Comments and Corrections

Corrections to "High Performance Quantum Cascade Lasers Grown by Metal-Organic Vapor Phase Epitaxy and Their Applications to Trace Gas Sensing"

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In the above paper [1], there are some additional comments. A compact broadband QCL-based mid-IR spectrometer, suitable for lab-on-a-chip integration was recently demonstrated [2]. The device is based on an array of 32 closely spaced DFB lasers with emission wavelengths spanning the gain bandwidth of the QCL material, fabricated monolithically on a same chip and driven by a microelectronic controller (see schematics in Fig. 2(a)). The spacing of the emission wavelengths of the lasers in the array is sufficiently small (3 cm^{-1}) such that for any wavelength within the gain spectrum of the QCL material, one can select a DFB QCL in the array and adjust its temperature with a thermoelectric cooler to produce single-mode emission at the desired frequency. Each of the lasers in the array is addressed and driven individually by the microelectronics controller. The actual lasing frequencies of the 32 individual lasers in the array spanned from 1146 cm^{-1} to 1061 cm^{-1} ($\lambda = 8.73$ to $9.43\ \mu$m), as shown in Fig. 1. This single mode QCL source can be used as a compact widely tunable narrow-linewidth mid-infrared source in a variety of spectroscopic applications. Its application to mid-infrared absorption spectroscopy analysis of liquids was also demonstrated: the setup consisted of the QCL source, a transparent BaF_2 fluid cell containing the analyte, and a mercury cadmium telluride (MCT) liquid-nitrogen cooled detector. As shown in Fig. 2(b), the results compare favorably with spectra obtained using a conventional Fourier-transform infrared (FTIR) spectrometer.

Most recent work includes the development of DFB arrays covering a significantly broader wavelength range from $\lambda = 8.0$ to $9.8\ \mu$m (see [3]) and the detailed study of the performance characteristics of the different lasers in the array in terms of single mode selection of the DFB grating, variability in threshold, slope efficiency and output power [4]. In addition in a subsequent study, wavelength beam combining was used to overlap and co-propagate in the far-field the output from the different elements of a DFB QCL array [5].

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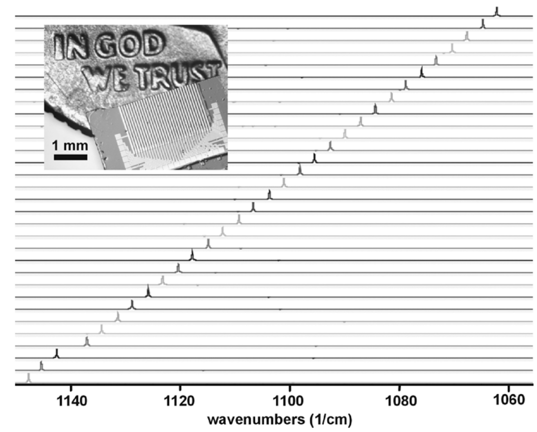

Fig. 1. Spectra of the DFB array lasers and (inset) picture of the device array.

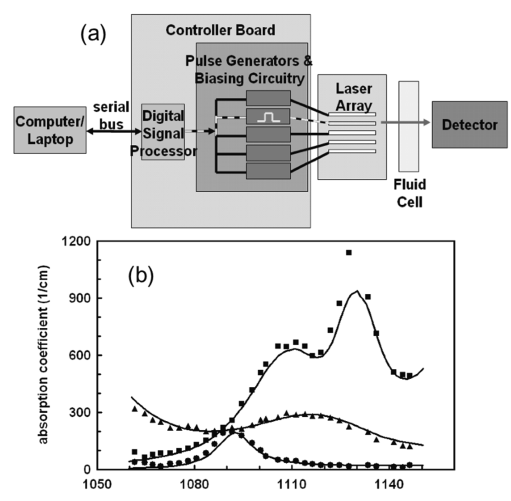

Fig. 2. (a) Schematics of the tunable source sensing system and (b) measurements results for various analytes (dots) compared to FTIR transmission measurements (continuous lines).

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