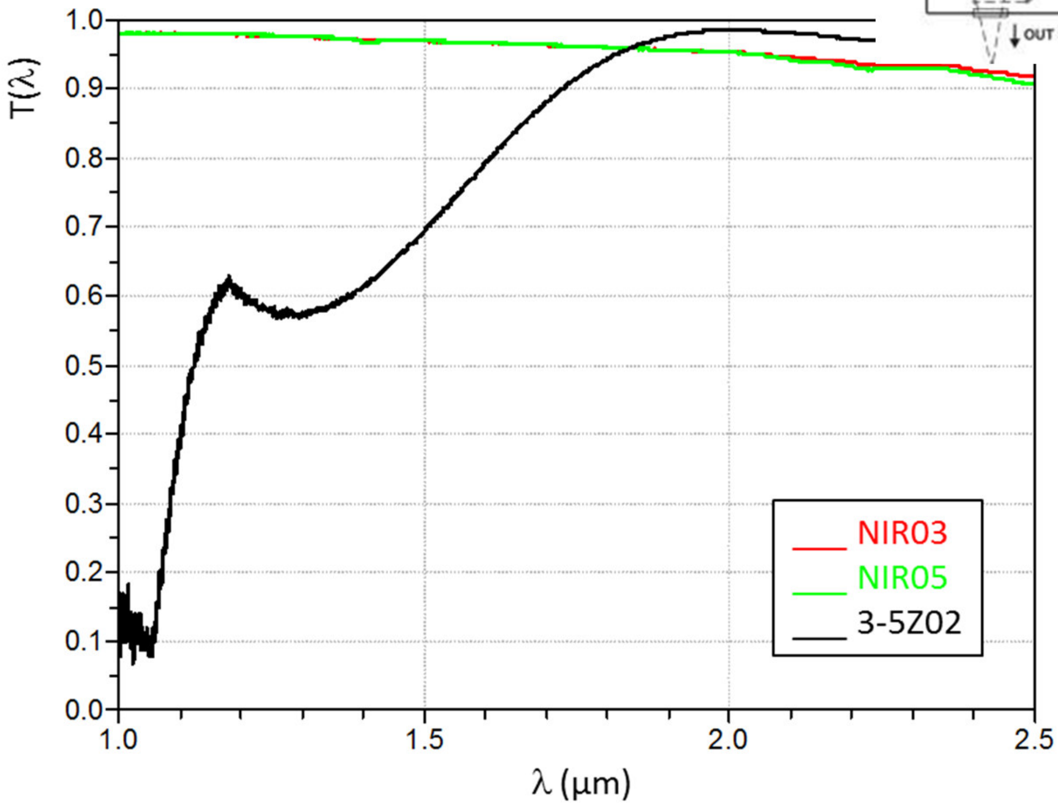


PV	λc (µm)	λp (µm)	Cryo window
3261	1.97	1.94	3-5Z02
3262	1.90	1.82	NIR05
3263	2.02	1.93	NIR05
3264	2.03	1.96	NIR03

Cryostat windows…

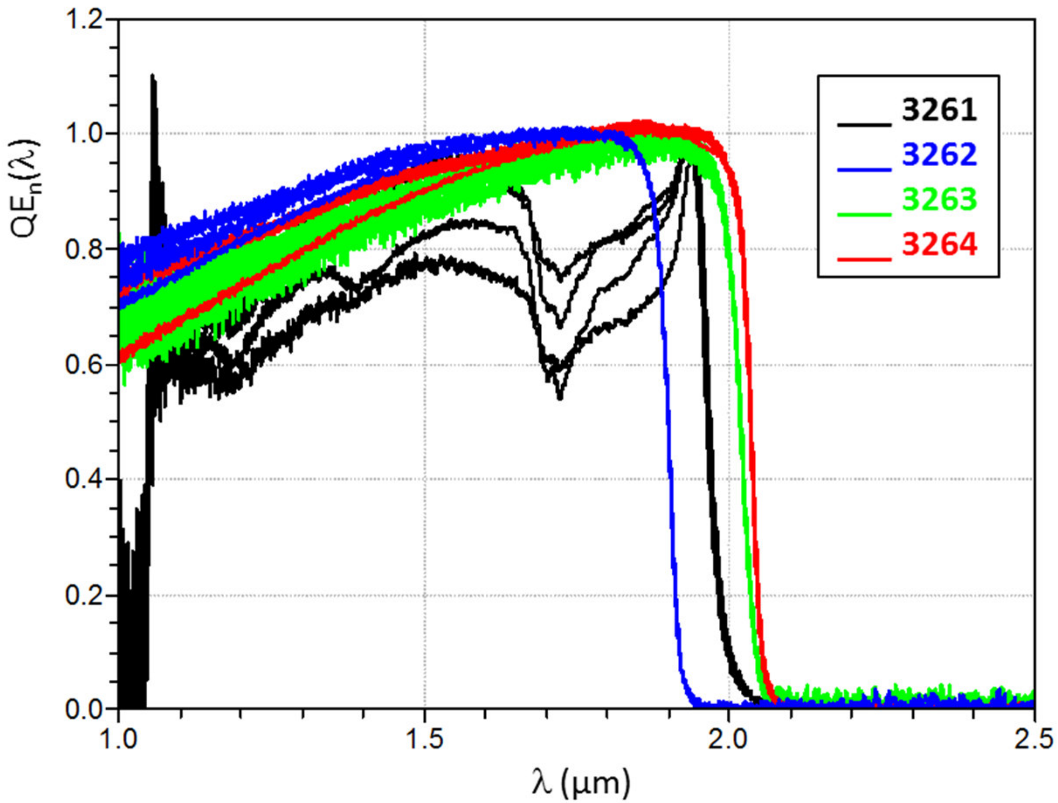
- PV 3261 has been unfortunatelly caracterised with a non-optimal window
- Window must be corrected to get the detector spectral QE





