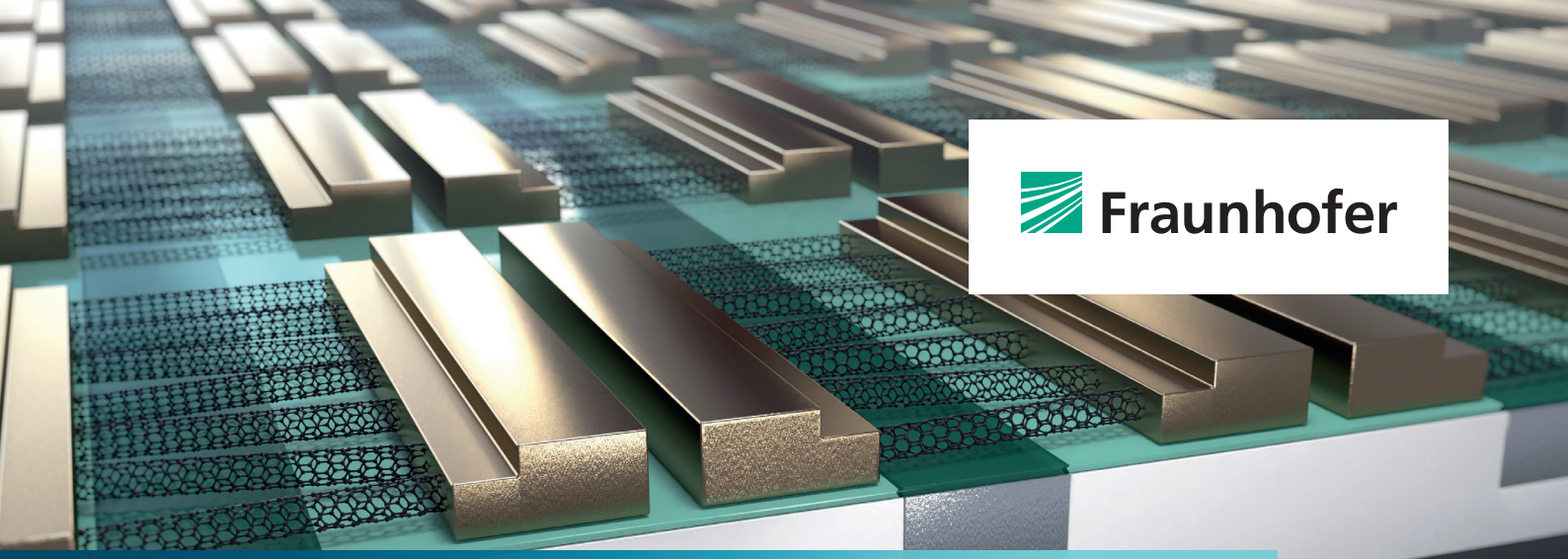


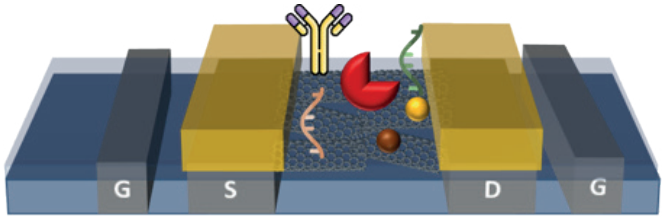
Fraunhofer

Technologies

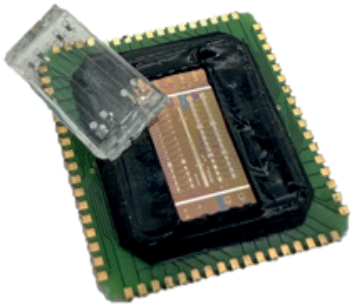
CNT-FET Platform for Gas and Biosensor Arrays

Fast Facts

- Application in Point-of-Care Diagnostics
  - Exhaled breath analysis (e.g. metabolic intolerances)
  - Multifactorial disease detection (e.g. Alzheimer's)
- Detect more, faster: high-responsivity gas and biosensing
- Customize on demand: flexible, modular functionalization
- Scale with confidence: proven 200 mm wafer platform
- Get richer data: multi-parameter FET-based sensing



