Ethylene Detection using Laser Modulated Photoacoustic Resonance at 1625nm

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ABSTRACT

The detection of ethylene (ethene) gas at parts-per-million concentrations is important for agricultural product transportation, storage and retailing, since ethylene affects the ripening behaviour of many fruit species. In-situ detection at these levels is a difficult problem, and there is a need for a portable and self-calibrating instrument at reasonable cost. Present solutions are too bulky and expensive for widespread use in the food industry. The laser-induced photoacoustic approach is promising for very low concentrations, but the determination of appropriate operating wavelength remains problematic for ethylene. Furthermore, the signal-to-noise ratio of the recovered photoacoustic signal is poor when room-temperature low-power diode lasers are employed. We present experimental results which indicate that the phase of the recovered photoacoustic signal is able to perform a discriminant function at 200 parts per million, whereas the magnitude does not appear to provide adequate discrimination at the power levels employed.