In field, portable spectroscopy

Livio Gianfrani and researchers from the Seconda Universita di Napoli, Italy, have constructed a portable spectrometer based around a 2 micron diode laser to perform in-situ measurements of carbon dioxide gas emissions from the nearby Solfatara crater. Isotope ratios of volcanic gases are currently measured by collecting gas samples and sending them for laboratory mass spectrometry measurements. Highly sensitive and reliable, results are typically available in a few weeks.

In contrast, diode laser spectroscopy is well suited for making accurate, in-situ measurements and it is possible to implement portable and reliable systems capable of continuous and unattended operation over days and week. The Naples team performed the gas measurements between July and October 2004 reporting an accuracy of better than 0.05% in their ratio results.

The spectroscope was built on a 60x60cm breadboard and consists of a room-temperature operated DFB laser diode emitting 3mW at 2.008microns,a sample and a reference gas cell, and laptop controlled InGaAs photodiode detector housed in thermally insulating box.

The gases are collected by a 20m long Teflon tube that feeds directly into the spectrometer sample chamber.A laser then scans the sample 30 times to probe the gas for its 13CO2 and 12CO2 absorption lines.

A big challenges was to make the system robust to endure volcanic conditions. The team is now to improve its set-up with a new version of the spectrometer, based on a new diode laser and a long optical absorption path length
techto increase the detection sensitivities.

This will allow isotope ratio measurements in atmospheric CO2 at molecular densities much lower than those observed in volcanic gases, without any sample treatment.

IR speed hots up

Agilent Technologies offers industry’s fastest low-power infrared transceivers that offer IrDA (Infrared Data Association) compliant data transmission at up to 4Mb/s and enable mobile phones and PDAs to function as universal IR remote controls for televisions, VCRs, DVDs and other home appliances. A 4Mb/s data rate means that Agilent’s HSDL-3020 and HSDL-3021 transceivers can transfer a 640 x 480-pixel photo in approximately 0.7sec, and a 329 MB 1280 x 960-pixel image in around 2.3 sec.

Such speeds are becoming critical, as the newest camera phone designs now permit applications such as downloading pictures directly to photo-quality printers. The HSDL-3021 transceiver provides a remote control distance of up to eight meters (26 feet) and the HSDL-3020 up to 14 meters (46ft).

Both transceivers provide an IrDA link distance of up to 50 cm (approximately 20”) from 9.6kb/s to 4.0Mb/s, compatible with Agilent’s universal remote control software.

Both have a separate 875 nm-wavelength infrared LED for IrDA data transmission and 940 nm LED for IR remote control, but the HSDL-3020 comes with an enhanced three-lens optical package for optimised IrDA and remote control performance.

EOTS laser on BAE’s Edinburgh schedule

Lockheed Martin’s F-35 Joint Strike Fighter (JSF) team received the first laser system for the aircraft’s Electro-Optical Targeting System (EOTS) from BAE Systems Avionics, on schedule at a special event in Edinburgh, Scotland.

The F-35 JSF will provide the US Air Force, Navy and Marine Corps, and the UK’s RN and RAF affordable and stealth tactical aircraft for this century. The JSF EOTS system enables precision range measurements, designating tactical targets for laser-guided weapons.

“BAE’s accomplishment is a major milestone toward the successful delivery of the JSF EOTS, a system that will provide important new capabilities to aircrews,” said Tom Simmons, VP Fire Control at Lockheed Martin Missiles & Fire Control.

Lockheed Martin Missiles & Fire Control.

Nick Franks, group MMD at BAE Systems Avionics, added: “This milestone on the JSF laser program is testimony to the close collaboration between the programme teams.” of Lockheed Martin Missiles and Fire Control and BAE Systems Avionics.”