

033

Principle and theory of surface plasmon

Peter De Backere

Supervisor(s): Geert Morthier and Peter Bienstman

SOI offers the possibility to achieve integration levels which are comparable with current electronic integrated circuits. In combining metals and SOI on the same platform we can achieve low-loss nanophotonic waveguides where the functionality can be taken care of by highly miniaturized Surface Plasmon structures. We propose a new concept for surface plasmon sensing based on the phases of two isolated surface plasmon modes. The high field enhancement of surface plasmons near

the interface makes them ideal for use in bio- and chemical sensors where a very small change in refractive index should be detected. To our knowledge this is the first time that the SOI material system has been combined with metals for sensing purposes. The device is two orders of magnitude smaller than current sensors, and has a highly customizable behavior. We obtain a theoretical limit of detection of 10^{-6} RIU for a component of length 10 micrometer.

034

Towards a widely tunable laser on silicon with liquid crystal technology

Wout De Cort

Supervisor(s): Roel Baets

We show the first steps towards the realisation of a widely tunable laser integrated on a silicon chip. This component would easily find its applications in telecom, sensing... The laser cavity will be fabricated in the Silicon-On-Insulator material system and we achieve amplification of the light by applying semiconductor nano-particles. These extremely small particles have interesting properties: highly efficient

luminescence or a tunable emission and absorption spectrum. We will show the first experiments concerning these nano-particles. We want to achieve a broad tuning range by using liquid crystals as a top layer on the laser structure. It is known that the optical properties of liquid crystals change in the presence of an electric field. We will show how to use this effect for the tuning of the laser wavelength and we will give some early experimental results.

8e UGent - FirW DOCTORAATSSYMPIOSIUM

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