Photonics newsletter Contribution (Project News), August 2009

In the NEMIS project (www.nemis.eu), aiming on the development of compact and packaged vertical-cavity surface-emitting laser diodes (VCSELs) for the 2 – 3.5 µm wavelength range and pilot photonic sensing systems for trace gas analysis, a demonstrator for optical CO measurement at 2.33 µm has recently been developed (see Fig. 1). The basis for this sensor was the successful development of GaSb-based VCSELs operating continuous-wave and single-mode up to 90°C. By (electro-)thermal tuning, their emission wavelength can be adjusted continuously over more than 10 nm. This allows for the realization of a calibration free sensor, as several absorption lines of different gases (here CO and CH_4) can be scanned simultaneously. Consequently, the lines of one of the gases may serve as wavelength calibration of the laser. The innovative sensor concept and laser sources were awarded the German "Kaiser Friedrich Forschungspreis" (www.kaiser-friedrich-forschungspreis.de) in May 2009.

On the way towards longer wavelength emission, the project consortium successfully developed a mesa-constricted device emitting at 2.63 µm and a buried tunnel junction VCSEL at 2.60 µm. These promising results pave the way for the development of application suited tunable electrically pumped devices emitting in the full 2 – 3.5 µm wavelength range.

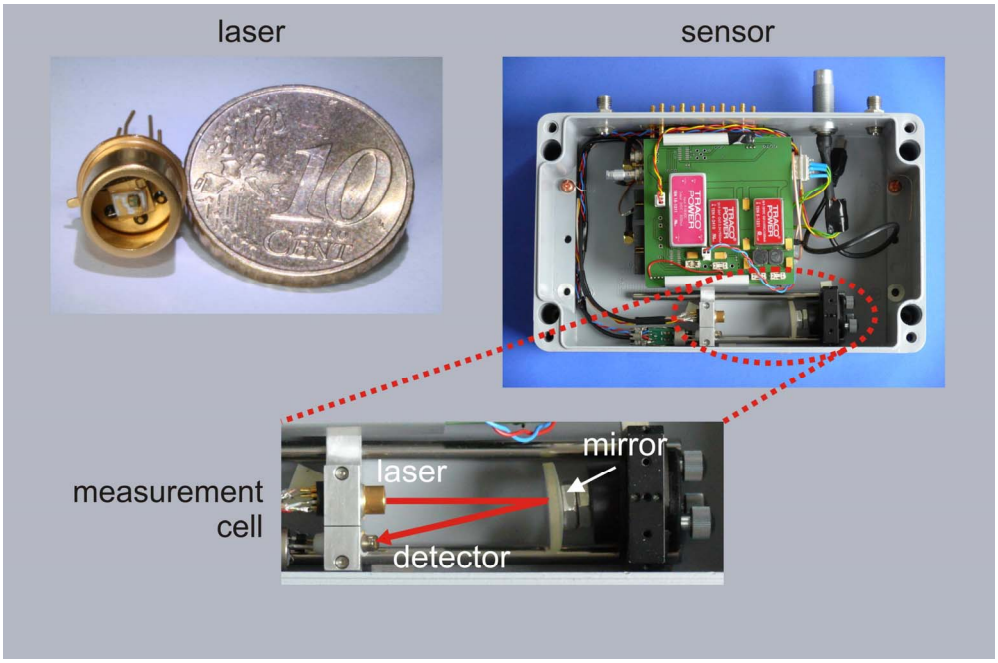

Fig. 1: TDLAS sensor for the detection of CO and packaged GaSb-based VCSEL developed by the NEMIS project consortium.