

LINEWIDTH AND CHIRP OF LONG WAVELENGTH QCL WITH PULSED OPERATION

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Molecular spectroscopy applications depend on the availability of laser sources at specific wavelengths in the near and mid-infrared corresponding to the fingerprint absorptions of the target molecules. The unique antimonide quantum cascade lasers (QCL) technology developed by mirSense extends the accessible spectral range into the long wavelength infrared up to 20 microns [1]. These Unimir lasers can operate in continuous wave (CW) mode at room temperature and address new molecules such as benzene and the BTEX family [2][3]. The CW regime is generally presented as a requirement for high-resolution, high-sensitivity spectroscopy applications using QCLs, as it is associated with a much narrower linewidth. However, the large power consumption of the laser and its temperature regulation system can be a strong limitation for real applications. Driving the laser with short current pulses is a way to reduce this power consumption. In addition, the pulsed mode allows a wider and higher temperature range of the QCL chip to be exploited. This leads to a wider spectral coverage for a given QCL chip and facilitates its integration into a system. We present here a study of the chirp of the Unimir QCLs and demonstrate that narrow linewidth, suitable for gas sensing applications close to atmospheric pressure, can be easily achieved with pulsed operation of the lasers. This is a specificity of the QCL operating at long wavelength with low current densities.