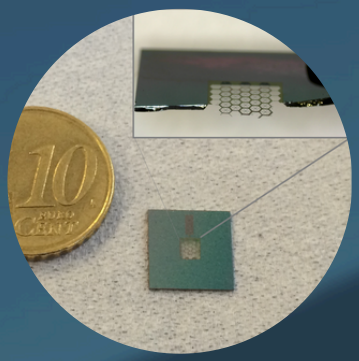
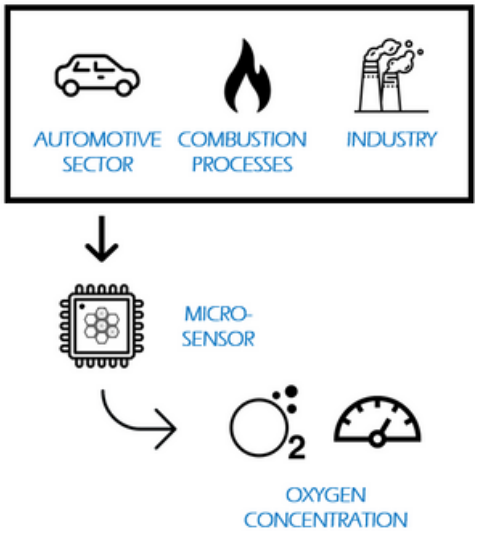


COST EFFECTIVE MICRO-OXYGEN SENSOR

TECHNOLOGY FOR A CLEANER TOMORROW

IREC
Shaping Energy for a Sustainable Future

THE CONCEPT



ADDED VALUE

- Improves energy efficiency of burners
- Reduces fuel consumption and environmental impact
- Miniaturized low-cost sensor

TRL

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PATENTED

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PRODUCT DESCRIPTION

A **customizable micro-fabricated** zirconia-based **sensor** which provides a fast and stable response to different **oxygen** concentrations. It comprises a nanometric membrane and self-heating elements, everything integrated in less than 1 cm^2.

Microfabrication techniques, added to the know-how of the group, allow to **adapt the design** of the sensor to any space constraint.

APPLICATIONS

- Industrial gas boilers
- Industrial combustion processes
- Automotive sector

DESIRED PARTNERS

- System integrators,
- Boiler manufacturers
- Automotive sector distributors

EXPECTED BENEFITS

- Reduction of harmful emissions
- Large-scale low-cost production
- Small volume
- Response time in the range of milliseconds

technical details

SPECIFICATIONS

The sensor incorporates self-supporting membranes of ceramic materials with nanometric dimensions. These membranes are separated by silicon nerves with a double function: on the one hand, they confer stability to the film of active material. On the other, they serve as a support on which heating elements are integrated. The latter will provide a very fast and efficient heating since they are very close to the active element. At the same time, its electricity consumption will be almost negligible due to the small dimensions to be heated. The sensor is fabricated using silicon microtechnology.
The technology allows an almost instantaneous heating (ca. 2s) thanks to the miniaturization and the integration of the heating elements, which will remain active in any condition. Current sensors need longer (30-40s) to reach their optimum operating temperature. Likewise, the small volume it occupies means that the sensor can be placed in a variety of locations. As additional advantages, energy consumption will be small and the manufacturing cost is much lower, thanks to the large-scale manufacture using microfabrication techniques.
The same technology can be used to add functionalities to the sensor, such as multigas or temperature sensing, by replacing certain materials or changing the design somewhat.

MICROFABRICATION

The use of microfabrication technology allows getting possibly the smallest potentiometric oxygen sensor in the market which will allow its location in places of difficult access nowadays.
At the same time, these reduced dimensions will enable its fabrication in mass production conditions; therefore, a great decrease in the manufacturing expenses is anticipated. These two facts would allow improving the combustion process control via an optimum location of the sensor and more redundancy (since more sensors could be allocated for the same price and space).

PERFORMANCE

The performance of the sensor has been tested in laboratory environments where the device chemical response, cyclability and stability have been evaluated positively.
Proof of concept devices with integrated heater have demonstrated good operability under very diverse conditions with negligible energy consumption.

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