

## 25Gb/s Silicon-Photonics WDM Platform for Low-Power Optical I/O

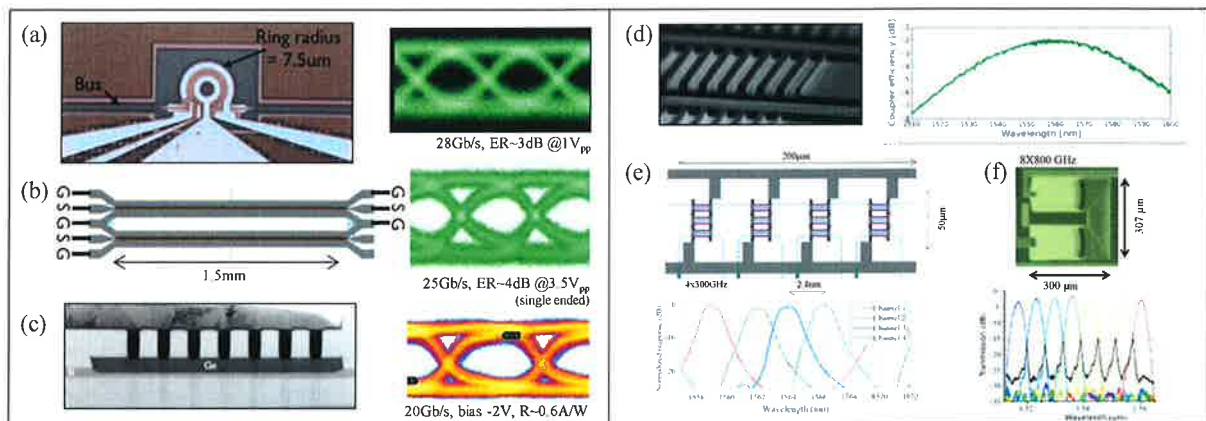
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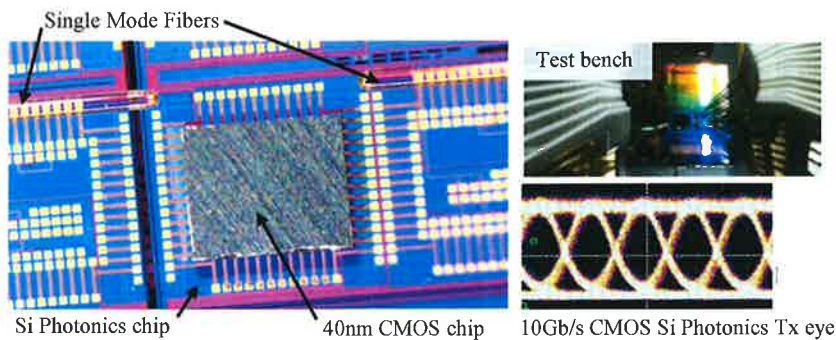
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The adoption of silicon photonics as a viable technology for chip-level optical interconnects requires the co-integration in a single platform of high-performance silicon optical devices such as high-speed and low-voltage silicon modulators, highly responsive Ge photodetectors, as well as passive optical devices such as efficient fiber couplers and low-loss wavelength-division multiplexing filters. In this paper, we review the performance of imec's recently announced 200mm fully integrated 25Gb/s Silicon Photonics Platform [1]. We will discuss high-speed Si ring [2] and Mach-Zehnder modulators, high-speed Ge p-i-n photodetectors and passive devices such as ring-based DWDM filters [3] and arrayed-waveguide grating CWDM filters [4] demonstrated in this platform (see Fig. 1). In addition, we will discuss the recent demonstration of a highly efficient 10Gb/s 1.1V CMOS Photonics transmitter, comprising a Si ring modulator and a co-designed flip-chip integrated 40nm CMOS driver chip (see Fig. 2).



**Fig. 1.** (a) 28Gb/s Si ring modulator, (b) 25Gb/s traveling-wave Si MZ modulator, (c) 50GHz Ge p-i-n photodetector, (d) 2dB grating fiber coupler, (e) Si ring 4-ch DWDM filter [3], (f) Si AWG 8-ch CWDM filter [4].



