Recent developments in QEPAS – a spectroscopic technique for trace gas sensing

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Quartz-Enhanced Photoacoustic Spectroscopy (QEPAS) is a technique for photoacoustic detection of trace gases utilizing a quartz tuning fork (TF) as a resonant acoustic transducer. Advantages of the technique compared to conventional resonant photoacoustic spectroscopy include QEPAS sensor immunity to environmental acoustic noise, a simple absorption detection module design, and its capability to analyze gas samples of ~1 mm^3. The theoretical basis of the QEPAS technique, the associated technology in terms of laser sources, quartz-tuning forks and the recent developments in detection methods as well as performance limitations will be discussed. In particular, a newly introduced family of customized tuning forks will be presented, as well as preliminary results of their performance in comparison to standard commercial tuning forks operating at 32.6 kHz.

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