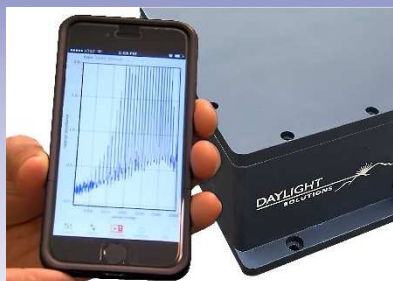


# OEM QCL Spectrometer ChemDetect™ Sensor Platform



## ChemDetect™ includes:

High speed, broadly tunable laser module  
Wireless / networked control and DAQ module  
Integrated reference and signal detectors  
ChemDetect™ software (standalone GUI or DLL)  
Cabling and power cable

Daylight Solutions, the pioneer in mid-IR laser systems for molecular detection and imaging, announces a new Sensor Platform, configurable for OEM or Private Label applications. The ChemDetect™ Sensor is a fully integrated spectrometer, combining the latest in high-speed, broadly tunable QCL technology with advanced detection capability and embedded chemical ID algorithms. The result is a compact Sensor module capable of measuring multiple chemical species in real time.

The ChemDetect™ Sensor has advantages over traditional Fourier Transform Infrared (FTIR) spectrometers—FTIRs are limited in probe beam power and optical quality, and have undesirable trade-offs between spectral resolution and acquisition speed. The ChemDetect™ Sensor breaks through these limitations through the use of rapidly tunable mid-IR lasers. Signal and reference detectors are built in, along with advanced control and data acquisition electronics. The Sensor can be customized to your application for easy integration: room temperature operation with minimal thermal load, compact footprint, and multiple modes of control and communication (networked, wireless, or USB).

Each sensor platform contains a world-class mid-IR QCL from Daylight Solutions, offering unprecedented spectral coverage, power, and beam quality. This allows stand-off detection or coupling into any number of sample cells, including long path length multi-pass cells, fiber optics and hollow waveguides, or attenuated total reflectance (ATR) sample cells. The high speed and broad tunability of the system allows for the simultaneous detection of multiple species—often performing the function of several independent sensors in one compact unit.

The ChemDetect™ Sensor offers the advantages of a turn-key system for measuring chemical concentrations, yet is highly configurable. The laser module includes a built-in reference detector. The probe beam can be used in the sample configuration of the user's choice, including fiber-coupled and free-space delivery. A separate high speed signal detector is used to capture the beam after sample interrogation. An integrated controller and data acquisition (DAQ) module powers the laser and receives reference and signal detector data. High-speed digitization constructs spectra in real time. Embedded processors convert spectral data to concentrations. Spectral libraries configurable to specific applications. Concentrations or spectra are available for connected clients. Data is transmitted via Ethernet or wireless to any client instrument or Daylight Solutions' ChemDetect™ software.

Call today for pricing and availability.

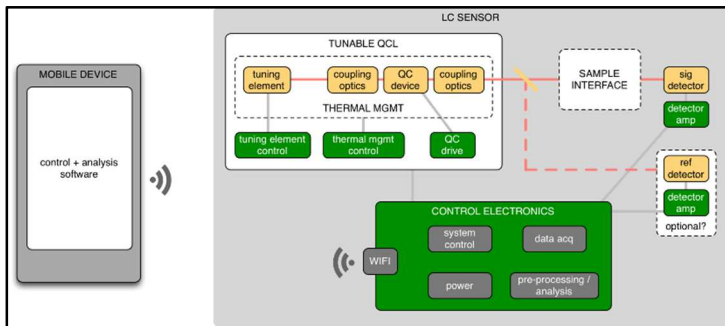
US Patents 7424042, 7492806, 7535656, and patents pending.

<b>Technology:</b>	Broadly tuned IR laser spectroscopy
<b>Spectral Range:</b>	User specified in the 2.9 to 12.7 $\mu$ m range, typically > 300 $\text{cm}^{-1}$ of tuning
<b>Sample Interface:</b>	User-defined: gas or liquid cells, ATR probes, or stand-off config. available
<b>Sample Phase:</b>	Gas, liquid, or solid (sample interface dependent)
<b>Sensitivity:</b>	ppb to % (sample interface dependent)
<b>Dynamic Range:</b>	> 10 <sup>3</sup>
<b>Update Rate:</b>	≥ 1 Hz
<b>User Interface:</b>	Mobile device app, networked client
<b>Beam Quality:</b>	TEM <sub>00</sub> , nominal
<b>Optical Interface:</b>	Free space or fiber connector
<b>Operation:</b>	Room temperature, no chiller
<b>Data Collection and Processing:</b>	Automated control, DAQ module
<b>External Interface:</b>	Ethernet, wireless, or USB
<b>Software Support:</b>	ChemDetect™ standalone GUI or DLL. Also mobile app clients.
<b>Laser Module Size:</b>	7" x 7" x 3" (approximate)
<b>Operating Temperature</b>	5 to 45°C
<b>Storage Temperature</b>	-10 to 70°C
<b>Electrical Interface:</b>	120 or 220 VAC

15378 Avenue of Science, Suite 200  
San Diego, CA 92128  
Phone: 858.432.7500  
Fax: 858.432-5737  
Email: [info@daylightsolutions.com](mailto:info@daylightsolutions.com)  
[www.daylightsolutions.com](http://www.daylightsolutions.com)



