FIT-4-NMP

FIT-4-NMP Networking and Brokerage Event

organized by FIT-4-NMP H2020 project at the 45th International Semiconductor Conference - CAS 2022

Sensitive structures for microsensors with optical read-out

Short description of topic: Sensitive structures developed in collaboration with industrial partners

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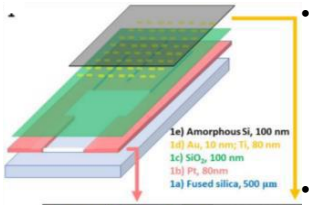
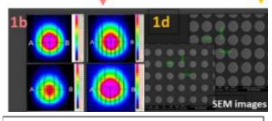
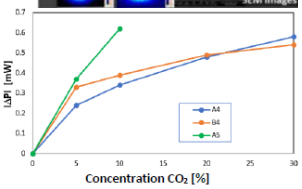
- On-chip **thermal source** with **broad IR radiation** with **a metasurface structure.**







- **Compact selective IR radiation source** suitable for developing a **highly selective and efficient gas detection system**.
- The **modification of the spectral response of metasurface-based structures** is easily achieved by adapting the geometrical parameters of the plasmonic micro-/nanostructures in the metasurface.

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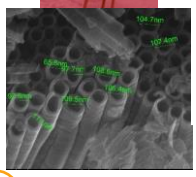

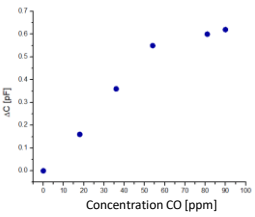

- **Gas sensor** based on **TiO_2 nanotubes** for CO.

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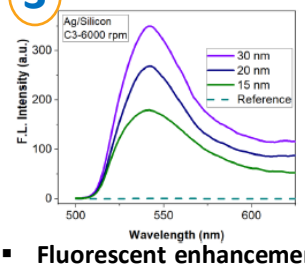
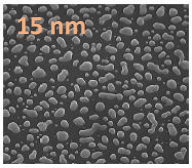
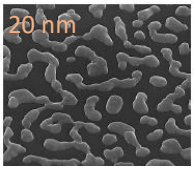
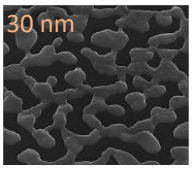


- Thermal annealed Ag layers: thicknesses of 15, 20 and 30 nm.







- **Fluorescent enhancement** on large areas (low-cost processes for cheap platforms) based on **plasmonic metasurfaces**.
- **Biosensing applications** in the visible spectral domain.
- The metasurfaces offered an enhancement of 423 folds.

Short description of Laboratory:

- **Mission: Research, development and education in micro and nanophotonics**
- **Research domains:**
  - **Modelling, simulation and CAD of micro and nano-photonic structures (Optoelectronic devices and photonic integrated circuits; Plasmonics; Micro-optics and diffractive optical elements; OMEMS).**
  - **Optical and electrical characterization of materials and devices:**

New materials for micro-nanophotonics (hybrid nano-composites with controlled optical properties, transparent semiconducting oxides, Graphene, quantum dots) **and new processes and devices.**

Micro-nano photonics components (photodetectors, photonic integrated circuits, metasurfaces, plasmonic structures, DOE, optical components); **Organic optoelectronics** (devices based on graphene-polymer nanocomposites) **and quantum technologies.**

- **Applications:**

∗ **Optical sensors** (gas sensors based on composite nanomaterials/metasurfaces, fluorescent biosensors) ∗ **Security elements for anti-counterfeit protection and logistic monitoring** (holographic labels with extra security nanoelements, RFID elements and temperature sensor); ∗ **Free space optical communications,** ∗ **Beam shaping.**

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Topics of interest: microsensors, plasmonics, custom metasurfaces.

Potential contribution: design, modeling, simulation, fabrication, characterization of micro and nano-photonic structures.

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