

Smart Systems for Environmental and Biomedical Applications

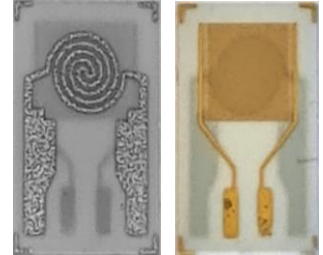
Sensors and Smart Systems for Pollutant and Hazardous Gases

The sensors and smart systems for gases detection address three main topics:

- Environment monitoring (detection of pollutant gases, e.g. CO_x, CH₄, NH₃, NO₂);
- Indoor air quality monitoring (detection of Volatile Organic Compounds);
- Detection of explosives (TNT, RDX).

The smart systems include:

- An array of dedicated sensors, optimised for each targeted gas;
- Data processing algorithms, to discriminate between gases within a mixture;
- Software for data recording, transmission and for the user interface.



Devices for biomedical applications

Implantable electrodes interfacing nerves with prosthetics:

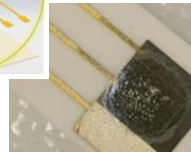
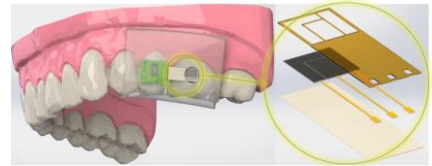
- stimulation and recording the neural activity in the peripheral nervous system;
- acquisition of neural electrical signals for the control of motor prostheses;
- stimulation of the optic nerve for visual prosthesis;
- electrical stimulation of the nerves, for the restoration of the motor functions;



A non-invasive reusable saliva glucose sensor:

A new technology, based on micro fabrication and plastic electronics will lead to a new, sensitive, selective and completely non-invasive sensor for the continuous monitoring of glucose in pregnant women diagnosed with diabetes, in high risk of diabetes or other complication with high risk of premature delivery.

The project aims to develop a reusable, biocompatible, stable and sensitive glucose layer for a wide range of glucose concentrations in saliva samples and/or blood.



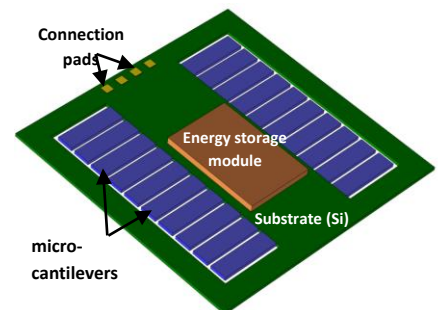
MEMS-based energy harvesters

Integrated, miniaturized, highly energy efficient, maintenance-free and environmentally-friendly energy sources, with extensive scalability and re-configurability.

Targeted applications:

- Implantable devices;
- Automotive and aerospace applications;
- Smart factories.

The systems include silicon-based piezoelectric resonators, an energy storage module and the required electronics.



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Targeted topics and challenges

- Energy;
- Health and wellbeing;
- Components, modules and systems integration;
- Process technology, equipment, materials and manufacturing.