



mi4sens

international workshop on opportunities and challenges
in mid-infrared laser-based gas sensing

15 - 17 May 2017
Wrocław, Poland

Book of abstracts

Tuesday – 16.05.2017			
SESSION: Laser sources I			
10:00	10:40	M. Bugajski	Strain-compensated AlInAs/InGaAs/InP Quantum Cascade Lasers
10:40	11:20	R. Yang	Recent Progress in Interband Cascade Devices
11:20	11:40	Coffee break	
SESSION: Laser sources II			
11:40	12:00	K. Abramski	Fully-fiberized Multi-wavelength Difference Frequency Generation Mid-infrared Source for Laser Spectroscopy Applications
12:00	12:20	M. Shahmohammadi	Dual-wavelength DFB Quantum Cascade Lasers for NO and NO ₂ Sensing
12:20	12:40	P. Gutowski	MBE Growth and Fabrication of In _x Ga _{1-x} As/Al _{0,45} Ga _{0,55} As/GaAs Strained Quantum Cascade Lasers
12:40	13:00	P. Moselund	Mid-infrared Supercontinuum – A Maturing Technology
13:00	13:20	T. Czyszanowski	Quantum-cascade Vertical-cavity Surface-emitting Laser
13:20	13:40	M. Gładysiewicz	Electronic Band Structure and Material Gain in GaSb-based Quantum Wells Containing Bismuth: Toward Enhancement of Quantum Confinement in the Valence Band
13:40	14:30	Lunch break	
14:30	15:30	Poster session	
SESSION: Sensing systems III			
15:30	16:10	B. McManus	Recent Progress in Trace Gas Instrument Development at Aerodyne Research, Inc.
16:10	16:50	R. Kan	MIR TDLAS Technology for Industrial Emission and Environmental Monitoring
16:50	17:10	R. Heinrich	High Performance Spectroscopy of Hydrocarbon Gas Mixtures in the 6 – 11 μm Range
17:10	17:30	O. Aseev	Breath Alcohol – High Precision Measurement of VOCs Using a DFB-QCL
17:30	17:50	A. Ghetti	TDLAS Determination of Carbon Dioxide Isotope Ratio for Diagnosis of Helicobacter Pylori
17:50	End of the day		

GaSb SLDs and gain-chips for sensing applications in the 2-2.5 micron wavelength range

I. Šimonytė¹, R. Wang², K. Vizbaras¹, G. Roelkens², and A. Vizbaras¹

¹ Brolis Semiconductors UAB, Moletu pl. 73, LT-14259, Vilnius, Lithuania

² Photonics Research Group, Ghent University-imec, Technologiepark-Zwijnaarde 15, iGent, 9052 Ghent, Belgium

In this work we will present latest results on development of high-performance GaSb type-I based superluminescent diodes (SLDs) and broadband gain-chips for spectroscopy and sensing applications in the 2-2.5 micron wavelength range. This wavelength range is of particular interest for many applications due existence of numerous gas and biological substance absorption lines that can be used for a variety of applications such as environment, medical or security. We present results on broadband SLDs with spectral width > 50 nm and high spectral power density up to 1 mW/nm as well gain-chips with ultra-wide tuning bandwidth in external cavity configuration [1, 2]. Depending on the configuration, the tuning bandwidth ranges from 170 nm in Littrow configuration to > 200 nm in Littman-Metcalf with output power exceeding 4 mW in entire tuning range. Moreover, we will show recent result of hybrid external cavity laser based on GaSb gain-chip integration with SOI platform with CW output power exceeding 7 mW and tuning bandwidth of 58 nm [3].

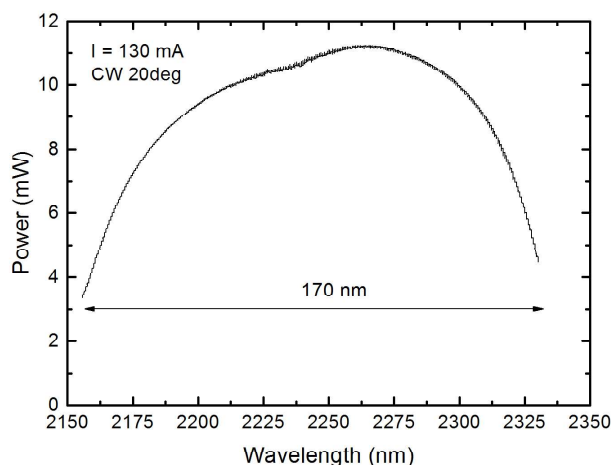


Fig. 1. Tuning bandwidth of GaSb gain-chip embedded in external cavity with Littrow configuration.

- [1] K. Vizbaras, E. Dvinelis, I. Šimonytė et al., *Appl. Phys. Lett.* **107**, (1) 011103 (2015).
- [2] I. Šimonytė, L. Andrulionis, J. Aleknavičius et al., *Proc of SPIE*, **10111**, (2017).
- [3] R. Wang, A. Malik, I. Šimonytė, A. Vizbaras, K. Vizbaras, G. Roelkens, *Optics Express* **24**, (25), 28977-28986, (2016).