

## Monolithically integrated coupled-cavity quantum cascade lasers

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Single mode, room-temperature quantum cascade lasers emitting in the 9.5  $\mu\text{m}$  range have been produced by focused ion beam (FIB) etching. Modification of the resonator geometry by dividing the cavity into two sections separated by a small gap, of the order of emission wavelength, results in strong optical coupling of the sections and consequently leads to a strong modification of spectral properties of the emitted radiation. Additional possibilities of influencing the mode structure of coupled-cavity quantum cascade laser (CC QCL) are provided by the feasibility of independent current injection into each section. The long section provides gain and can be operated in pulse or continuous mode. The short section provides the possibility to fine tune its refractive index, through injection of carriers. The stable, single mode emission was observed within temperature tuning range, with a side mode suppression ratio of 43 dB. The paper will review our recent results on design, technology and fabrication of GaAs and InP based mid-IR CC QCLs. We will also discuss a new type of two section, coupled-cavity QCLs with monolithically integrated heater (CC IH QCL), designed for extended temperature tuning.

