



MEMS devices for the next generation of sensors

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Key points and motivations

- **Sensors** allow electronic systems to gain awareness of the surrounding environment
- The lack of **sensors** with adequate characteristics limits the development of innovative electronic systems
- **Sensors** are several generations behind the present stage of electronic HW and SW

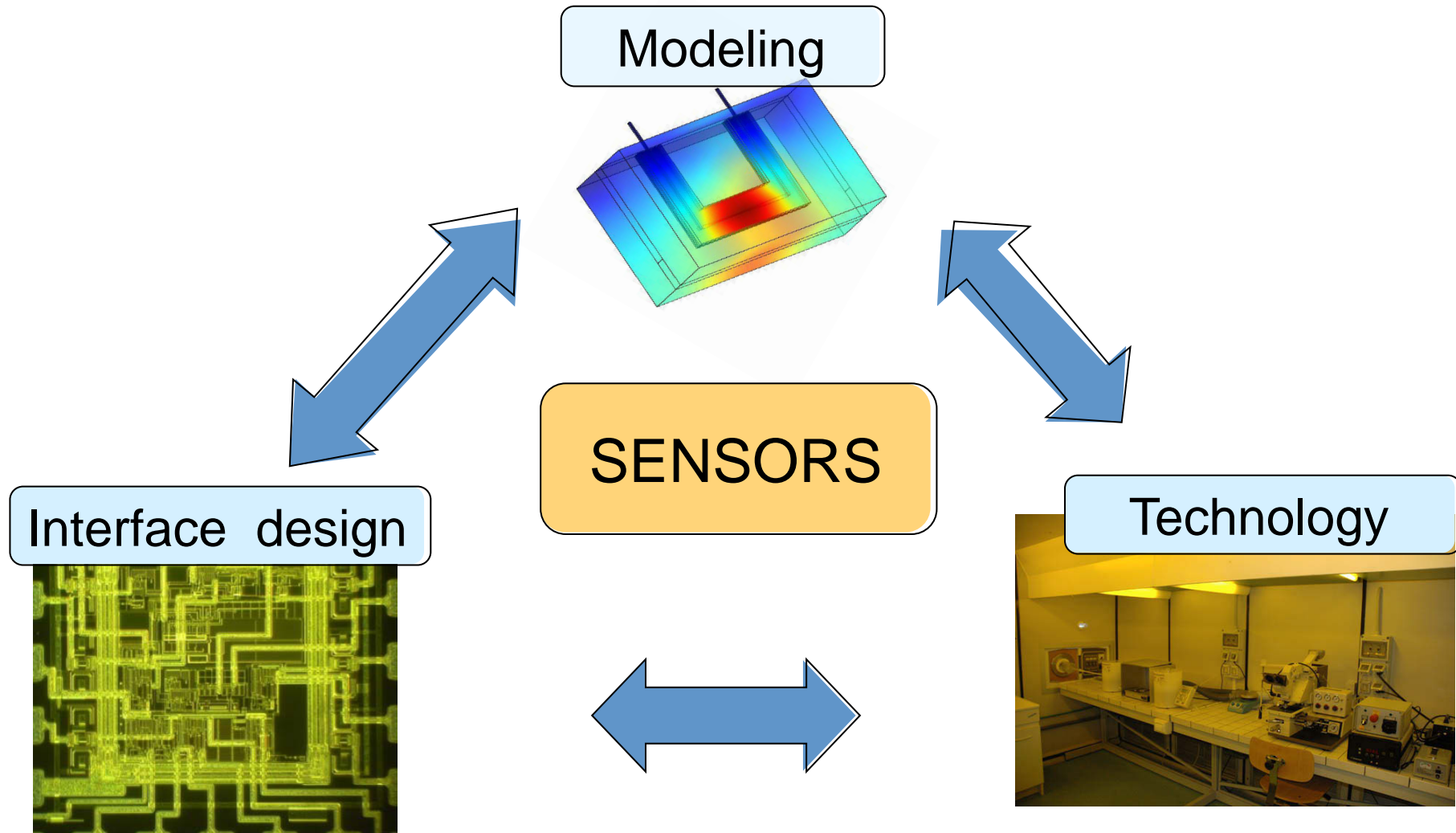


New sensors should:

- Expand the range of physical and chemical quantities that can be reliably detected
- Improve miniaturization and reduce power requirements for superior mobile device and WSN compatibility
- Reduce fabrication costs, to facilitate diffusion

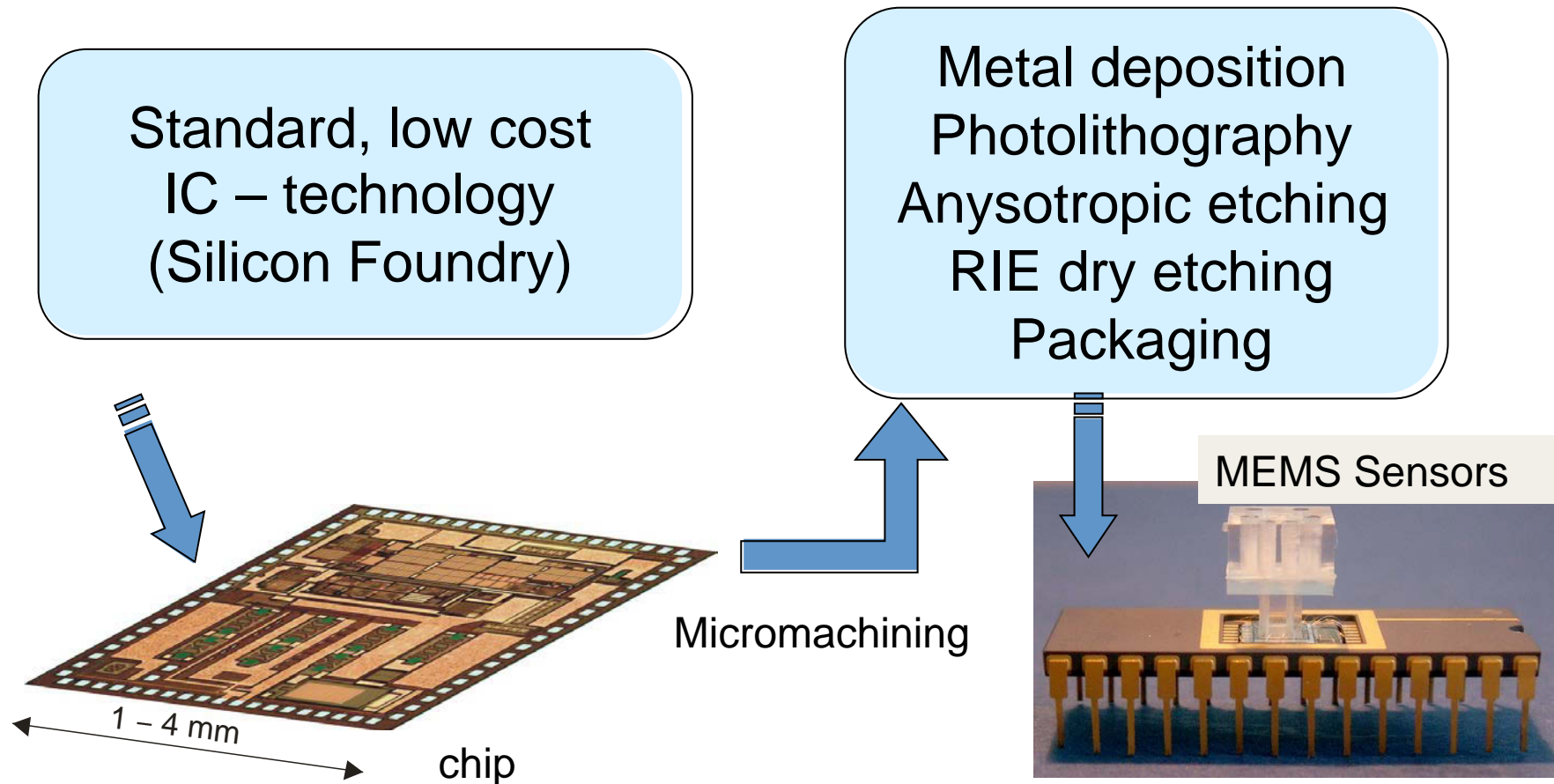