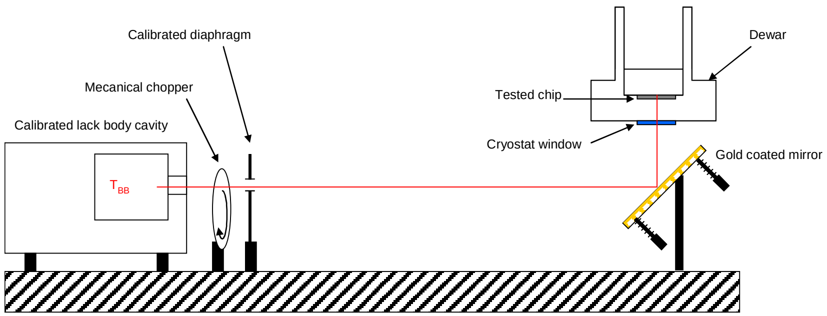
QE(λ) normalised to unity, corrected from window

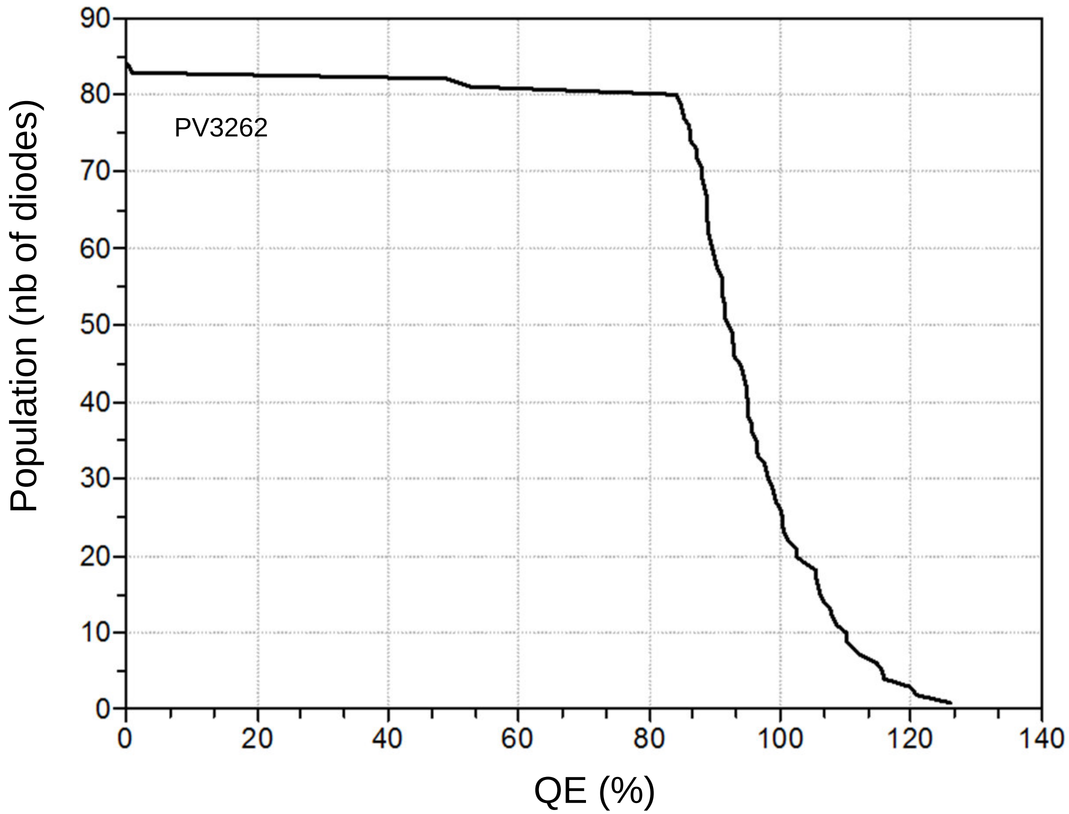
- PV3261 remains « weird »
- λ/4 AR coating visible on the other layers (PV3262-3263-3264)



Calibrated BB response for peak QE estimation

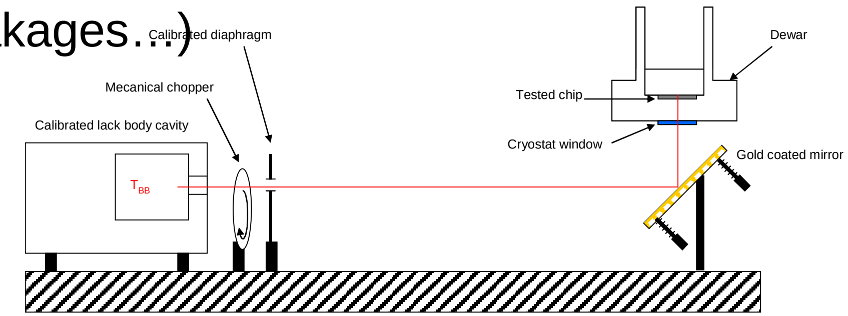
- AC response measurement in front of a 1200°C calibrated BB cavity
- 77K, 84 test diodes
- Serial test (One diode tested at a time)
- QE is given at peak response



