Seminarankündigung

Dienstag, 10. Januar 2017
17:15 Uhr

WSI, Seminarraum S 101

“Monolithically integrated quantum cascade lasers (QCLs) and detectors (QCDs)”

QCLs are compact coherent light sources with designable wavelength, which makes them attractive to realize compact sensing systems for various applications. Integrated mid-infrared photonics allow the integration of all optical components such as light source (QCL), interaction region and detector (QCD) on a single chip. In order to realize this, we design a QCL active region with an additional detection capability at the laser emission wavelength. This allows a straightforward integration, where different parts of the chip are used for lasers and others for detectors. The performance of such bi-functional designs has been optimized to reach a similar laser performance as conventional QCLs, allowing for high duty cycle operation at room-temperature.

Sensing liquids utilizes surface plasmon polaritons to allow a strong interaction within a short distance. Different distributed-feedback-laser/waveguide/detector units can be combined on a single chip, to use the inherent selectivity of the mid-infrared region. Gas sensing approaches incorporate surface-active lasers and detectors. The latest demonstrator consists of two concentric ring QCLDs with second order distributed feedback (DFB) gratings on top of the waveguides. These DFB gratings facilitate vertical light emission and detection in the biased lasing and unbiased detector configuration, respectively. The two rings emit at two different wavelength, which provides room temperature lasing and detection of two wavelengths monolithically integrated on the same chip.

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