

European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

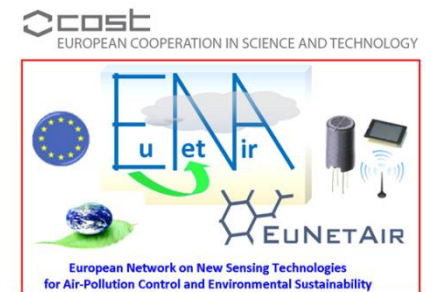
WGs and MC Meeting at ISTANBUL, 3-5 December 2014

Action Start date: 01/07/2012 - Action End date: 30/06/2016

Year 3: 1 July 2014 - 30 June 2015 (*Ongoing Action*)

Research and Innovation Needs of SIG3

Eduard Llobet, Sub-WG 1.2 leader, SIG3 Deputy Chair, MC member
Universitat Rovira i Virgili/ Spain



SIG3: Guidelines for Best Coupling Air Pollutants and Transducer

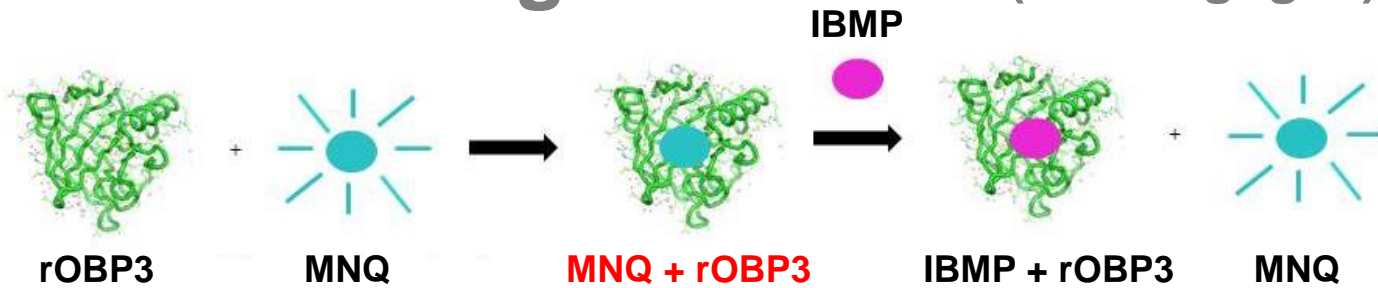
CONCLUSIONS

From Cambridge meeting in dec. 2013

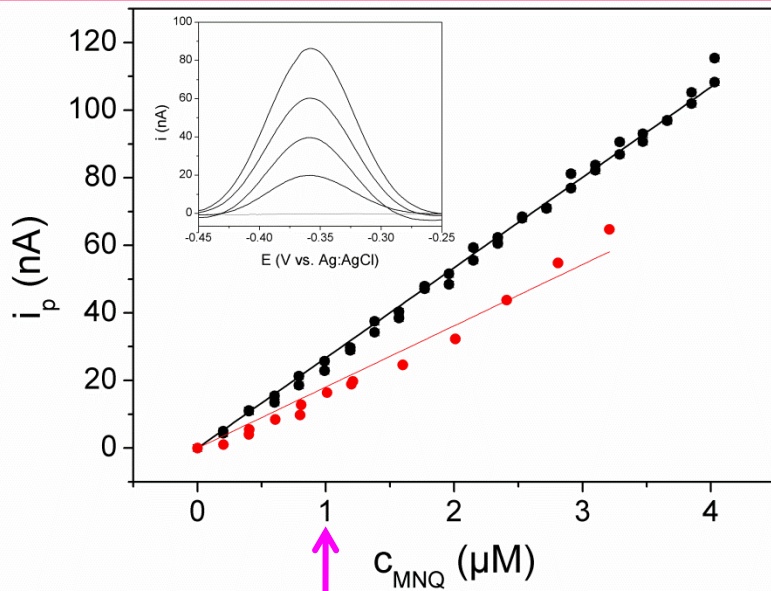
Suggested R&I Needs for future research to Action WGs/SIGs General Assembly

- Research directions as WGs R&I NEEDS for Action TD1105:
- Coupling air pollutants to transducers generally overlooked
- Detecting pollutants at required levels (e.g, ppb for toxic gases, detection of nanosized PM)
- Sensing materials based inks for fully printed sensors
- Appropriate testing of sensors under realistic conditions to speed up development time.