Sensor know-how at DII

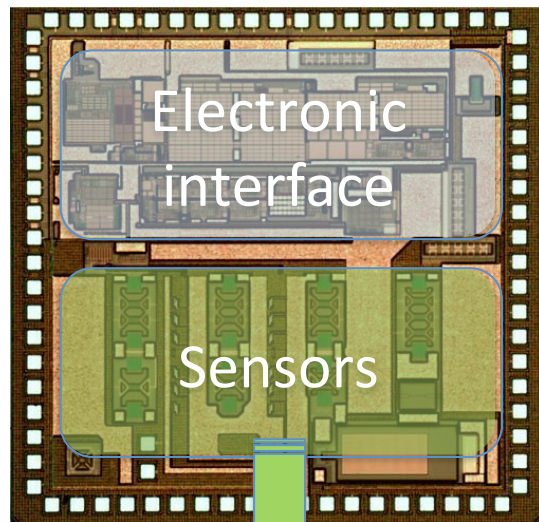




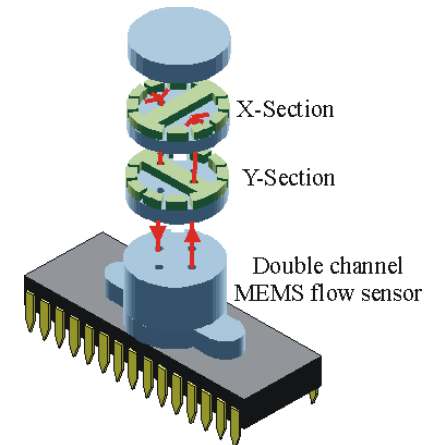
Technology: the post-processing approach



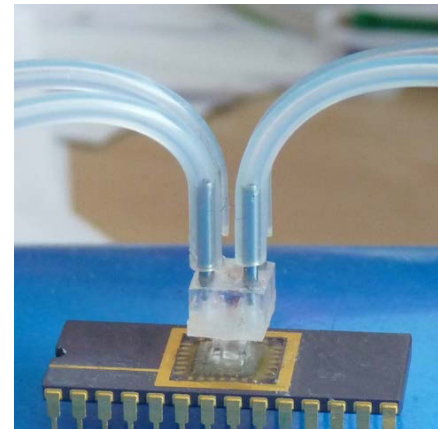
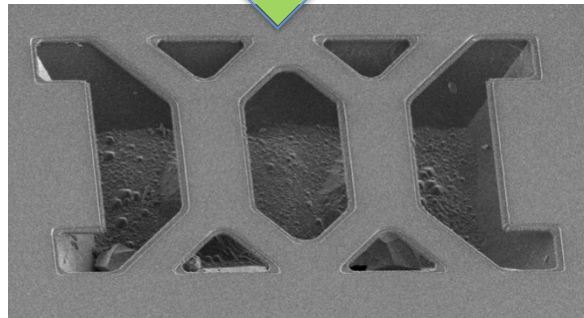
Example I: smart flow sensor