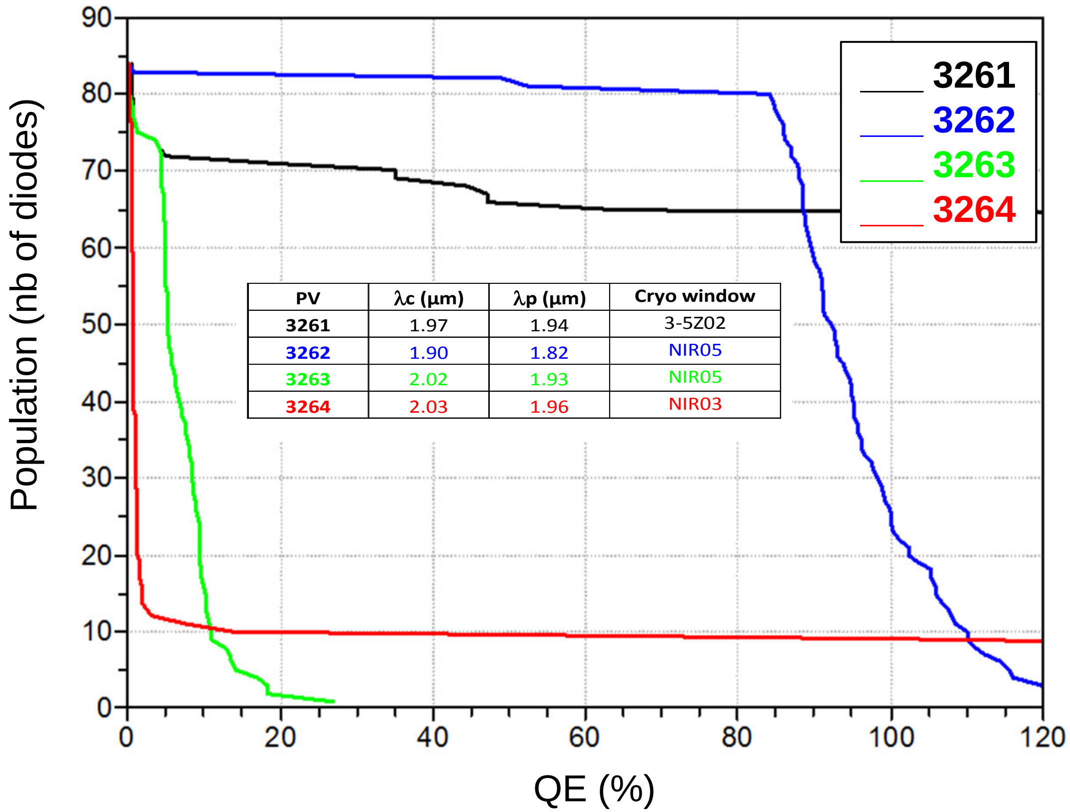


Calibrated BB response for peak QE estimation

- PV3261 has huge response (surface leakages…)
- PV3263 show small response
- PV3264 either



- Only PV3262 gives reliable values



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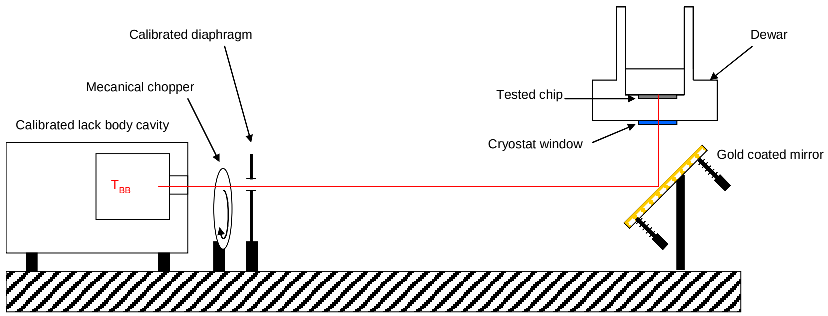
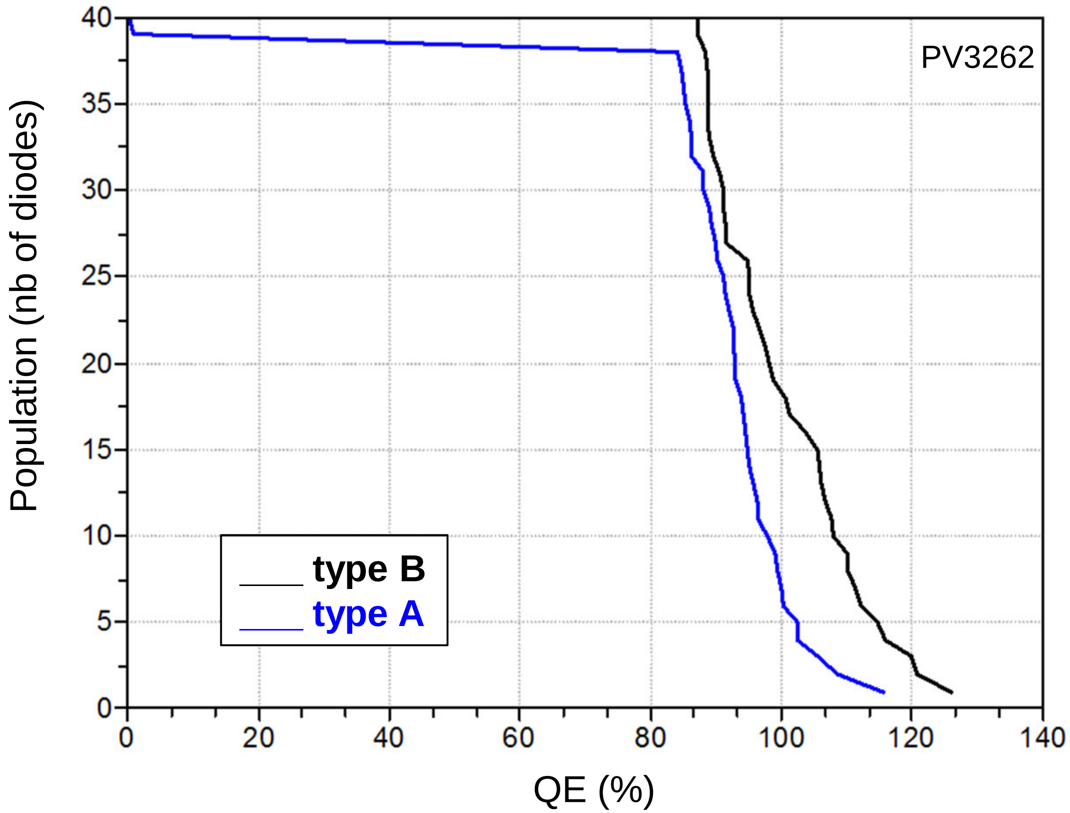
Calibrated BB response for peak QE estimation

- PV3262 gives reliable values

- Passivation type seem to have an impact on diode response
  - Larger Xtalk with type B diodes?





