

JEPPIX

OpenPICs WP 4: Planning and targets

January 2017

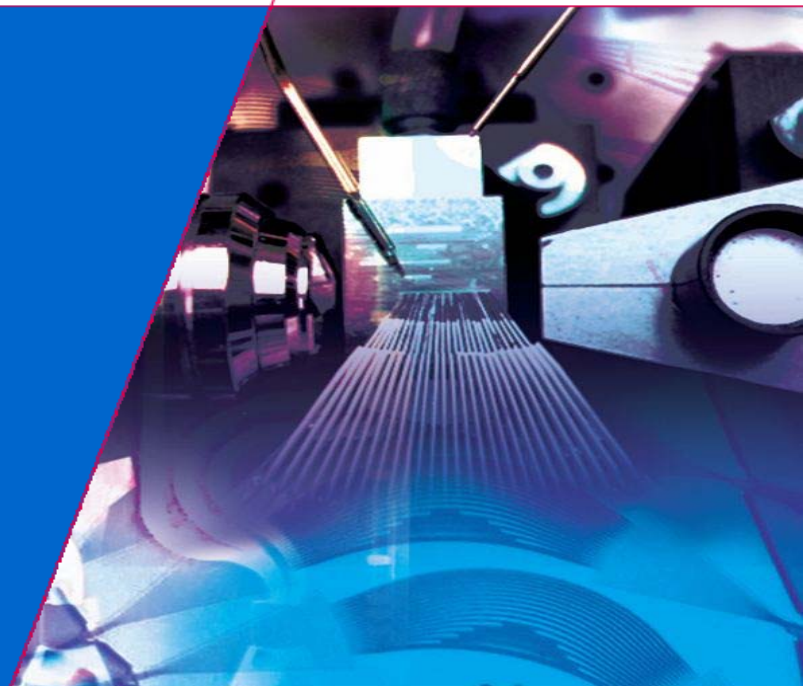


**Institute for
Photonic
Integration**
Materials • Devices • Systems

TU / e

Technische Universiteit
Eindhoven
University of Technology

Where innovation starts



Timetable

Initial test

Joint MPW validation

MPW validation

MPW commercial

Technologies	Schedule of introduction											
	2016	2017				2018				2019		
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
SI-substrate process												
Metal plating												
DBR process		EBL	DUV?									
DUV for WG definition			?									
Modulator MQW epi				Pending								
SSC stack and process				Pending								
AI-MQW epi integration												
Zn diffusion epi integration												
Thick insulation & RF lines												
- Stepper process												
- CMP process												

Milestones: M1 M2 M3

Milestone lists

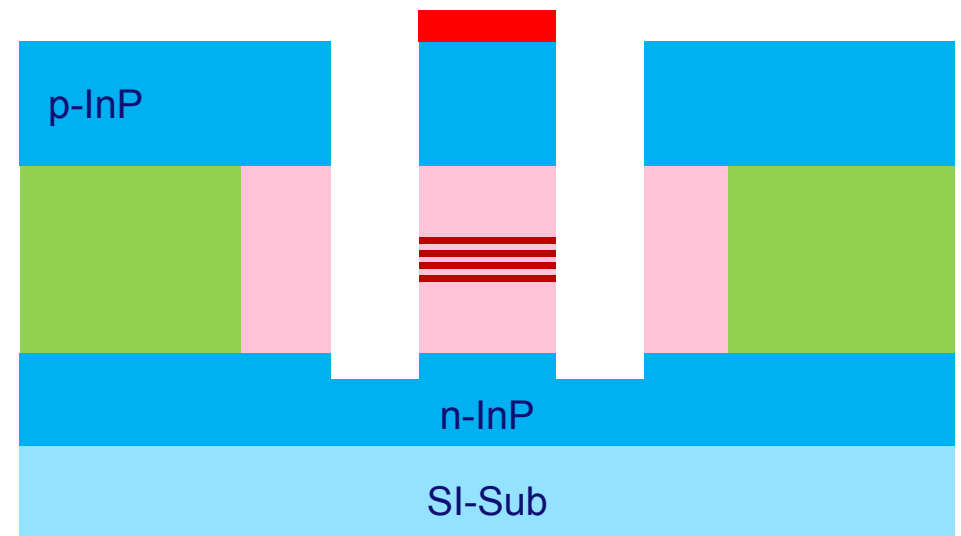
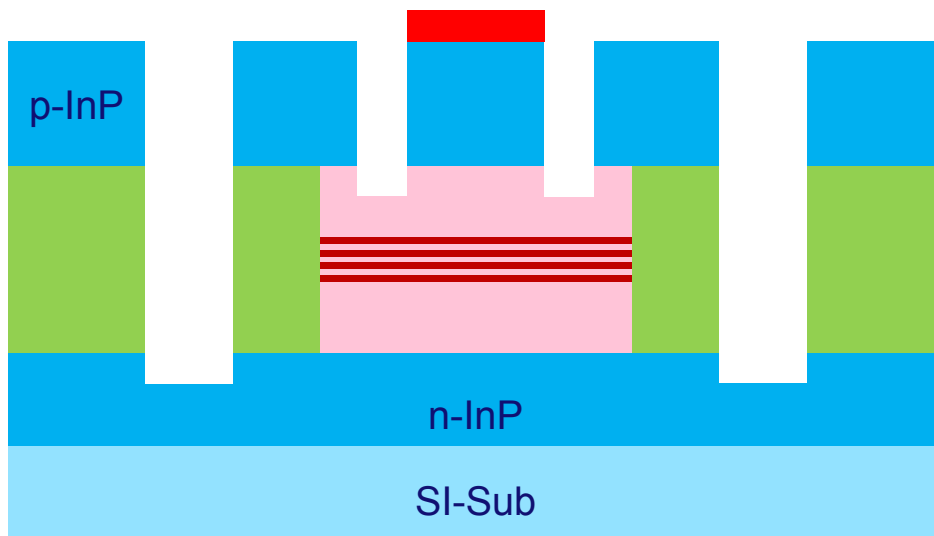
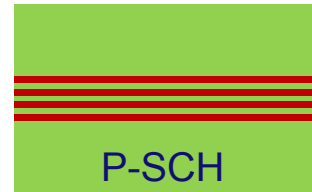
- Al-MQW epi integration Longfei
- Zn-diffusion epi integration Longfei, Rene
 1. Process test finished on dummy wafers September 2017
 2. Process ready for MPW validation September 2018
 3. Process open for commercial MPW users September 2019

