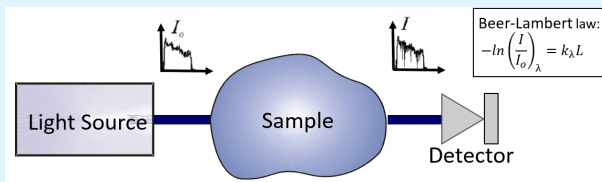


Hyperspectral Absorption Spectroscopy Sensor Systems



Spectral Energies' hyperspectral absorption sensors are capable of measurements of gas properties at high-kHz repetition rates using the principles of molecular absorption spectroscopy. Our current sensor architectures are optimized for accurate and precise measurements of gas temperatures and concentrations and can be extended to measurements of pressure and velocity.

Sensor Features

- Available spectral coverage: 1000 – 10000+ nm
- Target species: H₂O, CO, CO₂, N₂O, NO, small hydrocarbons. Other species accessible upon request.
- 100 kHz+ repetition rates achievable
- Possible measurement conditions - 0.01 < P < 50+ atm; 300 < T < 3000 K. Measurement precision of <0.25% at 2000 K demonstrated.
- Fiber-optic-coupled output
- Multi-location and tomographic measurements achievable

Spectral Energies, LLC

5100 Springfield Street
Suite 301
Dayton, OH 45431

Phone: (937) 256-7733
Fax: (937) 256-7702

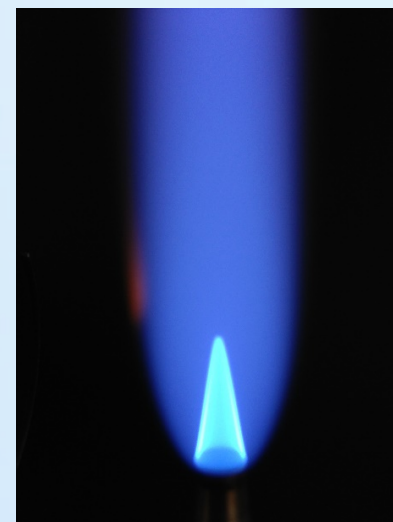
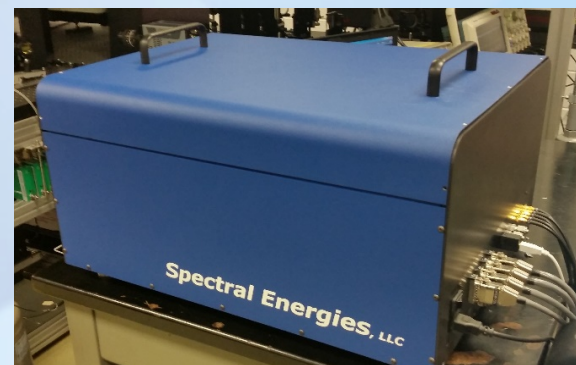
www.spectralenergies.com



**Spec sheets for all
products available
upon request.**



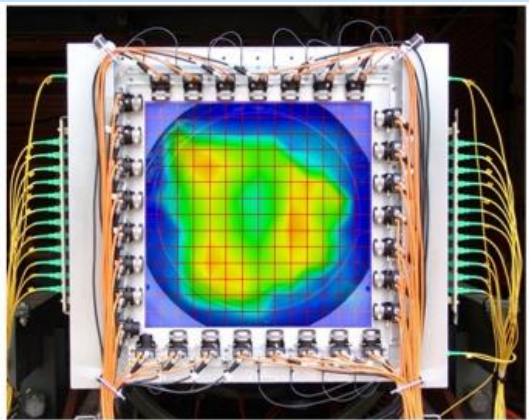
*High-Quality Custom
Laser Diagnostics Products*



Near Infrared H₂O Sensor System

SYSTEM SPECS	
	Near Infrared
Laser source type	VCSEL
Target Species	H ₂ O
Repetition rate	1-100 kHz
Tunable wavelengths	1330-1365 nm
Spectral coverage	~250 cm ⁻¹
Output channels	1-10+
Power	25 mW
Spectral bandwidth	< 1 MHz
Output type	Single Mode Fiber

System architecture is built around a tunable VCSEL. Laser output is split into multiple outputs.



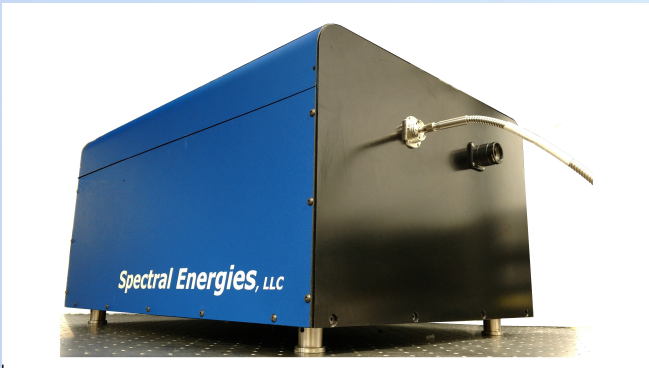
[Ma, Caswell et al., Optics Express, Vol. 21, Issue 1, pp. 1152-1162 (2013)]. Approved for Public Release: 88ABW-2012-6416

Multiple lines-of-sight and tomographic measurements achievable.

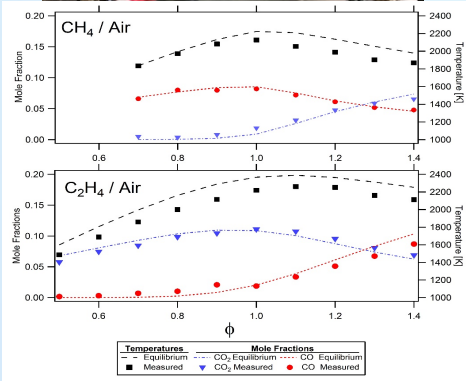
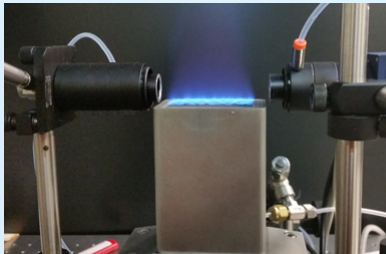
Mid-Infrared QCL Sensor System

SYSTEM SPECS (example)	
	Mid - Infrared
Laser source type	QCL-DFB
Target Species	CO, CO ₂ , N ₂ O
Repetition rate	1-100 kHz
Tunable wavelengths	4308-4327, 4504-4537, 4952 -4982 nm
Spectral coverage	10 cm ⁻¹
Output channels	1
Power	10 mW
Spectral bandwidth	< 1 MHz
Output type	Single Mode Fiber, Free Space

System architecture is built around multiple tunable quantum cascade lasers. These lasers are time-division-multiplexed into a single output. Wavelengths of the QCLs are selected for maximum sensitivity for the target application.



Capable of simultaneous measurements of multiple species.



[Rein, Roy, et al., Applied Optics, Vol. 55, Issue 23, pp.6256-6262 (2016)]. Approved for Public Release: 88ABW-2015-5554