Conclusion

- 4 layers
- Accident identified during passivation process
  - Surface leakage current : C(V), I(V), spotscan

- One layer saved (PV3262)
  - Spectral response gives a lc shorter than expected
  - $C_{diode}(V) \in [15 ; 25 \text{ fF}]$
  - Spotscan suggest close to unity FF
  - High QE

2nd April 2014

Large IRFPA at Sofradir

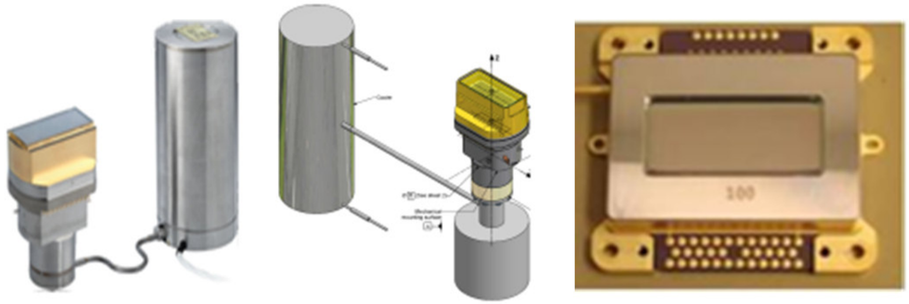
P. Chorier

Existing large focal plane arrays at Sofradir
NEPTUNE & SATURN detectors

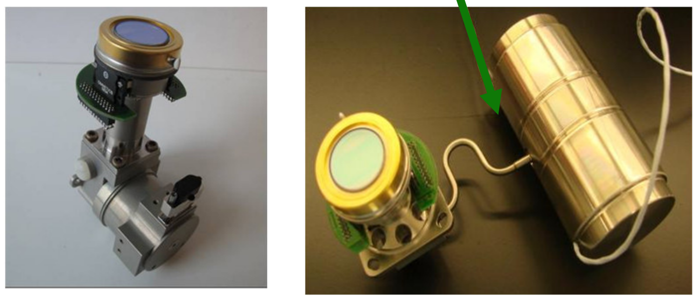
Versatile detector available in several configurations

- **2 formats: 500x256 (~15x10 mm²) or 1000x256 (~30*10 mm²)**
- SWIR or VISIR spectral range or specific cut-off wavelength
- Several packagings available:
  - Airborne or flight configurations
  - Active or passive cooling

New long lifetime cooler for NEPTUNE space detector



SATURN (1000 x 256, 30µm)

