

IN THE SPOTLIGHT

■ Revolution in struggling with noise?

Johan Wesselink, PhD student of the University of Twente, The Netherlands, has developed a first device to actively combat noise nuisance. Until now only passive solutions have been applied. This invention curtails sound waves and vibrations by producing anti-noise. The inventor is confident that his device will be used in the transport and industrial sectors within a matter of years. The device uses microphones to capture sound and can curtail sound waves by producing anti-noise through loudspeakers. This is achieved by means of a rapid-response algorithm, implemented efficiently using specially developed hardware. It involves building noise barriers or fitting soundproofing materials, often resulting in an increase in the bulk and weight of the object being soundproofed. Johan hopes that his device will one day replace all those thick layers of insulation. One effect will be to decrease the weight of motor vehicles, thereby reducing their fuel consumption. The new system is now being tested by TNO Research Institute on navy frigates, canal barges, extractor fans, heavy goods vehicles and optical precision equipment. The system can also be used to reduce the noise made by MRI scanners.

Source: <http://www.physorg.com>

■ Canaries retired - new optical sensor can revolutionize gas detectors

New generation of optical sensors enables making of dependable, fast and long-working gas detectors that can be applied in industry, safety devices, and households.

Canaries, primary gas detectors, last time were supplanted by electrochemical sensors, but even this method is unsatisfactory now. The sensor of new kind, based on most advanced technologies, able to quick detection and identification of rare gases is needed. In 2006 European Union started NEMIS (New Mid-Infrared Sources for Photonic Sensors) project, which has been finished recently. The objectives of the NEMIS project are the development and realisation of compact and packaged vertical-cavity surface-emitting semiconductor laser diodes (VCSEL) for the 2-3.5 μm wavelength range and the demonstration of a pilot photonic sensing system for trace gas analysis using these new sources. The availability of electrically pumped VCSELs with their low-cost potential, low power consumption, small beam divergence and compactness in this wavelength range that operate continuously at or at least near room-temperature and emit in a single transverse and longitudinal mode (i. e. single-frequency lasers) is considered a basic breakthrough for laser-based optical sensing applications. These devices are also mode-hop-free tunable over a couple of nanometers *via* the laser current or the heat sink temperature.

It is the purpose of the project to develop the underlying semiconductor technology based on Gallium Antimonide, the VCSELs as well as pilot applications in sensing systems to demonstrate the potential and performance of these novel lasers for tunable diode laser spectroscopy (TDLs). The NEMIS consortium consists of partners from five European countries: one of the world leader manufacturers of photonics systems, small and medium enterprises, and four universities. When scientists done their part of the task, industrial partners constructed a prototype detecting ammonia and carbon monoxide. Research work on sensors detecting carbon dioxide and hydrogen sulfide.

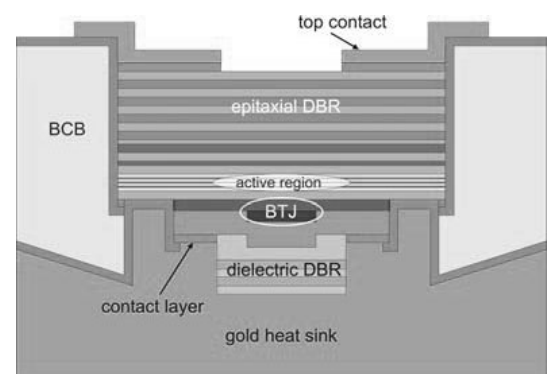


Fig. 1. BTJ-design.

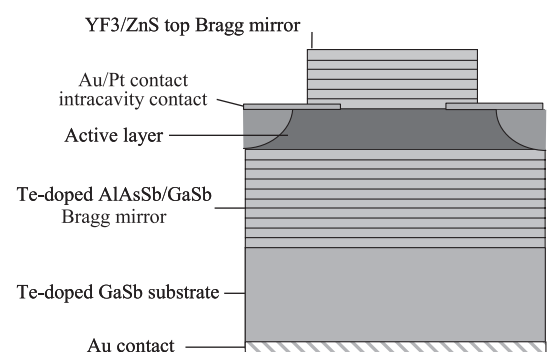


Fig. 2. Oxide-/mesa-confined design.