Products

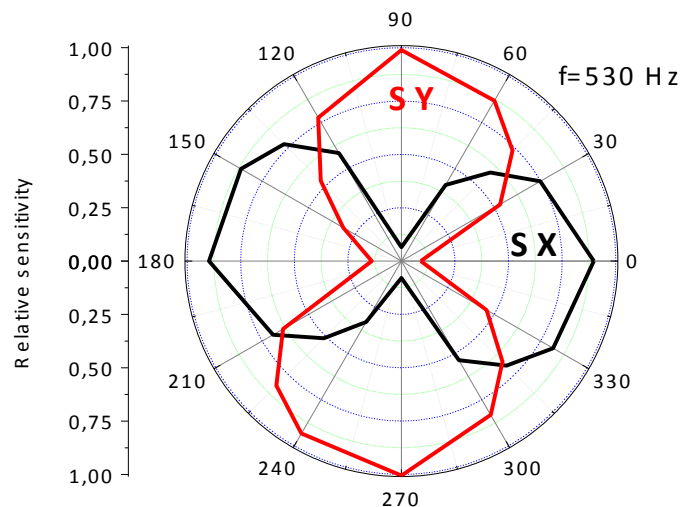
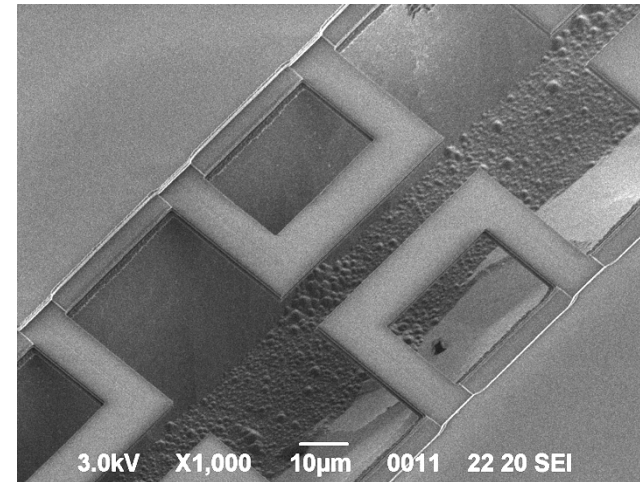
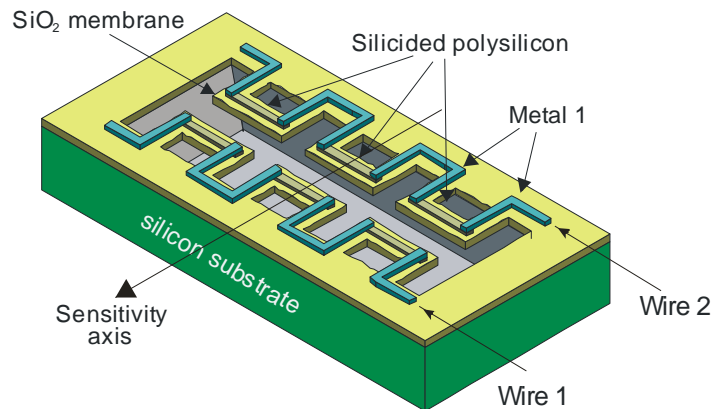


Directional anemometer



Multi-channel flow sensor

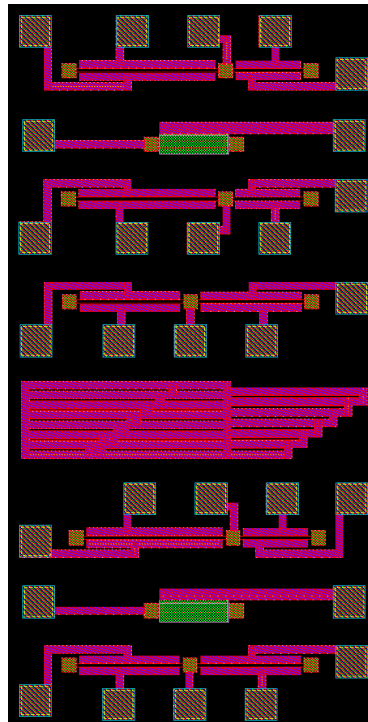
Example II: Acoustic particle sensor



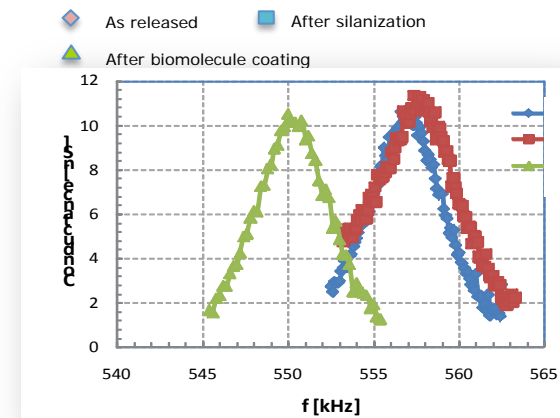
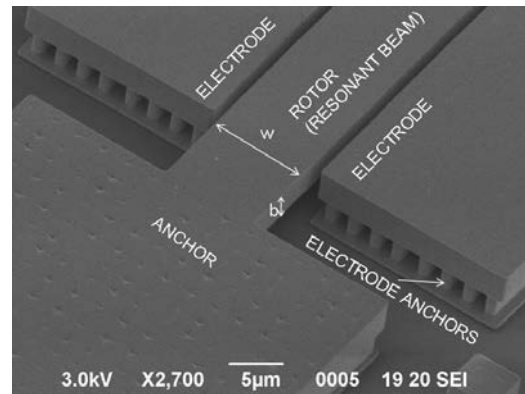
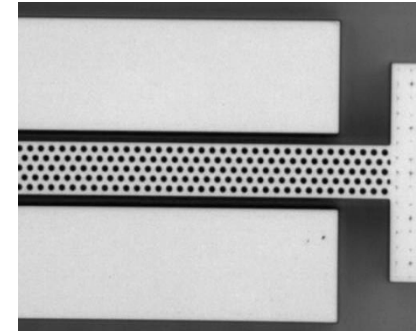
- Detection of the local velocity induced by the sounds on the medium
- Suitable for sound source localization
- Fully compatible with low-cost CMOS technologies