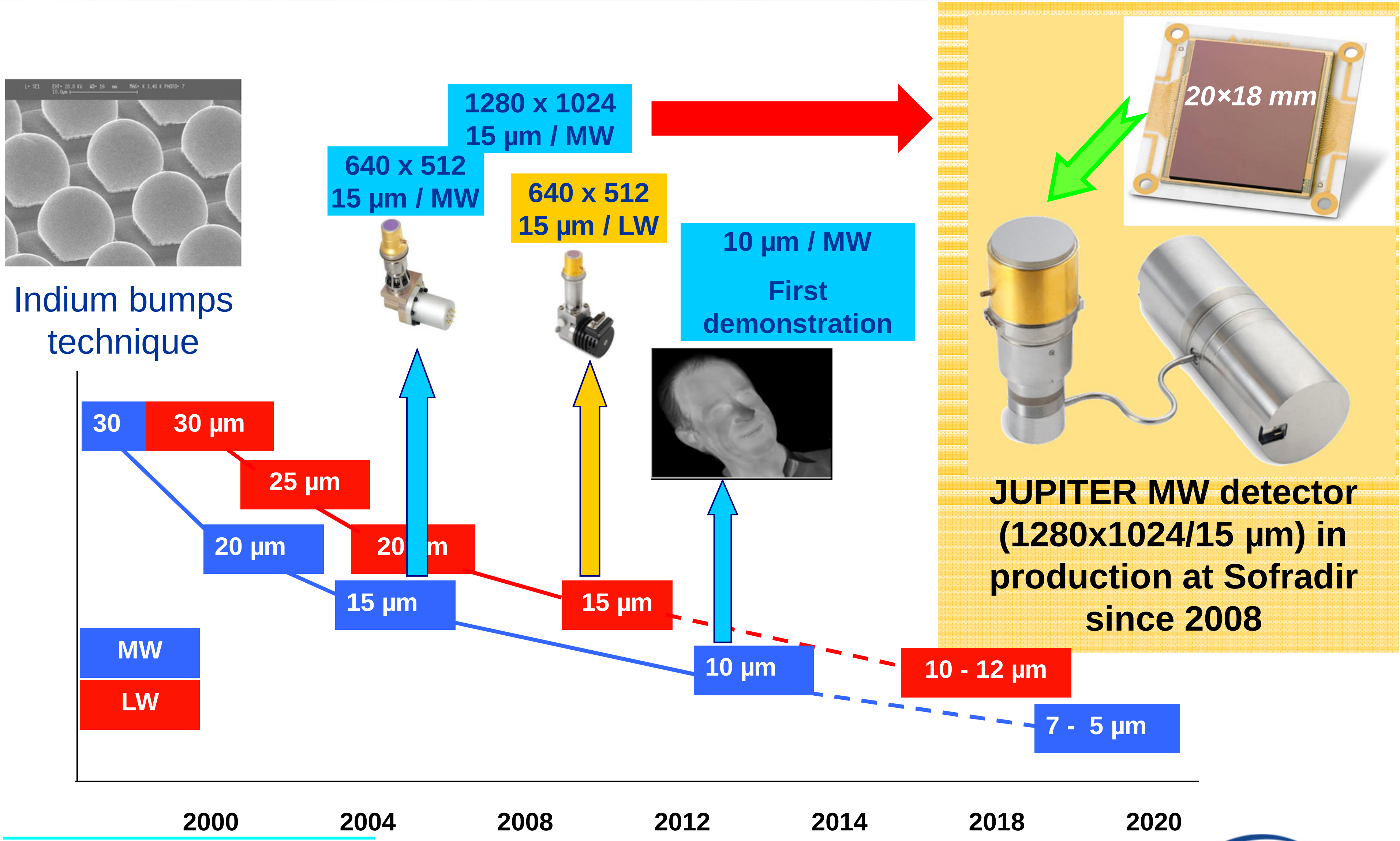


NEPTUNE (500 x 256, 30µm)

Already used for several space programs:

- PRISMA mission (Italy)
- HYSUI system (ALOS-3 – Japan)
- TROPOMI instrument (Sentinel 5P - ESA)
- SPIRALE system (French MoD)
- Phobos-Grunt (Micromega – IAS)
- and others …

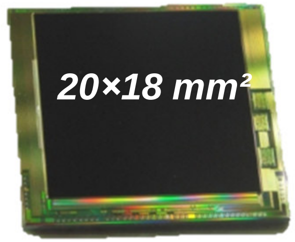
Existing large focal plane arrays at Sofradir
Toward large IRFPA & small pixel pitch

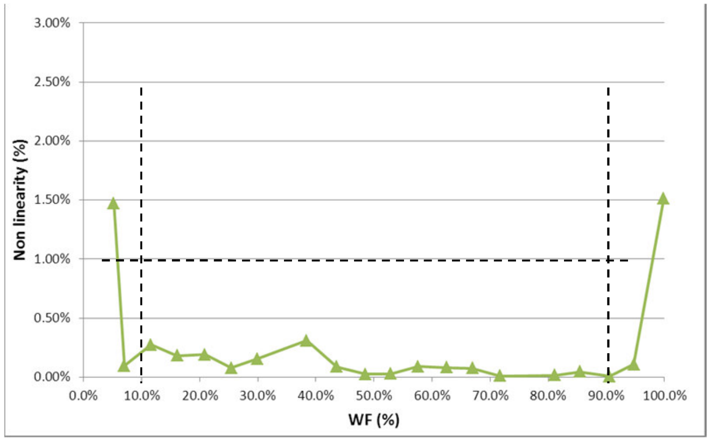


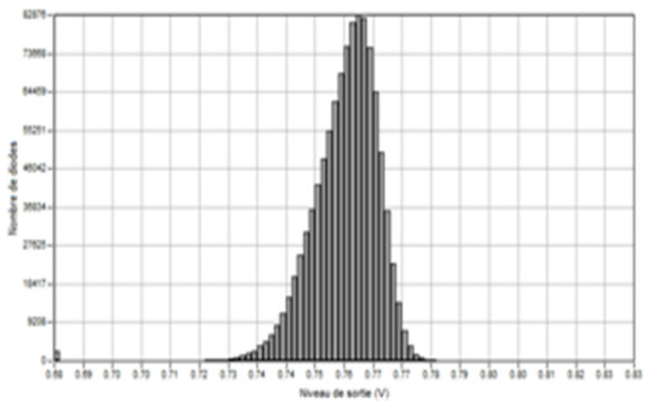
Existing large focal plane arrays at Sofradir
A new large SWIR detector (1024x1024 / 15 µm)

➤ NGP detector

Parameter	NGP validation phase
Array size, Pitch	**1024x1024, 15µm**
ROIC Noise	**140 e- rms @170K (σ=12%)**
Charge Handling Capacity (CHC)	**0.7 Me- (at saturation / 1.6V dynamic)**
Total Power dissipation	**< 140 mW**
Non linearity	**< 0.5% for 10% to 90% WF**
Memory effect	**0.6%**
PRNU	**2%**
Operability	**99.97%** (50% SNR_{mean} & +/-30% $Resp_{mean}$)







Main building blocks needed for large IRFPA

Large ROIC

- Available silicon foundries with adapted performances
- Compatibility of silicon foundries with large ROIC (stitching for ROIC larger than 20x20 mm² roughly)

=> Sofradir is currently working on new silicon foundries compatible with stitching techniques

Large MCT arrays

- All the manufacturing line is concerned : CdTe ingots, CdTe substrate manufacturing, epilayer manufacturing and photovoltaic process

⇒ Sofradir production is already compatible with manufacturing of large IRFPA like Saturn, Jupiter or NGP

⇒ Sofradir is currently working on the implementation of larger size substrate industrial processes and tools enabling 3.5" wafers

Main building blocks needed for large IRFPA

Hybridization

- Indium bump hybridization is used at Sofradir in production for all IR detectors up to the larger ones (Saturn, Jupiter & NGP)
- Same technique is anticipated for large IRFPA with relatively large pixel pitch (> 15 µm)

