

WWW . SENSHY . EU

SEVENTH FRAMEWORK PROGRAMME

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Welcome

This website is devoted to a European Project called SENSHY. In a collaborative effort scientists and engineers from all across Europe team up in this project to develop a new generation of laser based gas sensing systems for hydrocarbons.

SensHy project aims to achieve the following goals

- realization of GaSb based laser material enabling room temperature continuous wave operation in the wavelength range from 3.0 to 3.6 μm .
- development of laser diodes with increased tuning range.
- demonstration of highly sensitive hydrocarbon detection making use of widely tunable lasers and novel digital-signal-processing schemes to identify various gas constituents within a multi-component hydrocarbon gas mixture.

EU support

The SensHy Project is supported by funding from the European Commission as part of the Seventh Framework Programme (Theme FP7-ICT-2007-2-3.5 - Photonic components and subsystems).

[Read more about programme](#)

Example of tunable diode lasers spectroscopy

[Open in new window](#)

International workshop on opportunities and challenges in mid-infrared laser-based gas sensing
mirsens
WROCLAW UNIVERSITY OF TECHNOLOGY
MAY 4 - 8 2010
POLAND



Photonic sensing of hydrocarbons based on innovative mid infrared lasers

The project SENSHY

Nanosystems and Technologies GmbH

nanoplus

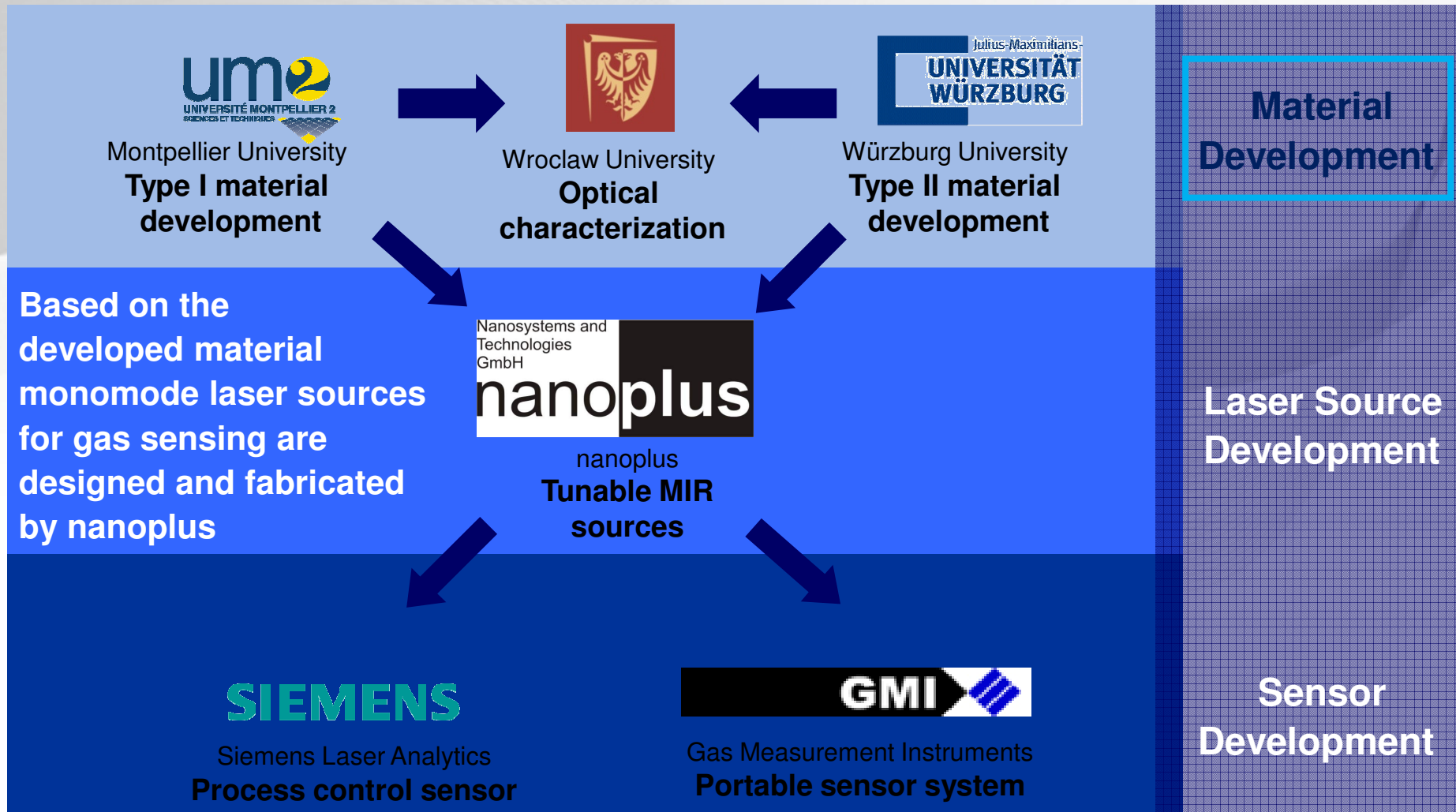
J. Koeth

nanoplus GmbH

Project overview and interaction



slide 2



Currently available laser sources for sensing



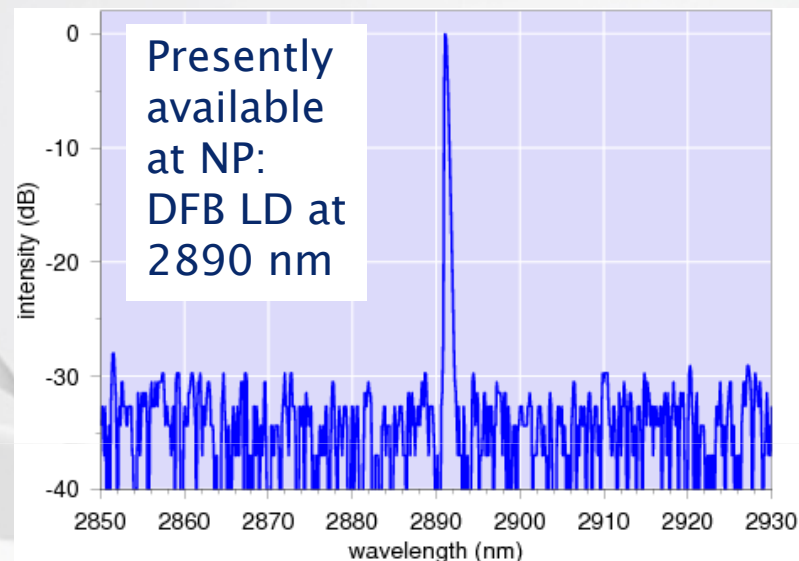
slide 3

Mono mode DFB LDs up to 2.9 μm

- but (currently) not above...

QCLs starting at 5.0 μm

- but (currently) not below...



DFB Laser Diodes and Quantum Cascade Lasers

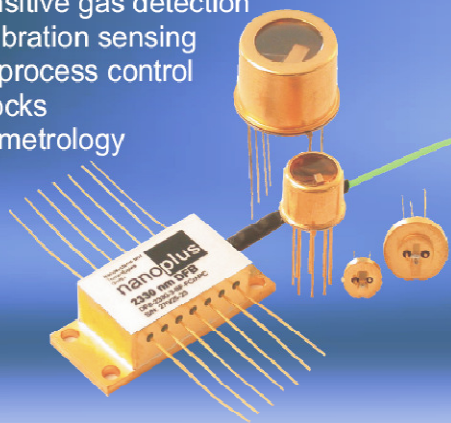


enabling YOUR specific application in

- highly sensitive gas detection
- single calibration sensing
- industrial process control
- atomic clocks
- precision metrology
- ...

nanoplus devices provide

- highly stable monomode emission
- excellent tunability
- outstanding reliability



nanoplus DFB laser diodes are available for **EVERY** wavelength between 760 and 3000 nm

www.nanoplus.com email: sales@nanoplus.com phone: +49 (0) 931 90827-0 fax: +49 (0) 931 90827-19



Novel MIR laser sources with **application grade performance** are developed within SensHy in the 3.0 - 3.6 μm range.