**Fig. 2.** 1.1V CMOS Si Photonics 10Gb/s Ring Transmitter demonstration [5].

### References

- [1] <http://www.europractice-ic.com/>
- [2] M. Pantouvaki et al., in Proceedings "ECOC", IEEE (2013), paper We.3.B.2
- [3] P. De Heyn, et al., J. Lightwave Technol. **31**, 2785-2792 (2013)
- [4] S. Pathak et al., in Proceedings "Group IV Photonics", IEEE (2013), paper WC7
- [5] M. Rakowski et al., in Proceedings "OFC/NFOEC", OSA (2013), paper OM2H.5

**15:50-16:10 Break**

(Session B contd.)

- 16:10 **B-5**  
 Demonstration of 30-Tbps/cm<sup>2</sup> Bandwidth Density by Silicon Optical Interposers Fully Integrated with Optical Components  
 Y. Urino (*PETRA/PECST*)
- 16:25 **B-6**  
 Hybrid Integrated Light Source on a Si Platform Using a Quantum Dot Laser under Wide Temperature Range  
 M. Ishizaka (*PETRA/PECST*)
- 16:40 **B-7**  
 Low-Voltage-Driven 50-Gb/s Ring-Resonator-Based Silicon Modulator  
 S. Akiyama (*PETRA/PECST*)
- 16:55 **B-8**  
 High Performance PIN Ge Photodetector and Si Optical Modulator with MOS Junction  
 J. Fujikata (*PETRA/PECST*)
- 17:10 **B-9**  
 Wide Wavelength and Temperature Tolerance in 10 Gbps Photonic Crystal Modulators  
 T. Baba (*Yokohama National University/PECST*)
- 17:25 **B-10**  
 Multi-Layer On-Chip Interconnection Using Si Waveguide Devices  
 N. Nishiyama (*Tokyo Institute of Technology/PECST*)

**Banquet (18:00-20:00): Foyer of Ito International Research Center****November, 19 (Tuesday)**

**Venue:** ENEOS Hall (Oral Sessions & Poster Preview)  
 Convention Hall (Poster Presentation)  
 Komaba Research Campus, The University of Tokyo

**Session C: Silicon Nanophotonics Devices & Systems II (9:30-11:30)**

- 9:30 **C-1 (Invited)**  
 Near Infrared Optical Properties of III-V Core-Shell Nanowires on Si  
 G. Abstreiter (*Technical University of Munich*)
- 10:10 **C-2 (Invited)**  
 Recent Silicon Photonic Activities in Europe  
 L. Fulbert (*CEA-LETI*)
- 10:50 **C-3 (Invited)**  
 25Gb/s Silicon-Photonics WDM Platform for Low-Power Optical I/O  
 J. Van Campenhout (*IMEC*)

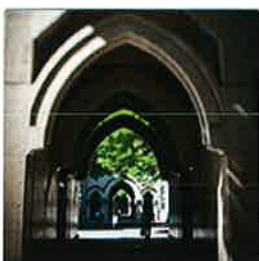
**11:30-13:00 Lunch break****Poster Session (13:00-15:45)**

- 13:00 **Poster preview**
- 13:55 **Poster presentation (core time for the odd-numbered posters)**
- 14:50 **Poster presentation (core time for the even-numbered posters)**

**Session D: Silicon Nanophotonics Devices & Systems III (16:00-17:25)**

- 16:00 **D-1 (Invited)**  
 MEMS-Based Integration for Optical Systems  
 K. Hane (*Tohoku University*)
- 16:40 **D-2**  
 Enhancement of Wavelength Characteristic Shift in Si Grating Waveguides

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**The 3rd International Symposium on  
Photonics and Electronics Convergence  
-Advanced Nanophotonics and Silicon Device Systems-  
(ISPEC2013)**

Tokyo, Japan on 18-20 November, 2013

**Notice**

November 18, 2013

Venue: Ito International Research Center (IIRC)  
Hongo Campus, the University of Tokyo, Tokyo, Japan

November 19-20, 2013

Venue: ENEOS Hall Komaba Research Campus  
Komaba Research Campus, the University of Tokyo, Tokyo, Japan

**Announcement for overseas students and young researchers**

ISPEC will provide some support for travel expenses for selected students and young researchers travelling from overseas.

**Sponsored by**

The University of Tokyo  
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**Co-sponsored by**

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IEEE Photonics Society Japan Chapter

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