

PHD POSITION ON 'LOW-POWER HETEROGENEOUSLY INTEGRATED LASER DIODES'

Ghent University – IMEC, Photonics Research Group
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Since more than 15 years, the Photonics Research Group has been doing research on the heterogeneous integration of Indium Phosphide (InP) membranes on silicon-on-insulator (SOI) circuits, a.o. for the realization of laser diodes on silicon. Such light sources could find widespread application in the optical interconnects connecting the servers in datacenters.

The many years of research have resulted in 'silicon lasers' which can be modulated up to very high bitrates (50 Gb/s has been demonstrated and it is hoped to demonstrate 100 Gb/s in the near future). However, the electrical power consumption of these lasers is still too high for use in optical interconnects. It is one of the main objectives for this PhD project to reduce this power consumption, while maintaining the high speed modulation capabilities. To this end, the laser dimensions have to be optimized, along with doping profiles and waveguide geometries. In addition, co-integration of laser and driver electronics can be explored as this allows to use drivers with lower impedance and to obtain better RF signal delivery to the laser diode.

In a later stage, work will also focus on making uncooled operation possible. Although this is strongly dependent on the power dissipation and thus on the reduction of the total power consumption, it will also be necessary to improve the heat sinking and optimize the active layer material composition (based on literature study). Finally, WDM modules allowing 4x100 Gb/s can be developed.

JOB DESCRIPTION:

The PhD will encompass simulations and design as well as fabrication in the clean room of the group and characterization of static and dynamic laser behaviour. The PhD student will be able to gain experience in areas such as chip design, clean room processing and optical as well as high speed (RF) measurements.

PROFILE:

We are looking for a candidate with a MSc degree in photonics engineering, electrical engineering or applied physics, that already has a good background in photonics and laser diodes, and has good theoretical and experimental skills.

APPLICATION:

Apply online: <http://photonics.intec.ugent.be/contact/vacancies/Application.htm>

MORE INFORMATION:

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ABOUT THE PHOTONICS RESEARCH GROUP

The Photonics Research Group (about 85 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, B. Kuyken, N. Le Thomas, G. Morthier, G. Roelkens and D. Van Thourhout. The main research directions are silicon nanophotonics, heterogeneous integration, optical communication, photonic (bio)sensors 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 Photonics Research Group has been coordinating the network of excellence ePIXnet and is involved in a number of EU-projects, including the FP7 projects ActPhast, PLAT4M, Cando, and Pocket and the H2020 projects TOPHIT, TeraBoard, PIX4Life, MIRPHAB and Phresco. Furthermore, the group is partner of the Center for Nano- and Biophotonics of Ghent University and the group has been awarded three ERC Independent Researcher Starting Grants, one ERC Consolidator Grant and one ERC Advanced Investigator Grant.