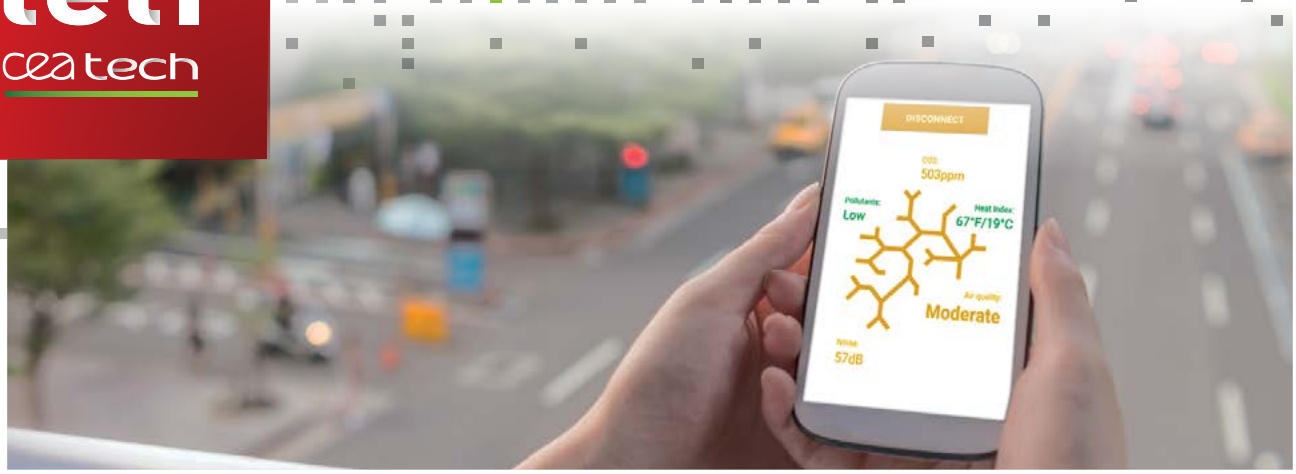


NDIR GAS SENSORS

LETI INNOVATES IN CHEMICAL SENSING **WITH NON-DISPERSIVE INFRARED SOLUTIONS**

WHAT IS NDIR?

The smart Leti non-dispersive infrared (NDIR) gas sensor is composed of:

- a MEMS blackbody source
- an optical cavity in which the gases flow
- an infrared detector

The light emitted by the broadband IR source is absorbed by the gas of interest and a suitable filter on the top of the detector selects the absorption line (cf schematics). The measured intensity is directly related to the gas concentration, according to the Beer-Lambert law.

APPLICATIONS

- **Security**: hazardous gas leakages in home appliances (methane, butane…)
- **Smart home**: CO_2 measurement
- **Smart city** (for example, embedded in a bus shelter): outdoor CO_2 measuring as an indicator of pollution (HAP and ozone) issued from unburned species

WHAT'S NEW?

The sensor is compact and low-power thanks to:
- the proprietary design of the source reducing the thermal losses
- the full MEMS fabrication of the infrared emitter
- the smart design of optical cell

Multiphysics modeling was used extensively to improve sensor performance: temperature uniformity, directivity of the IR source and electro-optic efficiency have been optimized thanks to patented optical solutions, while careful optical design has been carried out to increase the light power received by the detector.

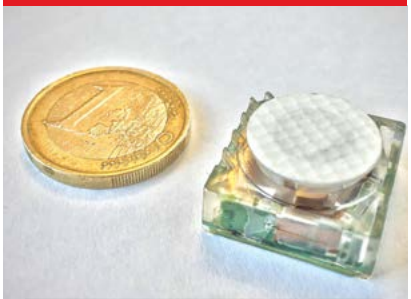
eLichens, a startup company working in close collaboration with Leti, is already industrializing and commercializing this low-power NDIR sensor. This device has been developed for multi-gas sensing (mainly CO_2, CH_4, CO and alkanes). It is currently embedded in a combo system or a stand-alone sensor. Targeted markets are smart homes, smart cities and workplace safety. Ultimately these miniaturized devices will open the way to NDIR sensors for IoT products and wearables.

KEY FIGURES

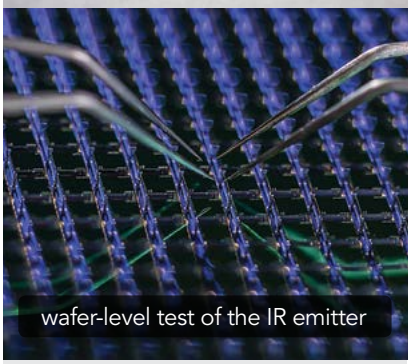
- Low power consumption: 2 mW
- Resolution: 10 ppm @1000 ppm concentration for CO_2 gas
- Multigas: CO_2, alkanes
- Reference channel
- Small footprint (300 mm²)

PATENTS, PUBLICATIONS, PARTNERSHIPS

- Portfolio of 15 patents
- 4 publications
- eLichens startup created in 2015



2016 packaged sensor



wafer-level test of the IR emitter

WHAT'S NEXT?

Leti currently is working on:
- Improvement of the micro-source efficiency (through membrane nano-structuration)
- Development of a high performance pyro-detector

INTERESTED IN THIS TECHNOLOGY?

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