Conclusion

- **Sofradir has already demonstrated the manufacturing at production level of large IRFPA**

- **The main building blocks for production of large IRFPA have been identified and Sofradir is currently working on some of them**

innovation for industry

Narrow InfraRed_ Large Format Sensor Array _2

Final Presentation (FP2)

CONCLUSION & DISCUSSION

2nd April 2014 @ CEA-IRFU/SAp Saclay

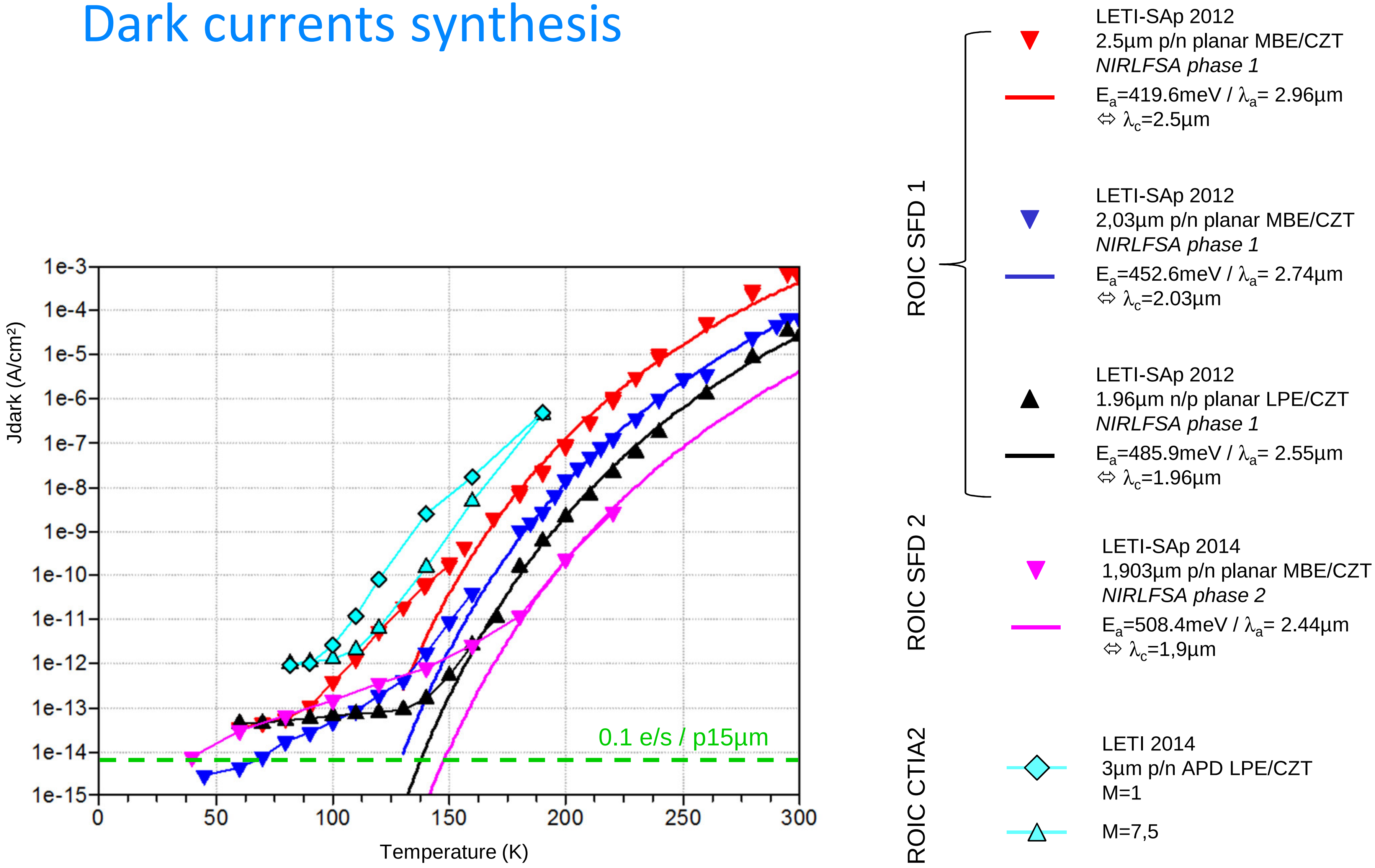
Conclusion of NIRLFSA phase 2 characterization

- Only one component fully characterized, from 40 to 200K
  - Operability, linear well, readout noise, Fowler, FUR OK
  - Cutoff wavelength too short
  - Dark current too high: 2 e-/s at 100K, phase 1 was 0.6 e-/s
  - Inter pixel capacitance too high
  - Passivation A better than B
  - Metallization A better than B (except for linear well)

- Second component showed that IPC is key parameter
  - Noise properties consistent with amount of IPC

- Improvement necessary in the following areas:
  - Better control of cutoff
  - Dark current
  - Inter pixel capacitance

Dark currents synthesis



Narrow InfraRed_ Large Format Sensor Array _2

CCN4 proposal

Attendees:
V Moreau; O Boulade; (CEA-IRFU/SAp)

C Cervera; O. Gravrand; F Guellec; G Destéfanis; JP Zanatta (CEA-Leti)
N Nelms; L Duvet (ESA-ESTEC)

2nd April 2014 @ CEA-IRFU/SAp Saclay

- CCN4 ➔ 6 months period
- From 1st May to 31st October 2014

ESA questions for CCN4

- Investigation of low yield from hybrid manufacture
  - @Leti bad yield due to a lot of studied parameters and reduced number of fabricated FPA
  - @ Sofradir: cf industrial analysis

- Production of further batch of MBE and /or LPE MCT
  - For us: the same and LPE is available immedialy

