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POLITECNICO DI MILANO

3 February, 2017

Workshop on

Silicon Photonics

from academic clean rooms to commercial foundries

Room Castigliano, Building 5

Politecnico di Milano

Piazza Leonardo da Vinci 32, 20133 Milano

With the aim of supporting and aggregating education and research activities, Polifab organizes short workshops on themes related to micro and nanofabrication technologies. The next event will be focused on the Silicon Photonics hot-topic with talks from the early days on academic fabrications to the new applications with industrial approach.

Programme

10.30 M. Sorel, University of Glasgow
Silicon Photonics: from simple waveguides to complex integrated devices

11.10 F. Morichetti, Politecnico di Milano
Harnessing Silicon Photonics

11.50 M. Zuffada, STMicroelectronics
Silicon Photonics in the Market: Technology Assessment and Perspectives

Chair: A. Melloni, Politecnico di Milano

Registration

The participation is free but pre-registration is welcome.
Please follow the link below to register:
http://tinyurl.com/Polifab-workshop

Contact: infopolifab@polimi.it, Phone: +39 0223998980
How to reach the conference room:
http://home.deib.polimi.it/ferrari/Castigliano.pdf

Silicon Photonics: from academic clean rooms to commercial foundries

Marc Sorel

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Silicon photonics has experienced a very rapid growth driven by the requirement for cheaper and more energy-efficient circuits for data centre, fibre-to-the-home, optical interconnect and sensing applications. The talk will review the evolution of silicon photonics research at Glasgow University, from basic low-loss waveguides and photonic crystals to the establishment, in collaboration with colleagues at Politecnico di Milano, of a silicon foundry model that will drive the future development of large and complex circuits. The talk will also discuss recent progress on heterogeneous integration of silicon chips with III-V semiconductor lasers through scalable wafer-level transfer printing.

Harnessing Silicon Photonics

Francesco Morichetti

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Silicon photonics enables extreme miniaturization of optical devices in such a way that many different optical functions can be implemented in small area photonic chips. However, when many photonic devices are aggregated into complex photonic integrated circuits (PICs), fabrication tolerances, thermal fluctuations, and mutual crosstalk effects become critical, and advanced tools are required to reliably set and hold the desired working point of the photonic system. An electronic control layer harnessing silicon photonics is therefore needed, especially when dealing with wavelength selective devices, such as microring resonators, as well as with flexible and reconfigurable architectures. In this seminar, the main issues related to the control of silicon photonics PICs are addressed, including fundamental aspects related to the realization of non-invasive on-chip light monitors, the implementation of compact and energy-saving actuators; accuracy, robustness, speed and power consumption of the control system; monolithic vs hybrid integration of the photonic and electronic layers.

Silicon Photonics in the Market: Technology Assessment and Perspectives

Maurizio Zuffada

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The driving market application for the Silicon Photonics technology is the energy efficient communications inside the modern Data Centers and the High Performance Computers. Today, the main commercial product with significant volumes is the 100G PSM4 QSFP28 optical module that allows a reliable data communication for distances of few meters up to 2km. The energy efficiency is below 35pJ/bit and the silicon photonics 3D engine, inside that module, achieves an aggregate bandwidth density higher than 120G/cm^2, thus new derivative products for a reduced range of distances, can scale down both the power consumption and the cost as requested by the market . By leveraging on the next technology generations and by further reducing distances, the silicon photonics has the potentialities to satisfy the market requests by increasing the aggregate throughput with a CGRY of 58% at a constant or reduced power consumption scaling down the cost and the module's size. This presentation shows the silicon photonics first generation developed at STMicroelectronics in 300 mm wafer size, it makes an assessment of the today solutions; it points out the challenges on the new active and passive optical devices to be realized to achieve the next two generations of 400G/cm^2, 1.6 T/cm^2 and beyond. Finally, the new emerging applications in the field of the optical sensors for health, security and automotive ADAS market will be shown.