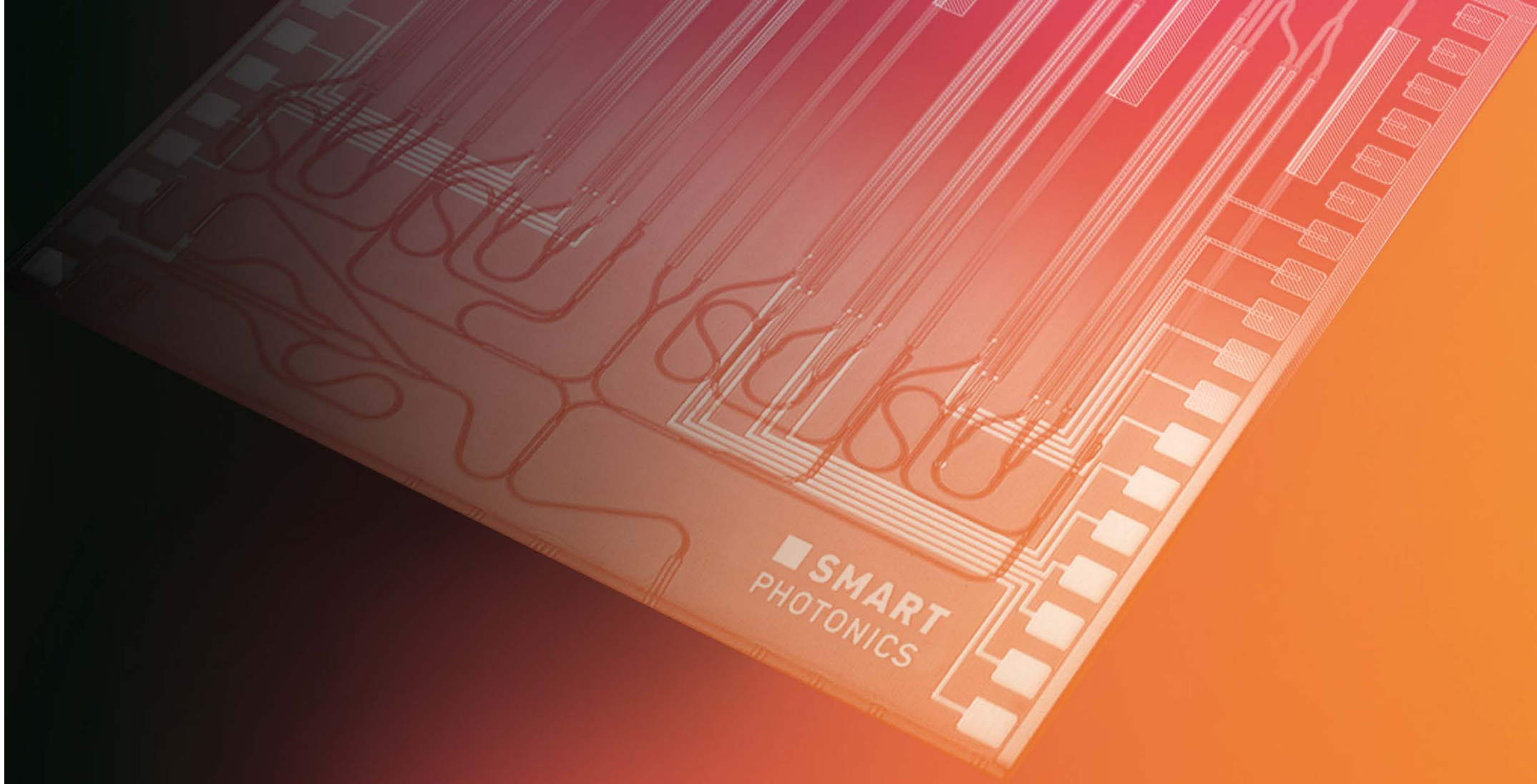

OPENPICS PROJECT

WP4 – review meeting

29th August 2017

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OUTLINE

- Process development
  - Scanner lithography
  - Etching development
  - Support for Zn diffusion experiments
- Photonic Design Kit (PDK) developments
- Summary

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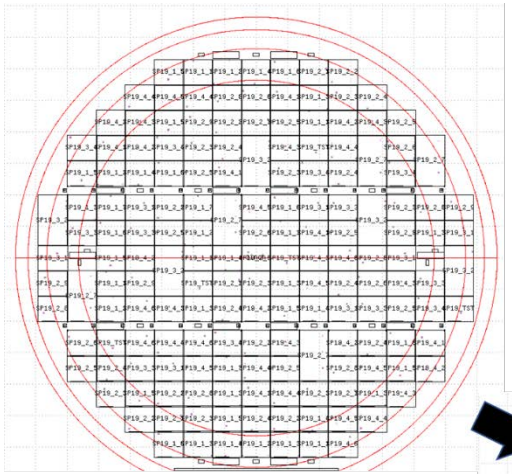
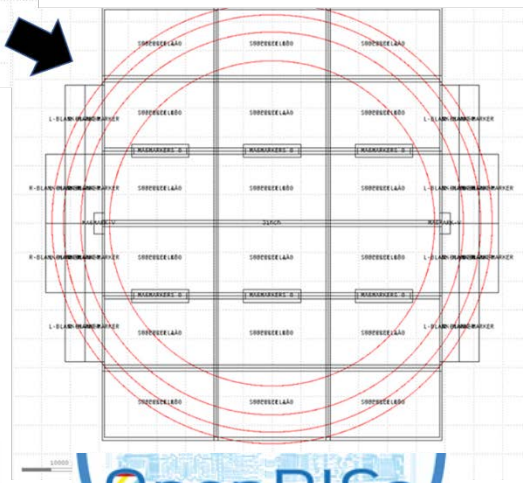
PROCESS DEVELOPMENT

