



PhD position on Twin-guide membrane laser diodes for high speed loss modulation

UGent/imec - Photonics Research Group
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<http://photonics.intec.ugent.be/>

Optical interconnects in data centers are expected to have line rates of 100Gb/s and even 400Gb/s in the coming years. However, modulation capacities of optical transmitters are not evolving in pace with this trend. There is a strong need for compact, very high speed transmitters with low power consumption. Light sources heterogeneously integrated on a silicon chip have certain advantages in terms of alignment and packaging, but they can also be designed for unprecedented performance and to fulfill the new speed and power consumption requirements imposed by data centers. The topic of the PhD is therefore to investigate new ultra high speed optical transmitters using the heterogeneous integration of Indium Phosphide (InP) membranes on silicon-on-insulator (SOI) and exploiting the advantages of this heterogeneous integration in the laser designs.

InP membranes comprising twin-guide structures will be employed to realize a new high speed laser on SOI with low power consumption: an electro-absorption modulated twin-guide laser, in which the electro-absorption modulation is inside the laser cavity (as opposed to externally modulated lasers, where an electro-absorber is outside the laser cavity). This structure allows much higher modulation bandwidth than current modulation, and a bandwidth far beyond the RC cut-off frequency of the structure. To enable ultrahigh speed modulation, we will also exploit 1) the small area and volume of the InP membranes, giving low RC constants and high optical confinement, and 2) the low losses of SOI waveguides, allowing laser diodes with well-defined external cavities.

This PhD topic requires both an understanding of microwave theory and photonics and the work will include modelling and chip design, fabrication and extensive measurements. Characterisation obviously will include a lot of very high speed experiments up to many tens of Gb/s.

Application:

Apply by filling in the [application form](#).



More information:

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About Photonics Research Group

The Photonics Research Group (about 70 people) is associated with IMEC, and is part of the Department of Information Technology of Ghent University. The group is headed by Prof. R. Baets and has been active in photonics device research for many years. The other professors in the group are P. Bienstman, W. Bogaerts, N. Le Thomas, G. Morthier, G. Roelkens and D. Van Thourhout. The main applications under study are silicon nanophotonics, heterogeneous integration, optical interconnect, WDM optical communication, silicon photonics biosensors and photonic integrated circuits for biomedical applications in the near-infrared and mid-infrared wavelength range. More in particular, the silicon nanophotonics work focuses on the design and fabrication of SOI-based photonic devices using standard lithographic techniques compatible with CMOS-processing. The group is also strongly involved in the development of heterogeneous technologies, whereby the silicon photonics platform is combined with other materials such as III-V semiconductors for efficient sources, nanocrystals and polymers.

The photonics research group has been coordinating the network of excellence ePIXnet and is currently involved in a number of EU-projects, including the FP7 projects ActPhast, PLAT4M, Cando, Pocket and SMARTFIBER. Furthermore, the group is partner in the Center for Nano- and Biophotonics of Ghent University and the group has been awarded with three ERC Starting Independent Researcher Grants and one ERC Advanced Investigator Grant.