

# IR application laboratory

## Application laboratory for laser-based infrared measurements

*Real-time contactless chemical identification*

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Do you need real-time chemical information? Do you have a quality or process control question that requires spectroscopic information about your sample or surface? Are you considering using quantum cascade lasers (QCL) for your application?

We can help answering your questions, or develop a customized solution for you! In our application laboratory we carry out spectroscopic measurements for you using our QCLs.

### Features

- QCLs addressing the 4–11  $\mu\text{m}$  range with tuning ranges for single emitters of up to 300  $\text{cm}^{-1}$
- MOEMS EC-QCL modules:
  - Non-resonant: quasi-static or adaptive spectral scanning speeds up to some 10 Hz ideally suited for photothermal or photoacoustic spectroscopy
  - Resonant:  $\sim 1$  kHz spectral scan speed for real time spectroscopy
- FTIR reference measurement systems
- Demonstrator systems for ATR, back-scattering spectroscopy and hyperspectral imaging
- System and application development up to demonstrator level

### Applications

- Spectroscopy of solids and liquids
- ATR, transmission or backscattering spectroscopy for process or quality control

**4–11**  
 $\mu\text{m}$  range of  
wavelengths

More information:

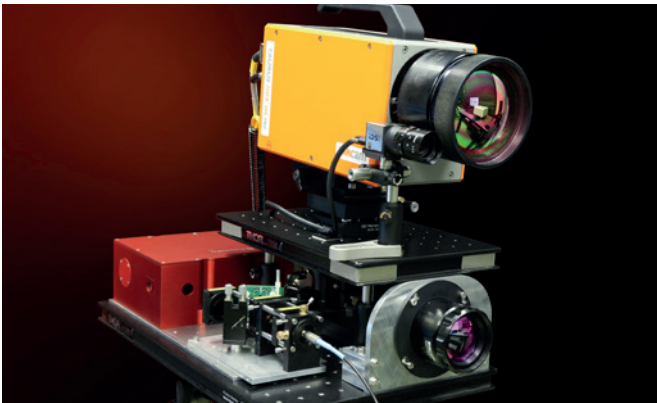


## MIR hyperspectral image sensor

QCL-based hyperspectral imaging technology is able to acquire chemically selective images of surfaces and detect various substance residues or contaminations. Based on QCLs tunable in the wavelength range of 7.5–10  $\mu\text{m}$  that illuminate the surface to be analyzed, Fraunhofer IAF has developed two hyperspectral imaging sensors for standoff detection: One for long-distance measurements to detect surface contaminations at distances up to 20 m, and the other one for large area illumination at close distances.

### Features

- Tuning range: 1000–1300  $\text{cm}^{-1}$
- Spectral resolution:  $\sim 1.5 \text{ cm}^{-1}$
- Detector: high-performance MCT camera
- Illuminated area (typ.) 6 cm  $\times$  6 cm
  - at a resolution of  $\sim 0.5 \text{ mm} \times 0.5 \text{ mm}$
- Measuring time  $\sim 20 \text{ s}$



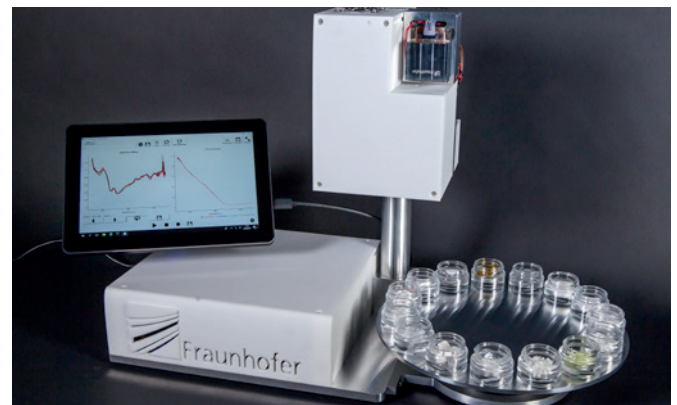
Short-range hyperspectral imaging system © Fraunhofer IAF

## Fast backscattering MIR-spectroscopy

Our fastest spectrally tunable laser modules allow the acquisition of complete IR spectra in only 1 ms. This laser source has enormous potential in a wide range of applications from process and quality control to medical diagnostics and process analytics. Our backscattering spectroscopy demonstrator shows the potential of this laser source for contactless identification of pharmaceutical substances.

### Features

- Tuning range: 1060–1350  $\text{cm}^{-1}$
- Spectral resolution: 1.5  $\text{cm}^{-1}$
- Detector: MCT single element detector
- Measuring time single spectrum  $\sim 1 \text{ ms}$
- Measuring distance:  $\sim 30 \text{ cm}$



Demonstrator for fast backscattering spectroscopy © Fraunhofer IAF

### Contact

Deborah Mohrmann  
Business Development  
Optoelectronics  
Phone +49 761 5159-216  
laser@iaf.fraunhofer.de

Dr. Marko Härtelt  
Business Unit  
Semiconductor Lasers

Fraunhofer Institute for Applied Solid State Physics IAF  
Tullastrasse 72  
79108 Freiburg, Germany  
www.iaf.fraunhofer.de