

LASER-BASED MOLECULAR SPECTROSCOPY FOR MONITORING EMISSION IN ANIMAL FARMING

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Monitoring gas emission becomes an important issue in the livestock sector. For example, industrial animal farming is responsible for substantial part of total anthropogenic emission of methane and ammonia. Here we present practical aspects of molecular spectroscopy by demonstrating a laser-based system for sensing of methane (near 1651 nm), ammonia (near 1531 nm) and hydrogen sulfide (near 1575 nm) using wavelength modulation spectroscopy (WMS) and a multi-pass cell. This instrument is designed for sequential detection of three species emitted in pig farming facility. Laser-based molecular spectroscopy in the near-infrared region provides unique opportunity for maintenance-free continuous operation at relatively low cost, and with sensitivity and accuracy at single ppmv levels for all three gases. System characterization in laboratory conditions will be presented. We will also demonstrate results of field tests and discuss technical challenges when moving spectroscopic systems from laboratory conditions to real-world environments.

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