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TECHNOLOGY INSIGHTS 24/04

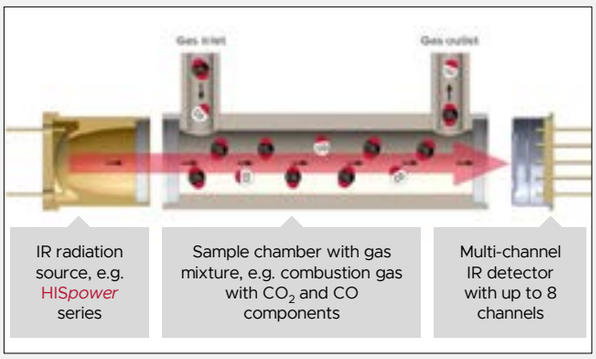

Fig. 1: Basic set-up of a non-dispersive infrared (NDIR) gas measurement system.

Fig. 2: NDIR-Demonstrator with HISpower series IR emitter and pyroelectric 8-channel-detector – supported by InfraTec GmbH.

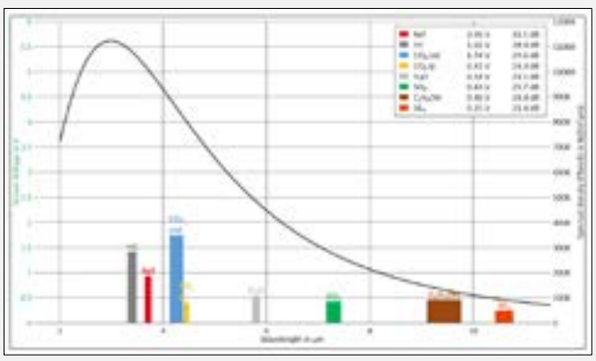

Fig. 3: Measurement example with the emission spectrum of the IR emitter and eight different measurement channels (sensor raw signals).

HIGHLIGHTS

- Pushing the limits of NDIR gas analysis with high-performance IR emitters.
- Highest optical output power and signal stability eliminate the need for an additional detector signal amplification.
- Wide wavelength range from (2 ... 20) µm enables a broad range of applications.

Explore the limits of multi-channel NDIR gas analysis

A common way to measure gas concentrations

Non-dispersive infrared (NDIR) gas analysis (Fig. 1) is a widely used technique for detecting and quantifying gas concentrations in various industrial, environmental, and medical applications. However, NDIR gas sensors have faced limitations in sensitivity and accuracy, particularly when measuring low gas concentrations. These limitations are primarily due to the performance constraints of the infrared (IR) source and detector components. Conventional infrared sources, such as wire filament and Si-MEMS emitters, have limited optical output power and signal stability, resulting in lower signal-to-noise ratios and reduced measurement sensitivity.

High-performance IR emitters

INFRASOLID has developed the HIS*power* series, a range of high-performance thermal infrared emitters in a standard industrial TO-8 housing specifically designed for highly accurate NDIR gas analysis. To demonstrate the unmatched performance an NDIR demonstrator has been built (Fig. 2), that utilizes INFRASOLID's HIS2000R-CWC300 IR emitter and the world's first eight-channel pyroelectric detector, the InfraTec LRM-278. The IR source's exceptionally high radiation power generates high detector signals and, therefore, eliminates the need for additional signal amplification (Fig. 3). This allows the analog detector signals to be converted directly into a digital signal for further signal processing. Electronics and signal processing are reduced to a minimum, thus eliminating further sources of noise and reducing manufacturing costs. The wide wavelength range from (2...20) µm enables its use in a broad range of industrial, environmental, and medical applications.

Pushing the limits of NDIR gas analysis

High-performance IR components play a crucial role in NDIR gas analysis. With an optimized combination of IR source and IR detector the boundaries of NDIR gas analysis can be pushed. In this way, applications that require the measurement of lowest gas concentrations, such as emission monitoring and leakage detection, can meet new legal regulations.