

## SEMICONDUCTOR PROCESS CONTROL USING LASER-BASED MULTI-GAS ANALYZER

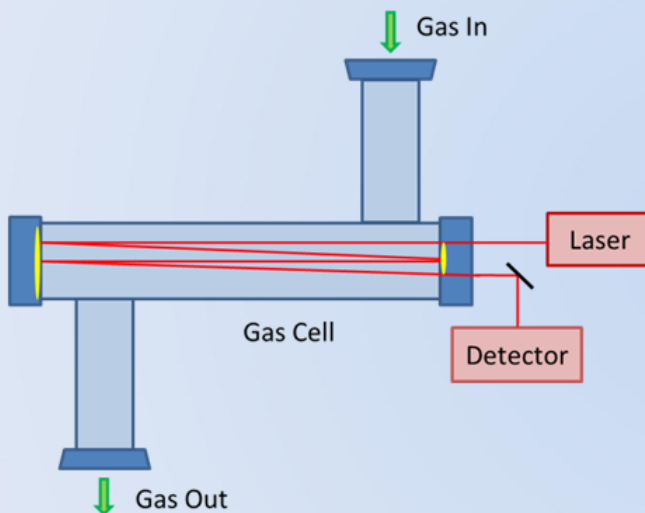
### Key Features

- ▶ High-sensitivity, high-speed, multi-gas analysis
  - ▶ Up to 10x more sensitive than FTIR or NDIR
  - ▶ <1 second measurement time (up to 10 Hz)
- ▶ Configurable for analysis of user-defined gas list
  - ▶ Either single- or multi-gas
- ▶ User-defined sensitivity and dynamic range
  - ▶ Standard 6-meter gas cell
  - ▶ Configurable for higher sensitivity using longer gas cell
  - ▶ Suitable for in-line low-pressure gas applications
- ▶ User-defined mechanical fittings
- ▶ No consumables
- ▶ Flexible control interface

### Compact Gas Analyzer



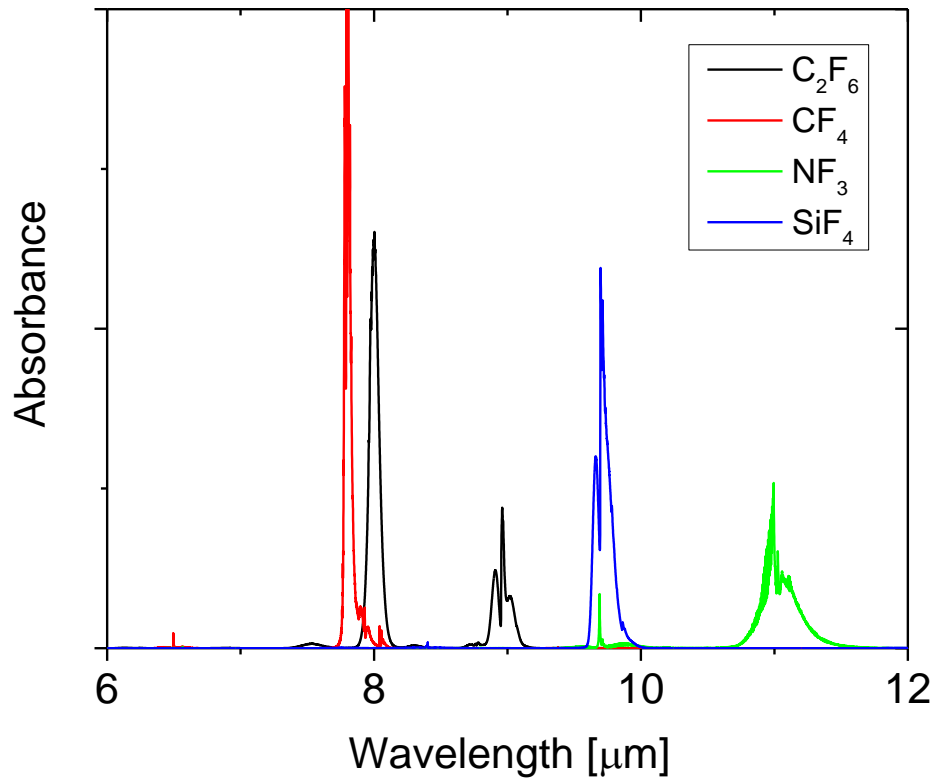
### Principle of Operation



- ▶ Mid-infrared absorption spectroscopy using quantum cascade laser (QCL) technology
- ▶ The engine within the LaserSense-SC is Block's Mini-QCL™ – a miniaturized, widely tunable, rapidly tunable mid-infrared laser module
- ▶ Spectral coverage from 5.4 – 13.0  $\mu\text{m}$



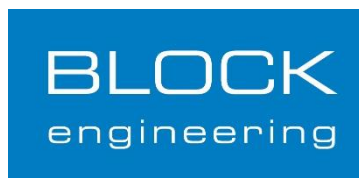
Absorption spectra for example gases



3σ lower detection limit (LDL) with gas cells from 6 – 60 meters

| Gas                                       | Lower Detection Limit (0.5-s measurement) |
|---|---|
| Silicon tetrafluoride (SiF <sub>4</sub> ) | 0.004 - 0.04 ppm                          |
| Carbon tetrafluoride (CF <sub>4</sub> )   | 0.002 - 0.02 ppm                          |
| Nitrogen trifluoride (NF <sub>3</sub> )   | 0.02 - 0.2 ppm                            |
| Methane (CH <sub>4</sub> )                | 0.05 - 0.5 ppm                            |
| Xylene (C <sub>8</sub> H <sub>10</sub> )  | 0.28 - 2.8 ppm                            |
| Formaldehyde (CH <sub>2</sub> O)          | 0.21 - 2.1 ppm                            |
| Ammonia (NH <sub>3</sub> )                | 0.09 - 0.9 ppm                            |

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