- Scanner Lithography development (reported in WP4-M5.1)



Example of SP19
Contact Aligner Mask

Example of SP20
DUV (193nm dry)
Scanner Mask



- For the DUV approach so-called super cells have been created, which fit 12 MPW cells of 4x4.6mm. A single supercell can be replicated 18 times on a 3 inch wafer.

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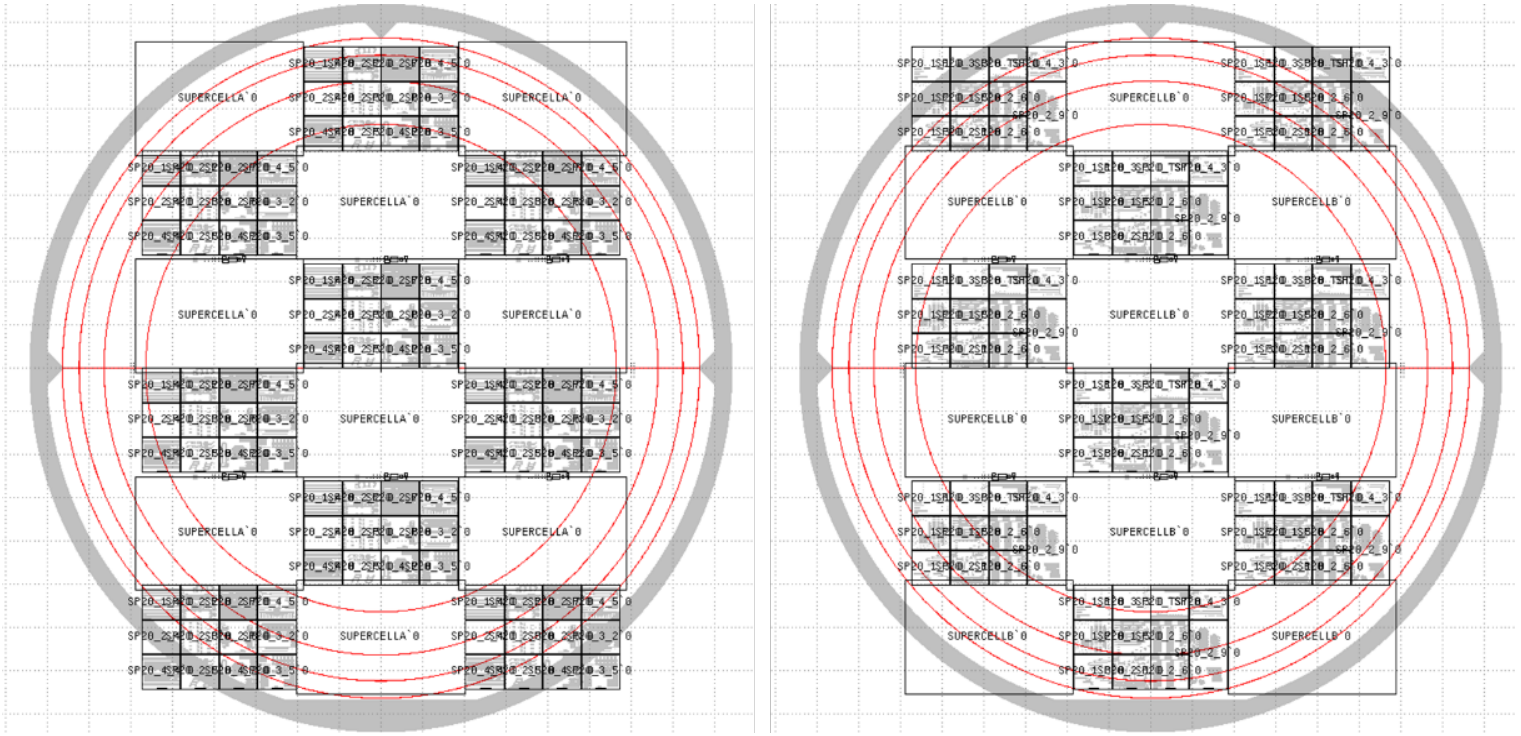
PROCESS DEVELOPMENT

