

## RECENT DEVELOPMENTS IN LASER-BASED SPECTROSCOPY FOR TRACE GAS DETECTION

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Laser spectroscopy is a powerful tool in chemical detection, particularly in trace gas sensing. In contrast to techniques which typically require laboratory conditions (e.g. mass spectrometry, gas chromatography or Fourier transform infrared spectroscopy) sensing instrumentation that uses narrow linewidth, compact semiconductor lasers can be operated in the real-world, non-laboratory environments. More importantly, it often does not require sample preparation, and have potential for maintenance-free operation with rare or no calibration. During presentation our recent results in this field will be discussed. We will talk about practical application of wavelength modulation spectroscopy (WMS) for quantification of gas emission from agriculture activity. Field performance of the sensing system that enables sequential detection of multiple gases (methane, ammonia, hydrogen sulfide and carbon dioxide) at parts-per-million by volume (ppmv) levels will be presented. We will also talk about our recent experiments with hollow core fiber which can serve as a gas cell that combines long path-length and small sample volume. Challenges and limitations of this sensing configuration will be discussed.

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