Milestone lists

- Insulation and RF lines Longfei, Tjibbe
 1. Process test ready on dummy wafers September 2017
 2. Process ready for MPW validation September 2018
 3. Process open for commercial MPW users September 2019
- CMP and Stepper process Robert
 1. Stepper available with AZ and MaN resist recipes September 2017
 2. CMP process available for BCB polishing September 2018
- DUV process optimization Roel, Robert

Al-MQW epi integration

- Two types of core film
- Two types of BBs



Al-MQW epi integration

- Initial research in Al-MQW
 - gain simulation (Jorn), Al-MQW (P-SCH) etching (Florian), growth (Rene)
 - Al processing
 - dry etching recipe (and its effect in non-Al layers)
 - passivation
 - regrowth
 - Al-MQW prototype tests (no regrowth, MPW preferred)
 - modulator prototype; SOA gain measurement
 - Prototyping using stepper litho?
 - Process transfer to MPW
- Now
- 2017 Q1- 2018 Q4
- 2017 Q4 – 2018 Q4
- 2019 Q1 – Q3

Zn diffusion A/P integration

- Diffusion test results from Domenico
 - Passive loss OK, active loss high (metal loss suspected)
 - Repeat diffusion tests
 - Calibrating new process conditions
 - Doping profile vs diffusion time (CV, SIMS)
 - Attention to Zn into Q core
 - Local Zn diffusion with MPW wafers
 - measuring basic building blocks (PCM) and IP blocks
 - Process transfer to MPW
 - Additional points
 - Diffusion in Al-based BBs
- Now
- 2017 Q1-Q3
- 2017 Q4 – 2018 Q2
- 2018 Q4 – 2019 Q2

Thicker insulation and RF lines

- 5 um thick BCB + sloped open + metal plating (Photronics project) Now
 - Resistance OK, adhesion OK, SEM photos pending
- Wafer scale test: statistics + tolerance 2017 Q1-Q3
 - plating metal to contact metal connection
 - RF transmission line measurements
 - BCB thickness map over the wafer → demands for CMP?
- Post-processing on MPW wafers 2017 Q4 – 2018 Q3
 - measuring basic building blocks (PCM) and IP blocks
- Process transfer to MPW 2018 Q4 – 2019 Q2
- Additional points
 - Narrow hole opening + sputtering metals
 - CMP for flat surface; multilayer metals

Effort resources

Technical tasks	FTE allocation							Resources	
	Longfei	Tjibbe	Robert	Rene	Smart	Lionix	Total fte	OpenPICs	Other projects
Al-MQW epi integration	0.5	0.1	0.1		0.2		0.9	WP 4.1	Florian (GeTPICs) Jorn (Gravitation)
Zn diffusion epi integration				0.2			0.2	WP 4.1	Jon, Simone (ECO group)
Thick insulation		0.3	0.1		0.3		0.7	WP 4.3	Tjibbe (Photonics) Robert (NextGen)
Stepper process			0.2				0.2	WP 4.3	Equipment technician (Nanolab)
DUV process	0.2				0.5	0.3	1	WP 4.2	Jereon (new STW project)
Total fte	0.7	0.4	0.4	0.2	1	0.3	3		