- Actual SP20 implementation



- 2 supercells with 12 dies each, being replicated 9 times

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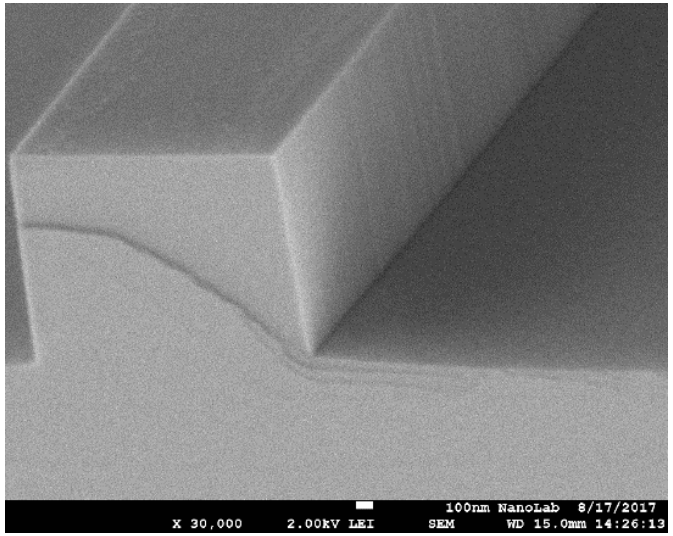
PROCESS DEVELOPMENT

- Etching development
- A new CH4-H2 recipe was developed showing:
  - Etchrate: 71.7 nm/min
  - Side wall angle: 0.44º
  - Hard mask erosion: 2.1 nm/min



- Recipe is now at validation stage.

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PROCESS DEVELOPMENT

- Support for Zn diffusion experiments
- 4 wafers were grown in our multi-reactor for Zn diffusion experiments

passive

Layer	Material	Doping	d [nm]
III-3	p-InGaAs	$1.5 \cdot 10^{19}$	300
III-2	p-InP	$1.0 \cdot 10^{18}$	1000
III-1	p-InP	low 10^{17}	300
II-2	n-InP	low 10^{16}	200
II-1	n-Q1.25	low 10^{16}	500
I-2	n-InP	low 10^{17}	500
I-1	n-InP	low 10^{18}	500
I-0	n-InP	1-4 $\cdot 10^{18}$	substrate

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PDK DEVELOPMENT

- A new Design Manual has been released
  - Update of the performance data of BB
  - Inclusion of the new BB
    - Experimental phase
    - Validation phase
  - Design Rule Check (DRC) included

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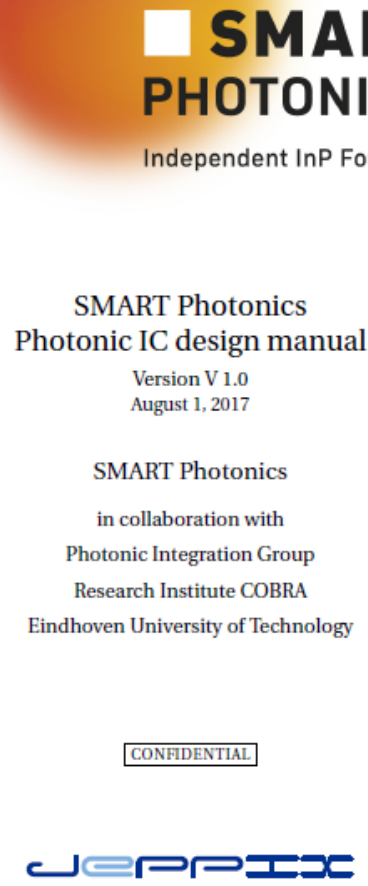
SMART Photonics
Photonic IC design manual
Version V 1.0
August 1, 2017

SMART Photonics
in collaboration with
Photonic Integration Group
Research Institute COBRA
Eindhoven University of Technology

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FUTURE

MPW validation | MPW commercial | Tape-out

		SP19	SP20	SP21	SP22	SP23	SP24	SP25	SP26	SP27	SP28	SP29	SP30
		Dec-16	Mar-17	Jun-17	Sep-17	Dec-17	Mar-18	Jun-18	Sep-18	Dec-18	Mar-19	Jun-19	Sep-19
Modulator			1st	copy				2nd			3rd		
	SI-substrate		x										
	Plating	x											
	Effect MQW			x									
	Al-MQW							x					
	CL-TWE										x		
RF Line	conventional				1st					2nd			
	new planarization					to	be	determined					
SSC					x								
Prec. Filter	(ring, AWG, MZI)			1st			2nd			3rd			
	DBR	x EBL	EBL	DUV									
	DUV		x										
Low LW LD													
	DBR laser		1st			2nd			3rd				
	Triplex Hybrid				1st	Oct Lionix run	2nd	+Lionix run					
	High Q cavity laser									1st		2nd	
WP4 items	Zn diffusion				x								
	Thick insulation + RF				x								
	Improved etching						x						
Demo	both chips								1st				

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SUMMARY

- Within WP4 several improvements have been achieved:
  - Scanner Lithography
  - Support for Zn diffusion experiments
  - Development of new etching recipes for improved waveguide profile

- Release of a new Design Manual

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