Louvain Technology Transfer Office

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Smart strain sensors based on MOS transistors

KEYWORDS

- Ultra low power
- Ultra thin
- Ultra low footprint
- Dynamic monitoring

Technology Market

Strain gauges for smart metrology

- ✓ Structural health monitoring (SHM)
- ✓ Biomedical monitoring
- ✓ Chip package monitoring
- ✓ In-situ operando measurements
- ✓ Flextronics
- ✓ Fast data acquisition

The UCL solution

The classical strain gauges sensors consist of piezoresistive metallic resistances mounted in a Wheatstone bridge configuration on a 100 µm-thin polyimide film, with a dedicated interface. These typically consume mW's of power at several V's supply voltage.

The UCL smart strain sensor exploits an innovative way to measure strain with ultra-low power consumption, using piezoresistance in active devices, i.e. with perpendicular PMOS transistors in current mirror configurations, designed for high stress sensitivity.

We are currently working to make the sensor autonomous through a passive RFID solution.

Key-figures of the invention

- ✓ power consumption: 10-100 µW
- ✓ low supply voltage: ≈1V
- ✓ simple read-out interface for direct connection to a microcontroller
- ✓ minimal footprint: 2x2 mm^2
- ✓ ultra-thin: 5 µm
- ✓ high gauge factor: 400
- ✓ high sensitivity: 300 ppm/µε
- ✓ high precision: 5 µε
- ✓ strain range: up to 1000 µε
- ✓ large frequency bandwidth response: 0 – 1 kHz

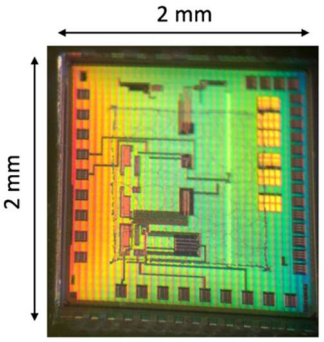

Fig. 1. Optical view of the 5 µm-thin strain sensor chip.

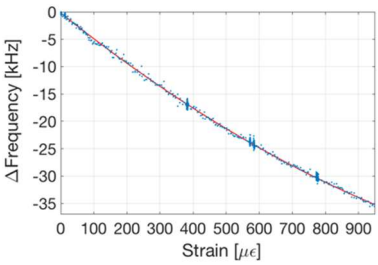

Fig. 2. Frequency variation of the strain sensor output in function of its deformation.

Technology Status

TRL 3, proof-of-concept demonstration and comparison with reference strain gauges

First results published in *Al Kadi Jazairli, M. et al., "Ultra-low-power 130nm SOI CMOS smart sensor for in-situ mechanical stress in SiP and SoC applications", 2016.*

Preferred partnership

Validation of the technology in real test situations (joint case studies)

UCL Université catholique de Louvain

Louvain Technology Transfer Office

INTERESTED TO VALIDATE AND DEVELOP THIS TECHNOLOGY?

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