



- 1 Scanning MOEMS grating module.
- 2 Miniaturized Quantum Cascade Laser with scanning MOEMS grating (Photo: Fraunhofer IAF).

EXTERNAL CAVITY QUANTUM CASCADE LASER WITH SCANNING MOEMS GRATING

The miniaturized quantum cascade lasers (μ EC-QCL) developed at Fraunhofer IAF and IPMS cover a wide wavelength range and a broad spectral tuning range at a high scan rate. The micro-mechanically manufactured diffraction grating developed at Fraunhofer IPMS acts as the quantum cascade laser's variable frequency external resonator. It allows the fast tuning of laser wavelengths, with a large variable frequency range.

Therefore they open completely new ways for infrared spectroscopy: from stand-off detection of explosives to time-dependent measurements of chemical reactions in aqueous solutions the quantum cascade lasers offer a wide range of applications.

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Features

- Wavelength range from 4 – 11 μ m
- Spectrally broad tunable ($\geq 30\%$ of central wavelength)
- Up to 2000 spectra per second due scanning MOEMS grating
- Typical output power 10 – 100 mW
- Line width $< 2 \text{ cm}^{-1}$ (pulsed)
- Pulse repetition rate 300 kHz, pulse length 100 ns
- Compact, robust modules
- Collimated output beam

Applications

- Detection of hazardous substances
- Infrared spectroscopy of liquids
- Continuous measurements in in- and online process control
- Food safety control
- Medical applications
- Environmental analysis