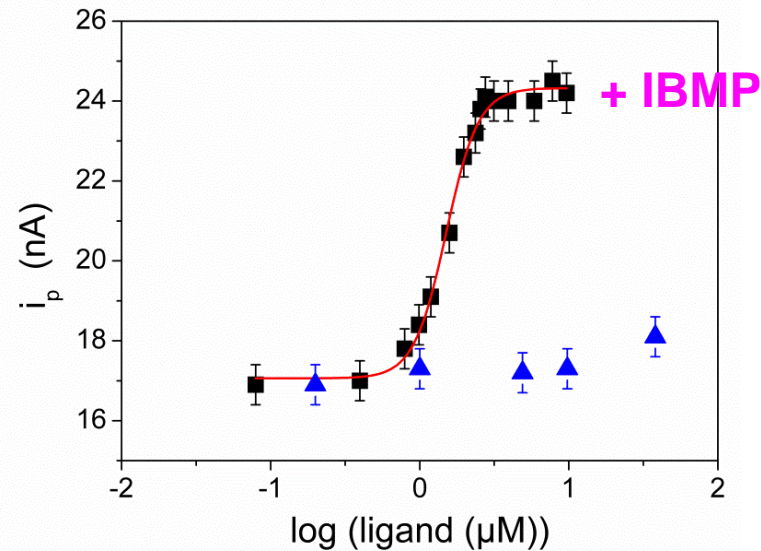
Odorant Binding Proteins: (U Bourgogne)



MNQ measured by square wave voltammetry



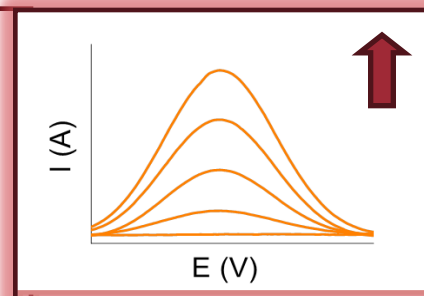
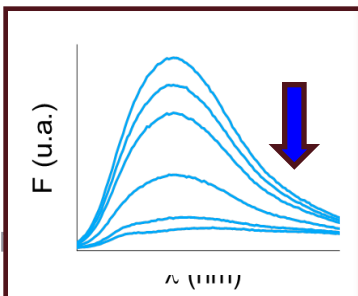
MNQ at $C_{MNQ} = 1 \mu M$



+ IBMP



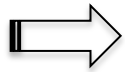
Fluorescent probe:
The signal decreases when the odorant enters into the protein



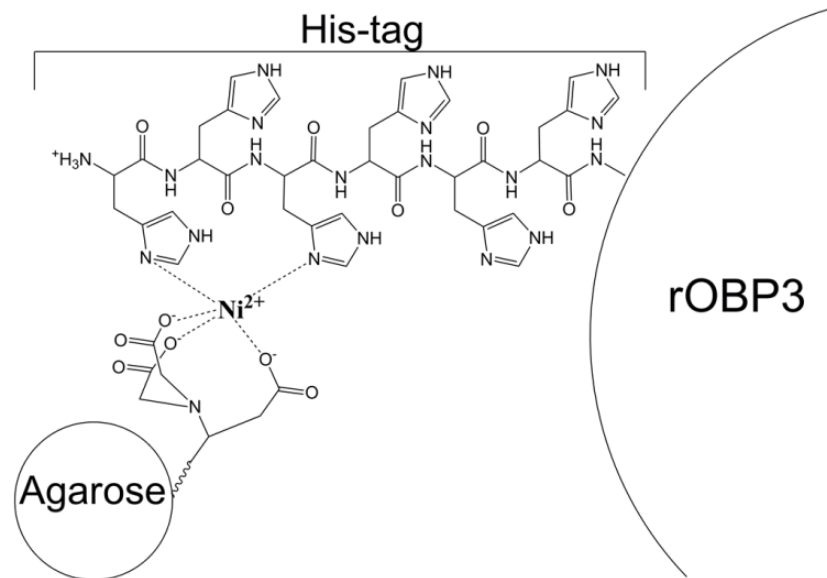
Electrochemical probe:
The signal increases when the odorant enters into the protein

Suggested **R&I Needs** for future research

- To go from OBP/Odorant interactions in solution to true devices:

