Optimization of an external-cavity Quantum Cascade spectrometer at 7.5 µm for gas spectroscopy

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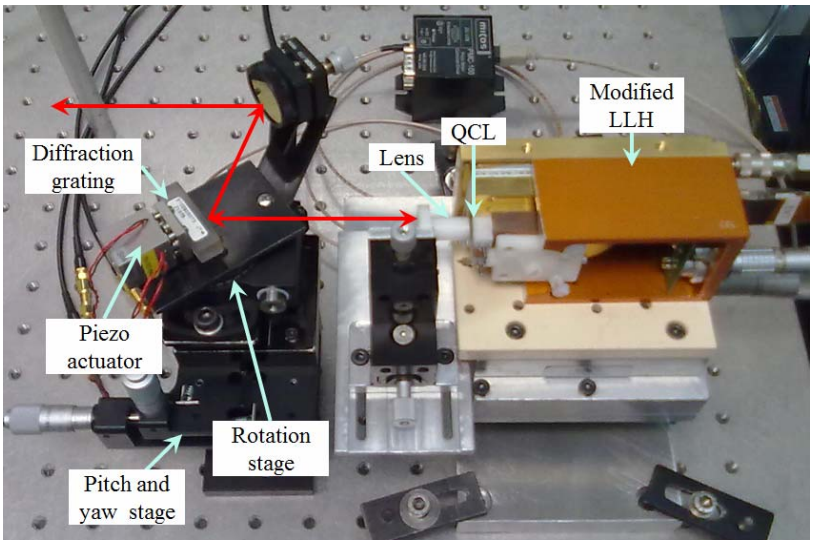
Tunable diode laser spectrometers provide good results for gas sensing in term of sensibility and selectivity because of the characteristic of these sources. Indeed, quantum cascade lasers commonly deliver power from 1 mW to #100 mW without the need for cryogenic cooling. Distributed feedback (DFB) configuration provides narrow linewidth that enhance selectivity. Besides, quantum cascade lasers also enables to reach the fundamental absorption bands of molecules in the mid-infrared region. The main limitation of these sources is usually their low tuning range (~ 10 cm^{-1}) which prevents from monitoring complex species with broad absorption spectra and measurements of spectroscopic parameters on the whole vibrational band of a small molecule in the infrared region.

One way to obtain a broader tuning range is to implement a semiconductor laser in an external cavity system. We present the latest developments of a home-made external cavity - quantum cascade laser at 7.5 µm and its applications to gas sensing. Photograph shows the developed source.



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