HORIBA presents innovative emission measurement technology based on Quantum Cascade Laser spectroscopy

Oberursel (Taunus), Germany, 22.06.2010. At this year's Automotive Testing Expo HORIBA Europe will present the MEXA-1400QL-NX emission measurement system for NO, NO_2, N_2O and NH_3 compounds. In comparison with existing measurement technologies the new analyser solution, which is based on Quantum Cascade Laser (QCL) technology, offers an improvement in performance due to its greatly expanded measuring range, its approximately 20 times finer resolution and its higher sensitivity and selectivity, even at low concentrations. The new method is able to test gasoline, diesel and alternative fuelled engines and is ideal for research and development on exhaust after-treatment devices. The QCL based analyser is complemented by a heated sample handling system that provides fast response, even for NH_3, easily meeting the legislative requirements of EURO VI.

Against the background of climate change, the reduction of greenhouse gases is becoming increasingly important. Automotive manufacturers are continually searching for improved analysers that will allow the optimization of engines and after-treatment devices including those for alternative powertrains. As the concentrations of nitrogen compounds become lower, the ability of instruments to give accurate measurements becomes more difficult with the existing techniques. In order to confront these challenges, HORIBA has developed an innovative measurement method based on Quantum Cascade Lasers (QCL) that provides these accurate measurements of NO, N_2O, NO_2 and NH_3 even at these low concentrations. In a serious of tests conducted in the course of the development of the MEXA-1400QL-NX, HORIBA proved the effectiveness of the QCL technology for all three major exhaust gas testing methods. In diluted measurement, raw gas measurement and bag measurement, QCL is characterized by its extremely precise and reproducible results. Its universal field of application makes it superior to the measurement techniques available at present.

”Quantum Cascade Laser technology allows the HORIBA-MEXA1400 QL-NX emission measurement unit to provide test results far beyond the limit values achieved up to now. This equips us for the increasing reduction of the pollutant concentrations as well as the extensive test requirements for alternative powertrain systems and allows us to offer our customers measurement technologies on the highest possible level today and in the future”, said Axel Wendorff, Vice President of HORIBA Europe.

Advantages of QCL compared to other measurement technologies

In comparison with Fourier Transform Infrared (FTIR) spectroscopy, the results of measurements made using QCL technology are significantly more precise at low concentrations and offer a wider dynamic range of measurement. The approximately 20 times finer resolution of the absorption spectrum makes the QL-NX less sensitive to incidental interference from other gases such as CO, CO_2, CH_4, H_2O and hydrocarbons. In addition to the higher sensitivity and selectivity, the QL-NX also does not suffer from the interference of NO_x measurement by NH_3 when using the Chemo Luminescence Analyser (CLA) principle.

How the MEXA 1400 QL-NX works

The QCL elements used in the MEXA 1400 QL-NX are designed to produce radiation at very specific wavelengths in the mid infrared region, thus allowing the measurement of the various nitrogen compounds which exhibit high sensitivity in this region. The wavelengths of the lasers depend primarily on the design of the QCL but also on its temperature, which is controlled thermo-electrically.

This arrangement means that there is little optimisation necessary once the analyser is adjusted in manufacture.

The intelligent use of two optical pathlengths within one gas cell gives the system a tremendous wide dynamic range. The ratio of maximum measurement range to the resolution is as large as 20000. At the same time, the optical cell was designed to achieve fast response times – well within the limits that are described for Euro VI NH_3 measurements.

About HORIBA
Headquartered in Kyoto, Japan, the HORIBA Group of worldwide companies provides an extensive array of instruments and systems for applications ranging from automotive R&D, process and environmental monitoring, in-vitro medical diagnostics, semiconductor manufacturing and metrology, to a broad range of scientific R&D and quality control measurements. The Internet address for HORIBA is http://www.horiba.com.

HORIBA Automotive Test Systems
Part of the HORIBA Group, HORIBA Automotive Test Systems has developed global leadership in the exhaust gas analysis, powertrain research and development and various certification test system fields. HORIBA ATS is able to provide total solutions to its customers, with full turnkey capability for driveline, engine, powertrain and vehicle tests. HORIBA ATS serves manufacturers and suppliers in every industry that utilizes internal combustion, turbine engines, including automotive, heavy-duty/off road, lawn and garden, marine, aerospace, locomotive and recreational and utility vehicles.

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