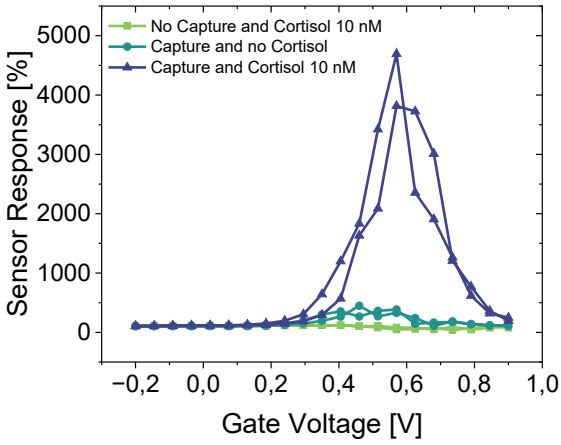
CNT-FET –surface functionalization possibilities with bioreceptors or nanoparticles for sensor applications.



CNT-FET – encapsulated chip with microfluidic channels.

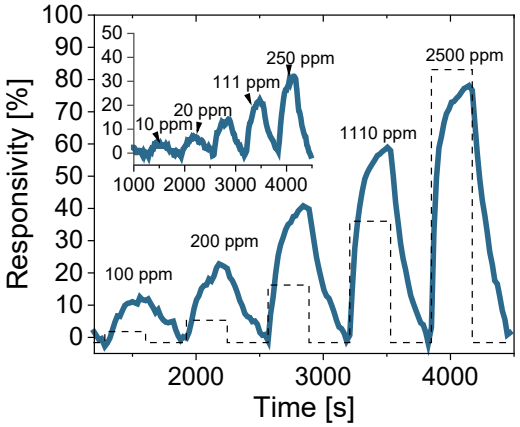
Bio Sensor

Target concentration range	DNA sensor: from aM to nM
Responsivity	R > 300% for tDNA = 100 aM
Response time	Readout in 10 min
Working media	Sensing in different buffers (PBS, 4 x SSC) and buffer strengths
Bioreceptors tested	Antibody, DNA, aptamer



Hydrogen Sensor

Hydrogen concentration range	1 ppm … 20 000 ppm (2 %)
Responsivity	R ~ 4 % @ 10 ppm
Response time	t < 15 s @ 2 % (1 000 sccm)
Low cross sensitivity	Selectivity against CH_4 > 100

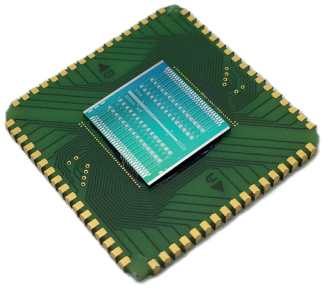


Front-End Wafer-level Technology

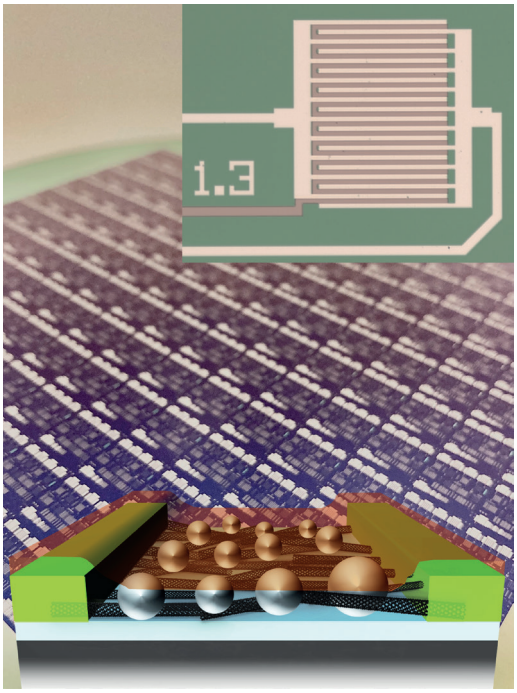
- CMOS compatible 200 mm 1D Semiconductor process
  - Additive electronic-grade semiconducting CNTs
- Prototyping for sensor array fabrication
  - Multiparameter readout enables multiplexing of multiple targets
- Cost/resource efficient fabrication

Back-End Technology

- Customizable functional layer
  - Nanoparticles, polymer, capture DNA, …
- Integration of microfluidics with standardized interfaces
- Advanced packaging solutions



Diced and wire-bonded chip with FET sensor arrays on standardized printed circuit board.



200 mm wafer with CNT-based sensor structures. Insets show light microscopy image and schematic cross-section after functionalization.

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