- Hybrid production and characterization
  - OK: see following proposal

- Hybrid 1 FPA has to be tested @ 40K
  - OK

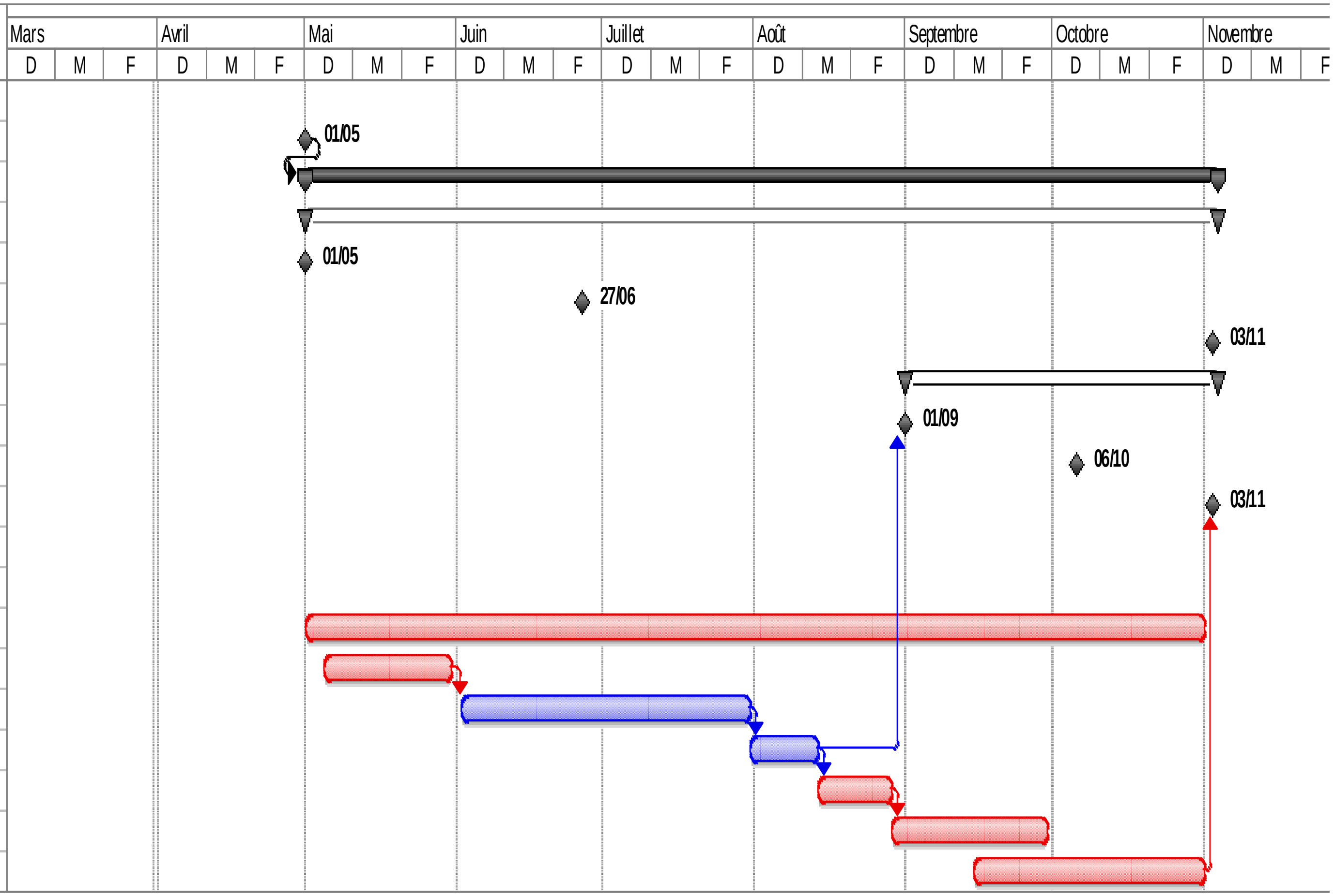
CCN4 NIR_LFSA_2

- Goal of the study:
  - Increase statistic in making an additional technological batch
    - experience on only 2 batches with a lot of different parameters
      - NIR_LFSA_1 batch and NIR_LFSA_2 batch

  - Test of a detector @ 40K

CCN4 W.P. planning

N°	Nom de la tâche
1	NIR LFSA_ PHASE 2
2	Jalon to contrat (CCN4 phase 2)
3	WP2.7.1 Management
4	Meetings
5	Start CCN4 phase 2
6	PM
7	FP3
8	Documentation
9	TN12 TAP test report
10	TN13 detector manufacturing report
11	TN14 detector test report
12	
13	Task 2.7 CCN4 activity
14	WP2.7.1 Management
15	WP 2.7.2 MCT material manufacturing
16	WP 2.7.3 PV Technology_1 batch (3 wafers)
17	TAP test
18	WP 2.5.4 IRFPA manufacturing
19	WP 2.5.5 IRFPA preliminary tests & selection
20	WP 2.5.6 Detector characterization



- Discussion on start time to (here 1st May 2014)

CCN4 W.P. listing

Task Number	Work description	period
2.7.1	**Management**	May – Oct 2014
2.7.2	**MCT material manufacturing**	May 2014
2.7.3	**PV technology**	June -July 2014
2.7.4	**IRFPA manufacturing**	August 2014
2.7.5	**IRFPA preliminary test and selection**	Aug – Sept 2014
2.7.6	**Detector characterization**	Sept – Oct 2014

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**Management**				
Contractor :	CEA	Country :	F	**WP N° :**	**2.7.1**
Start Event / Date :	1st May 2014 + 6 months			Issue Date :	**10/2014**
End Event / Date :	31st Oct 2014			Sheet :	1/1
WP Manager :	**JP Zanatta**				