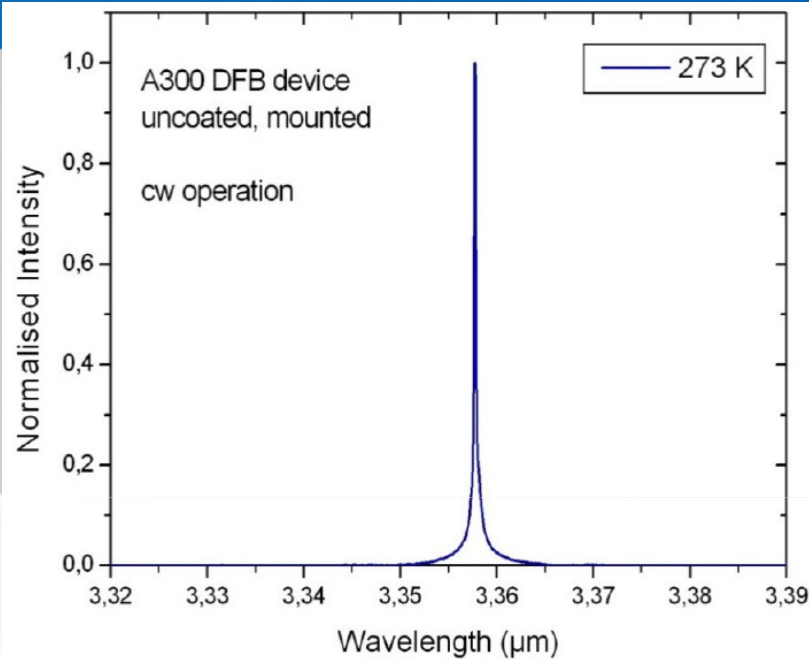
Such laser sources are presently not commercially available.

Novel SensHy Results

Long-wavelength DFB Emission

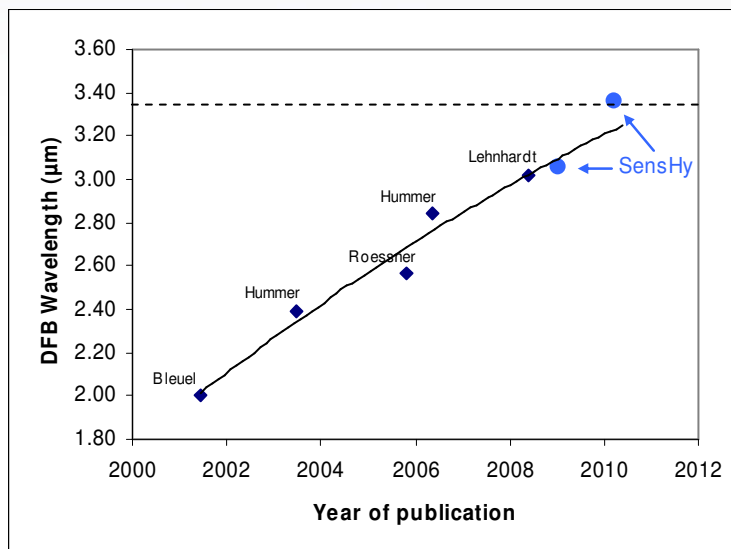


slide 4



DFB devices achieved up to >3.35 µm CW operation at 0°C
Threshold current: ~150 mA (uncoated devices)

Performance is defining the current state-of-the-art in the material system !



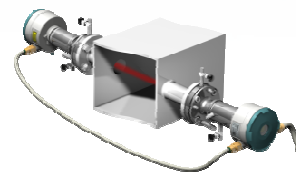
λ (µm)	ith (mA)	Year	Author	Article
2.00	21	2001	Bleuel	Photonics Technology Letters, 13-6, p 553
2.39	30	2003	Hummer	LEOS Proceedings, 1, p 276
2.57	56	2005	Roesner	Physica E, 30, p 159
2.84	75	2006	Hummer	Electronics Letters, 42-10, p 583
3.02	195	2008	Lehnhardt	Applied Physics Letters, 92, p 183508
3.06	54	2009	Belahsene	Accepted in Photonics Technology Letters

In principle three challenging objectives are targeted:

- GaSb based semiconductor material and epitaxial structures for application grade lasers will be developed for emission in the **3.0 to 3.6 μm wavelength range**.
- Based on the developed semiconductor structures, tunable monomode laser sources for gas sensing are designed and fabricated. Target performance figures include **continuous wave operation at room temperature** as well as an **extended electrical tuning range**
- Development of highly sensitive photonic sensor systems for important hydrocarbons making use of **innovative signal-processing techniques** to allow the identification of various gas constituents within a general hydrocarbon matrix

Application areas in sensing include:

- portable system for methane detection
- real-time process control system for aliphatic hydrocarbons



SIEMENS



GMI