Nano and Photonics Mauterndorf 2017

22th – 25th March 2017

Mauterndorf/Salzburg
Austria

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Program and Time Line

Thursday, 23.3.2017 – Morning (Plasmonic and Photonics)

09:00–09:30 **G. Strasser** (Technische Universität Wien, Wien/AUT)
"Remote gas sensing with quantum cascade systems"

09:30–10:00 **A. Hohenau** (Karl-Franzens-Universität Graz, Graz/AUT)
"Imaging localized surface plasmons with electron- and dielectric probes"

10:30–10:30 **T. Klar** (Johannes Kepler Universität Linz, Linz/AUT)
"Fluorescence from plasmonic nanoparticles"

Thursday, 23.3.2017 – Afternoon

16:00–17:45 **Poster presentation and poster session**

17:45–18:30 **O. Martin** (EPF Lausanne, Lausanne/CH)
"Using the phase of individual plasmonic nanostructures and metasurfaces to mold the flow of light"

Remote Gas Sensing with Quantum Cascade Systems

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Optical sensors for mid-infrared spectroscopy are widely used in industrial and environmental monitoring as well as medical and biochemical diagnostics. Conventional optical sensing setups include a light source, a light-analyte interaction region and a separate detector. We present a sensor concept, based on a bi-functional quantum cascade heterostructure, for which the differentiation between laser and detector is eliminated. This enables mutual commutation of laser and detector, simplifies remote sensing setups and facilitates a crucial miniaturization of sensing devices.

Liquid sensing utilizing bi-functional quantum cascade lasers/detectors (QCLDs) can be realized on a single chip [1]. Typical analyte interaction lengths for gas sensing are in the range of tens of centimeters or more and exceed the common semiconductor chip sizes. Our gas sensing approach incorporates surface-active lasers and detectors [2]. 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 [3] 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.

[1] B. Schwarz, et al., Appl. Phys. Lett. 107 (2015) 071104

[2] A. Harrer, et al., Scientific Reports 6 (2016) 21795

[3] R. Szedlak, et al., ACS Photonics 3 (2016)1794