Objectives

➔ Management of the phase 2

Inputs

- Authorization to start the study (CCN4 signature)

- ***Activities***
  - Interface with ESA and with the subcontractors ; follow-up and coordination,
  - Technical direction and coordination of in-house activities,
  - Schedule, progress and action item control,
  - Preparation of meetings and edition of presentation material,
  - Edition of progress reports, technical notes and reports,
  - Travel and subsistence.
- ***Outputs***

Deliveries

- Monthly reporting, study deliverables ; TN12 to TN14

Exclusions :

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**MCT material manufacturing**				
Contractor :	CEA-LETI	Country :	F	**WP N° :**	**2.7.2**
Start Event / Date :	1st May 2014 + 1 months			Issue Date :	1st June 2014
End Event / Date :	1st June 2014			Sheet :	1/1
WP Manager :	**JL Santailler**				

Objectives

➔ **LPE growth of MCT substrates for detector demonstration**

Inputs

- NIR_LFSA_2 nego meeting detector requirements specification
- TN10 detailed detector design report

Activities

- LPE growth of MCT:In material for MCT PV technology

Outputs

- 3 MCT substrates with adequate cut-off wavelength

Deliveries

- TN13 detector manufacturing report

Exclusions :

description of epitaxy technology conditions (classified and proprietary information)

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**PV technology**				
Contractor :	CEA-LETI	Country :	F	**WP N° :**	**2.7.3**
Start Event / Date :	1st June 2014 + 2 months			Issue Date :	1st August
End Event / Date :				Sheet :	1/1
WP Manager :	**J Baylet / O Gravrand**				

Objectives

➔ Manufacturing of PV MCT array for the demonstrator

Inputs

- NIR_LFSA_2 nego meeting detector requirements specification
- TN10 detectors tests report

Activities

- Manufacturing of one batch of 3 PV wafers, using the selected parameters for the optimised technology identified during the conclusions of FP2
- TAP test of PV wafers

Deliveries

- TN13 detector manufacturing report
- TN12 TAP test report

Exclusions :

detailed description and conditions of detector technology (classified and proprietary information)

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**IRFPA manufacturing**				
Contractor :	CEA-LETI	Country :	F	**WP N° :**	**2.7.4**
Start Event / Date :	1st August 2014 + 0,5 month			Issue Date :	14th August 2014
End Event / Date :				Sheet :	1/1
WP Manager :	**JP Zanatta**				

Objectives

➔ Assembly of IRFPA constituting the demonstrators

Inputs

- ➢ NIR_LFSA_2 nego meeting detector requirements specification
- ➢ TN9 detector manufacturing report
- ➢ CMOS wafers of WP 2.5.4
- ➢ MCT arrays of WP2.7.3

Activities

- ➢ Hybridization of a batch of MCT arrays on readout circuits
- • ***Outputs***
- ➢ TN13 detector manufacturing report
- ➢ A batch of around 6 IRFPA

Deliveries

- ➢ TN13 detector manufacturing report

Exclusions :

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**IRFPA preliminary test and selection**				
Contractor :	CEA-LETI	Country :	F	**WP N° :**	**2.7.5**
Start Event / Date :	15th August 2014 + 1 month			Issue Date :	14th Sept 2014
End Event / Date :				Sheet :	1/1
WP Manager :	**C Cervera**				

Objectives

➔ Selection of best IRFPAs for characterization in WP 2.7.4

Inputs

- NIR_LFSA_2 nego meeting detector requirements specification
- TN7 detailed detector design report
- IRFPA of WP2.7.4

Activities

- Integration of IRFPAs in LETI standard laboratory dewar
- Simplified E.O tests at 77K to select the best IRFPAs for WP 2.7.6

- ***Outputs***

- Simplified E.O test report of the IRFPAs in TN14 detector test report

Deliveries

- TN14 detector test report

Exclusions :

PROJECT :	**NIR large format sensor array**			**Phase 2**	**CCN4**
WP Title :	**Detector characterization**				
Contractor :	CEA	Country :	F	**WP N° :**	**2.7.6**
Start Event / Date :	15th Sept 2014 + 1,5 month			Issue Date :	15th Oct 2014
End Event / Date :				Sheet :	1/1
WP Manager :	**O. Boulade**				

Objectives

➔ Full characterization of the prototype detector array (excluding radiation testing)

Inputs

- TN6 detector test plan
- TN8 detector test bench description
- TN9 detector manufacturing report
- Minutes of the TRR review
- Detector array(s)
- Phase 2 test bench

Activities

- IRFPA mounting @LETI
- Perform tests as per TN6 and also from NIR_LFSA_2 measurements
- 1 FPA has to be tested T=40K
- Analysis of the test data
- Writing of the test report

Outputs

- TN14 detector test report

Deliveries

- TN14 detector test report

Exclusions :
radiation test versus dose effect (γ-rays)

Documentation of CCN4

Document	Title	Delivery date
TN12	TAP test Report	1st sept 2014
TN13	Detector manufacturing report	6th Oct 2014
TN14	Detectors test report Report	3th Nov 2014 2014

Hardware to be given to ESA

Item identifier	Description	Milestone	Delivery date	Quantity
HW4	MCT Hybrid Detector	FP3	Nov 2014	1 fully functionnal devices

Payment plan for phase 2

- Tbw

CCN4 propal: conclusion / discussion

- Admin form for answering to CCN4 ?
- Our preliminary estimation of the cost is compatible to 400K€ of ESA budget, to be confirmed
- CCN4 agreement of ESA expected for mid April
- 6 months period is very short, Leti will have to shift 2 on-going programs ➔ depending on max start time from ESA
  - We have to know the latest possible starting time
  - Depending on ESA answer, we need agreement from our contractor

Save the date now!

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2014

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