leti
cea tech

SILICON PIC PLATFORM

PHOTONICS TECHNOLOGIES CONVERGENCE **ON SILICON CMOS PLATFORM**

WHAT IS LETI'S Si PIC PLATFORM?

CEA-Leti's fabrication platform for silicon Photonic Integrated Circuits (PIC) enables large-scale integration of active and passive devices in a flexible CMOS-compatible process.

Beyond silicon, the platform also offers integration of SiN and III-V bonded epi layers on the same wafer, providing the advantages of each material. The convergence of various photonic platforms combined with CEA-Leti's multi-material process helps address numerous applications with the same technology.

APPLICATIONS

Several applications come with this photonics-technologies convergence on a Si CMOS platform, including:

- **Communication:** Telecom, Datacom, 5G infrastructures, quantum cryptography for cybersecurity
- **Computing:** Computer communication for High Performance Computing (HPC), quantum computing and neuromorphic computing for AI
- **Sensing:** optical gas sensing, structural health monitoring and 3D sensing such as LIDAR

Work performed in the frame of the IRT Nanoelec consortium.

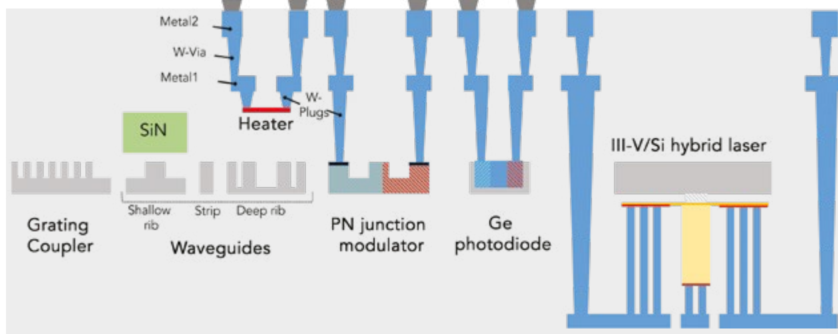
NANOELEC.

WHAT'S NEW?

Benefits of this convergence offer CEA-Leti's partners a greater number of functions on photonic integrated circuits (PIC), fabricated on an advanced CMOS-compatible platform.

CEA-Leti's key achievements:

- Mature device library for O-band and C-band in a Process - Design Kit (PDK), compatible with conventional CAD tools.
- III-V integration on CMOS-compatible process through collective die bonding
- Multilayer Si/Si or SiN/Si for 3D photonics
- 2D beam steering based on SiN OPA
- Tunable DBR, DFB, racetrack lasers



KEY FEATURES:

- 300 mm SOI substrate with 310 nm Si, other thicknesses available
- Multilevel silicon patterning for silicon heights of 0, 65, 165 and 310 nm
- Selective Ge epitaxy
- SiN layer (optional)
- TiTiN heater
- 6 implant levels for p-type and n-type for electro-optic modulators and silicon doped heaters
- Silicide tungsten contact
- III-V collective die bonding

WHAT'S NEXT?

CEA-Leti's Optics and Photonics Division will:

- Leverage its brand new immersion lithography to deliver smaller feature-size devices and low sidewall roughness
- Focus on ultra low insertion loss and high efficiency Si & SiN devices
- Develop high efficiency NbN Superconducting Single Photon Detector (SSPD)

INTERESTED IN THIS TECHNOLOGY?

Contact:
Eleonore Hardy
eleonore.hardy@cea.fr
+33 438 782 639

CEA-Leti, technology research institute
Commissariat à l'énergie atomique et aux énergies alternatives
Minatec Campus | 17 avenue des Martyrs | 38054 Grenoble Cedex 9 | France
www.leti-cea.com

@CEA_Leti CEALeti CEA-Leti

© Leti - Photo credits: CEA - 2020/09