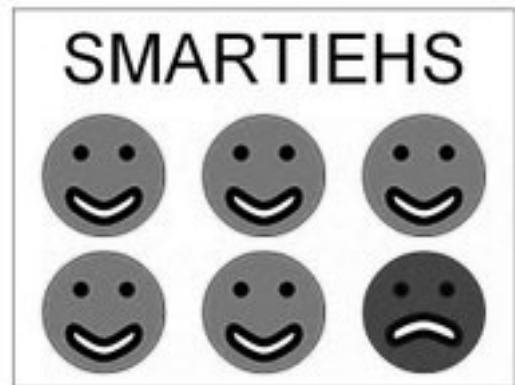
Source: <http://www.nemis.eu/>

■ SMARTIEHS: Smart inspection system for high speed and multifunctional testing of MEMS and MOEMS

For the present, MEMS have to be tested one by one, so the whole process is very expensive and time consuming. The SMARTIEHS is EU project, which is aimed at cheaper and faster method of testing for the market. SMARTIEHS develops a smart, high-speed, cost effective and flexible inspection system for production of Micro-Opto-Electro-Mechanical Systems (MOEMS). 8 project partners come from 6 European countries: Norway, France, Poland, Switzerland, Germany, and Italy. The co-coordinator is Kay Gastinger from SINTEF ICT (Norway). The prototype can test 5 chips at the same time. After finishing the project in 2011 researches expect to will decrease the inspection time of a wafer by a factor of 100. Shortening testing time from over 20 minutes to less than 30 seconds is expected. To achieve this, SMARTIEHS develops an innovative measurement concept: a probing wafer consisting of an array of micro optical sensors is adapted to and aligned with the wafer under test. The design and production of the micro-optical interferometer array inspects 100 M(O)EMS structures within only one measurement cycle. A multifunctional approach of the measurement concept allows the inspection of passive and active parameters within one inspection system. A novel smart pixel detector array is developed.

SMARTIEHS provides a multi-functional design with two interferometer configurations; a low coherent interferometer and a laser interferometer. The project focuses on the measurement of shape and deformation, resonance frequency and vibration amplitude distribution. The new technology will be validated and demonstrated with industrial end users. The work in SMARTIEHS will be organised in eight work packages: Project management, Inspection system design, Micro-optical interferometer system design, Micro-optical wafer production, Smart pixel camera development, Inspection system integration, Inspection system test and validation, Exploitation and dissemination.

Source: <http://www.sintef.no>
<http://www.ict-smartiehs.eu/>



■ Robots with the human touch

A student Jeroen Missinne and colleagues at Ghent University in Belgium developed a flexible „skin” containing optical sensors which could help robots develop a more human touch. The „skin” consists of two layers of parallel polymer strips lying perpendicular to each other to form a grid. These are separated by a thin sheet of plastic. Light is constantly fed into the polymer strips, which act like optical fibers in that their geometry encourages internal reflection and reduces light loss. When pressure is applied anywhere on the skin it causes the strips to be pushed closer together and allows light to escape from one set into the other. The detection of this leakage of light provides a highly sensitive feedback mechanism. Because they are optical, neighbouring polymer strips do not interfere with each other, allowing them to be packed tightly together - as close as 125 micrometres so far.

This sensor-rich „skin” could be applied for surgical robots. Missinne presented his latest findings, demonstrating that pressure triggers light to escape from one set of polymer strips to another, at the IMEC Flexible and Stretchable Electronics workshop in Ghent last week. He is now working on developing a full prototype and hopes to begin more detailed tests by the end of the year.

Source: <http://www.newscientist.com/>

