



Politecnico
di Bari

- ✓ H2S DILUTON - MICRO FLOW
- ✓ H2S DETECTION IN THE THZ RANGE

A SOLID BUSINESS CASE IN COLLABORATION WITH THE "POLITECNICO DI BARI"

GENERAL INFORMATION ABOUT THE PROJECT



TARGET OF THE PROJECT:

Dilution of H₂S for detection in THz range



DEPARTMENT:

PolySenSe Lab



HEAD OF PROJECT MANAGEMENT:

Vincenzo Spagnolo



ROLE OF MCQ INSTRUMENTS:

To dilute a certified gas mixture of 200 ppm of H₂S in pure N₂ down to 20 ppm

MORE INFORMATION ABOUT THE HEAD OF THE PROJECT

Vincenzo Spagnolo received the degree (summa cum laude) and the PhD, both in physics, from University of Bari. He works as Full Professor of Applied Physics at the Technical University of Bari.

Since 2017, he is the director of the joint-research lab PolySense, created by THORLABS GmbH and Technical University of Bari, devoted to the development and implementation of novel gas sensing techniques and the realization of highly sensitive QEPAS trace-gas sensors.

DESCRIPTION OF THE APPLICATION AND THE TARGET

Gas sensing spectroscopic techniques aim to operate with isolated or well separated absorption lines characterized by large cross-sections.

The THz spectral range offers many advantages for gas spectroscopy because of the comb-like distribution of the spectral features, the strongest line strengths in the whole infrared region and the fastest relaxation rates.

Hydrogen sulfide (H₂S) shows absorption bands in the THz region up to two orders of magnitude stronger with respect to mid-IR range and the possibility to be detected avoiding the interference of hydrocarbons.

The application developed is based on a liquid nitrogen-cooled THz QEPAS sensor, employing a pulsed QCL to excite a H₂S rotational transition at 95.63 cm⁻¹.

BENEFITS AND SAVINGS

The Gas blender 100 was used to dilute a certified gas mixture of 200 ppm of H₂S in pure N₂ down to 20 ppm. The mixtures generated led to a linear response from the QEPAS sensor, confirming that the maximum concentration of 200 ppm was not damaging the device. The calibration of the QEPAS sensor allowed us to calculate a minimum detection limit in the part-per-billion concentration scale. This prototype sets the basis for highly challenging and ambitious tasks such as H₂S detection in natural gas.



GAS MIXER VS MASS FLOW:

The GAS MIXER channels it's more compact than typical flow controller meters and can be specifically calibrated on the mixture to be used.



WITHOUT MCQ? (NOT POSSIBLE!!)

Since the laboratory was not equipped at all with instrumentation devoted to spectroscopy. The portability of the GB100 allowed Polysense to perform the calibration.



TIME SAVINGS:

Instead of changing a calibration cylinder for each point, our Gas Mixer uses pure gas allowing the Politecnico di Bari to set all the desired calibration points in just a few steps.



SOFTWARE AUTOMATION:

Thanks to our Software PRO version and its option 'Automatic Program', now Politecnico di Bari can bring forward experiments in automation, painlessly.



MICRO FLOWS - NO CUT OFF:

OUR GB100 Series allows you to control the flow in all the calibration range, from 0.1 mL/min to 500 mL/min with NO cut-off



HIGH DILUTION RATIO:

We helped the Politecnico di Bari to dilute a certified gas mixture of 200 ppm of H₂S in pure N₂ down to 20 ppm to get highly precise and stable micro-flows of gas to feed a spectrometer.

READY TO TALK ABOUT YOUR SOLUTION?

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