Example III

MEMS (SiGe) Resonant Biosensors

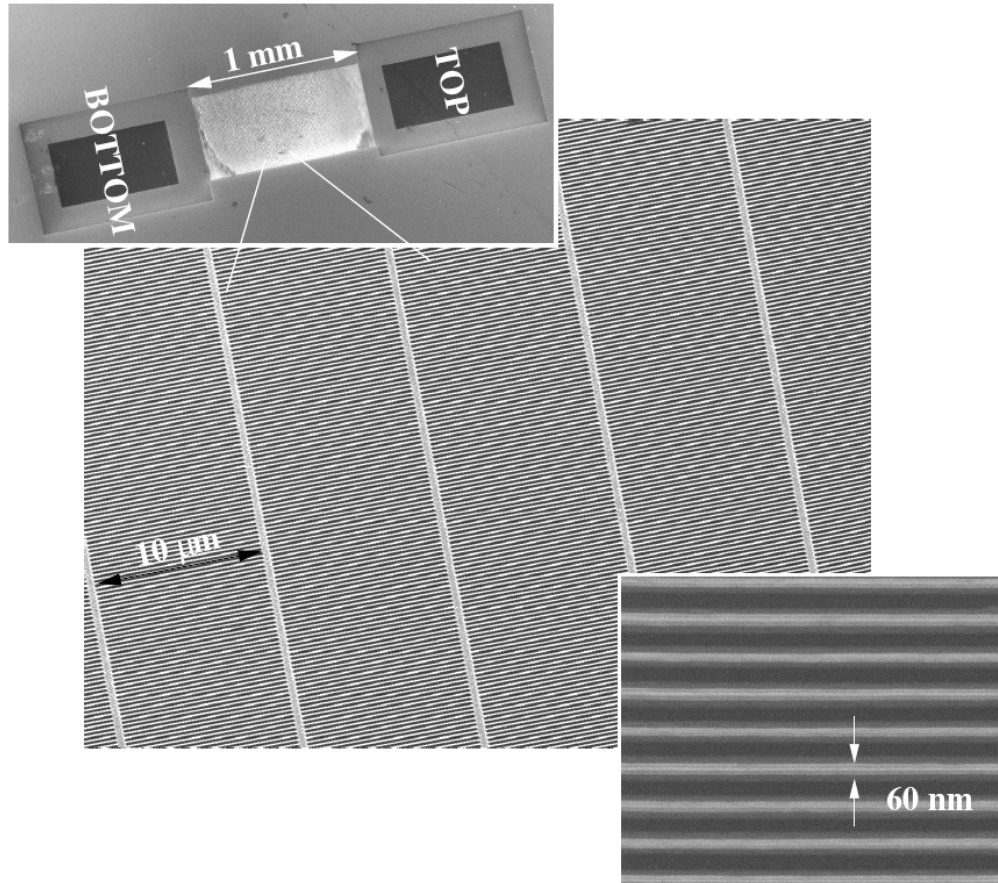


- Application: disposable, very low cost biosensors for POCT applications
- MEMS-over-CMOS technology
- Robust towards surface tension
- Electrical readout
- Sensitivity enhancement (perforations)



Response to biotin

Example IV: NEMS sensors



- E-BEAM Lithography
- Unique properties of nanostructures with macroscopic capture areas



MEMS-NEMS group at DII

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The group includes also 3 Ph.D. students and 1 research fellow