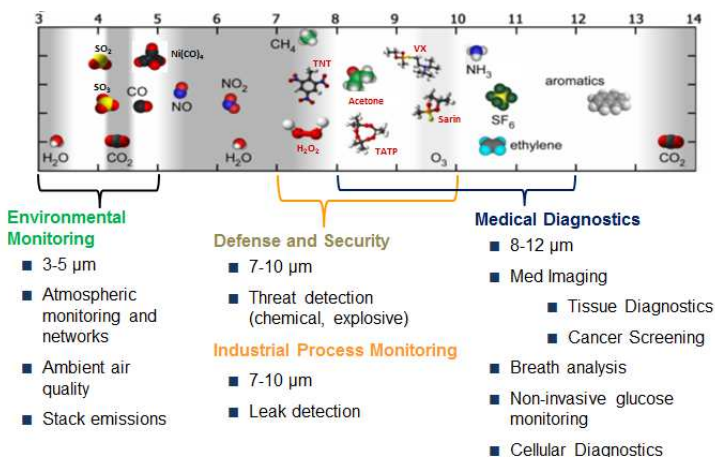
# Reference Performance and Function: ChemDetect™ Sensor Platform



**FIG. 1.** ChemDetect™ Sensor components. Sample interface can be multipass cell, fiber optics and hollow waveguides, or attenuated total reflectance (ATR) sample cells. Reflectance and stand-off configurations are also possible. Wireless control and communication allows use with mobile platforms or servers.

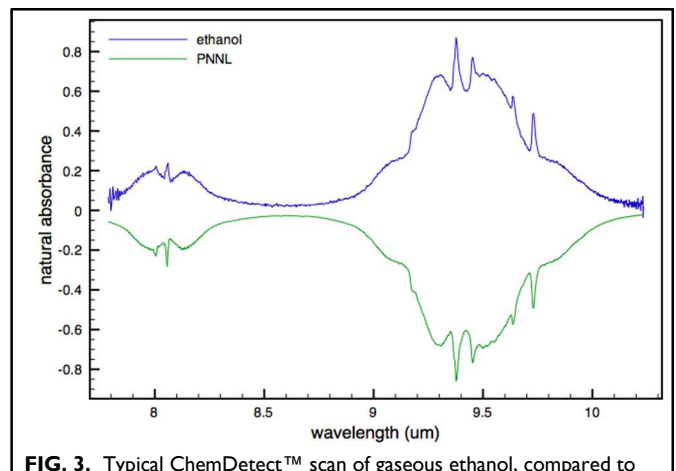
Daylight Solutions announces a high speed, OEM Sensor Platform based on the latest QCL laser technology. Customized for your application in chemical detection of either gas, liquid, or solid phase, the system provides a dynamic range of PPB to percent level concentrations for most molecules. Multiple species can also be detected simultaneously.

The ChemDetect™ software is a powerful yet easy-to-use spectral acquisition program that allows real-time viewing of spectral data, as well as chemical identification through fitting of database spectral libraries. Users can access provided spectral databases for fitting, or load their own reference spectra. Alternately, ChemDetect™ can be run as a dynamic link library (DLL) allowing the user's software to control the sensor and receive the raw spectral data in real time for processing.

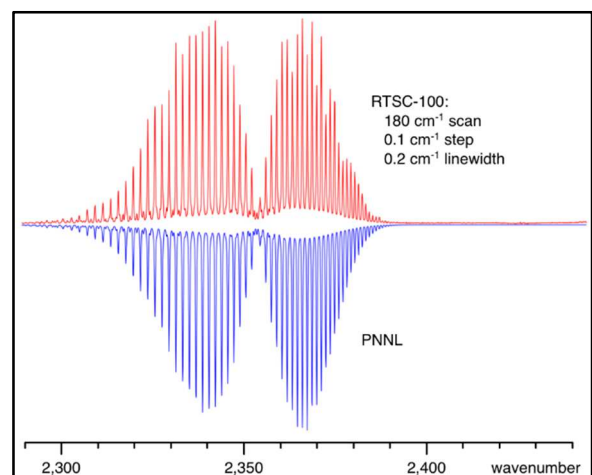


**FIG. 2.** Overview of chemicals that can be detected and analyzed with the ChemDetect™ Sensor. The mid-IR "fingerprint" region has strong, identifying spectra for a host of relevant chemicals. The sensor can be configured to specific spectral ranges for maximum sensitivity and selectivity, as well as multiple species detection.

The ChemDetect™ Sensor is unmatched in its combination of spectral resolution, wavelength accuracy, and acquisition speed. With spectral resolution of better than  $0.4 \text{ cm}^{-1}$  and wavelength repeatability of  $0.1 \text{ cm}^{-1}$ , it is possible to measure rotationally resolved features of light gas molecules such as  $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ,  $\text{CH}_4$ , and  $\text{CO}_2$ . Isotopologue ratio measurements become possible with the ChemDetect™ Sensor's spectral resolution and stability. The user can also set the resolution to lower values for condensed-phase studies. With the diffraction-limited laser beam, it is possible to couple the sensor with novel sample cells, such as hollow waveguides, enabling new applications such as high-speed micro-sampling and chemical identification.



**FIG. 3.** Typical ChemDetect™ scan of gaseous ethanol, compared to database spectrum from PNNL.[1] Note high resolution, sufficient to capture sharp spectral features, as well as broad spectral sweep, allowing full spectral features from heavier molecules and condensed phase species to be acquired.



**FIG. 4.** High resolution scan of  $\text{CO}_2$ . Rapid acquisition, broad spectral sweep, and high resolution allow analyzing light gas molecules and isotope spectra.