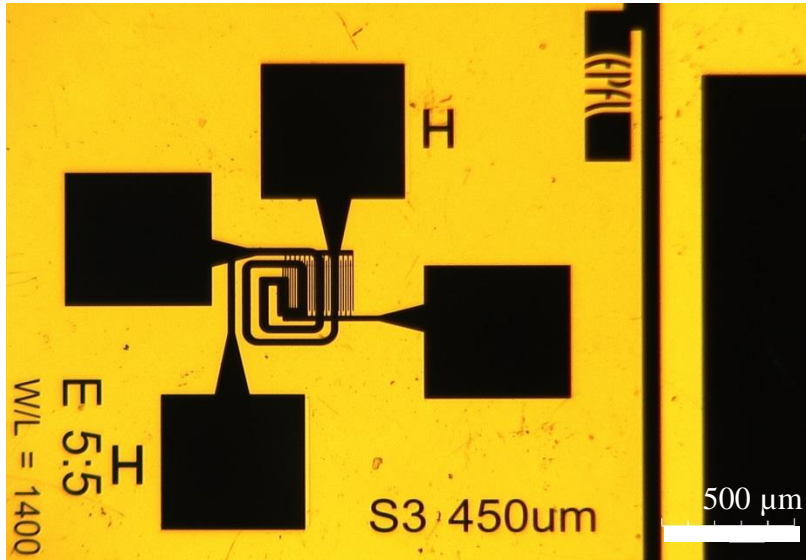


Immobilization of OBP



Example: Grafting on Ni^{2+} ions immobilized on the surface via the Hist-tag of the protein

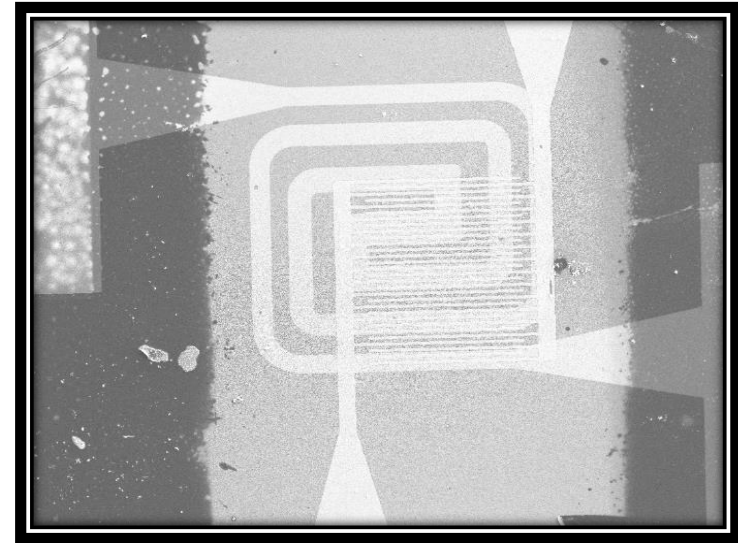
Fully printed sensors (EPFL-URV)



Heater: Pt

Electrodes: Pt, electrode gap: 5 μm

Electrode area: $\sim 250 \times 260 \mu\text{m}^2$

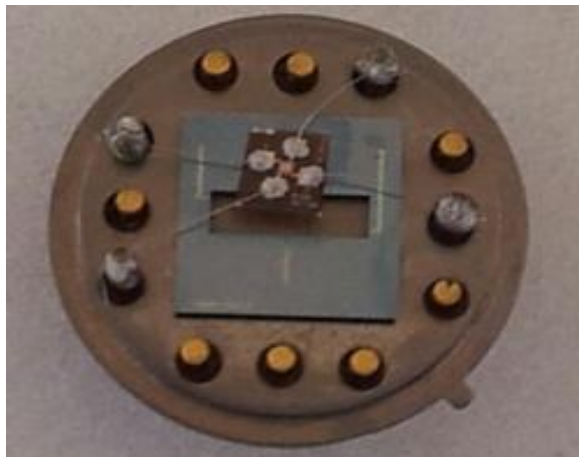


WO₃ NW-coated device

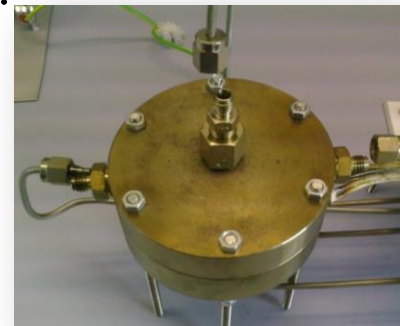
Precursors: tungsten hexacarbonyl, hydrogen tetrachloroaurate and hydrogen hexachloroplatinate

Growth temperature: 380°C

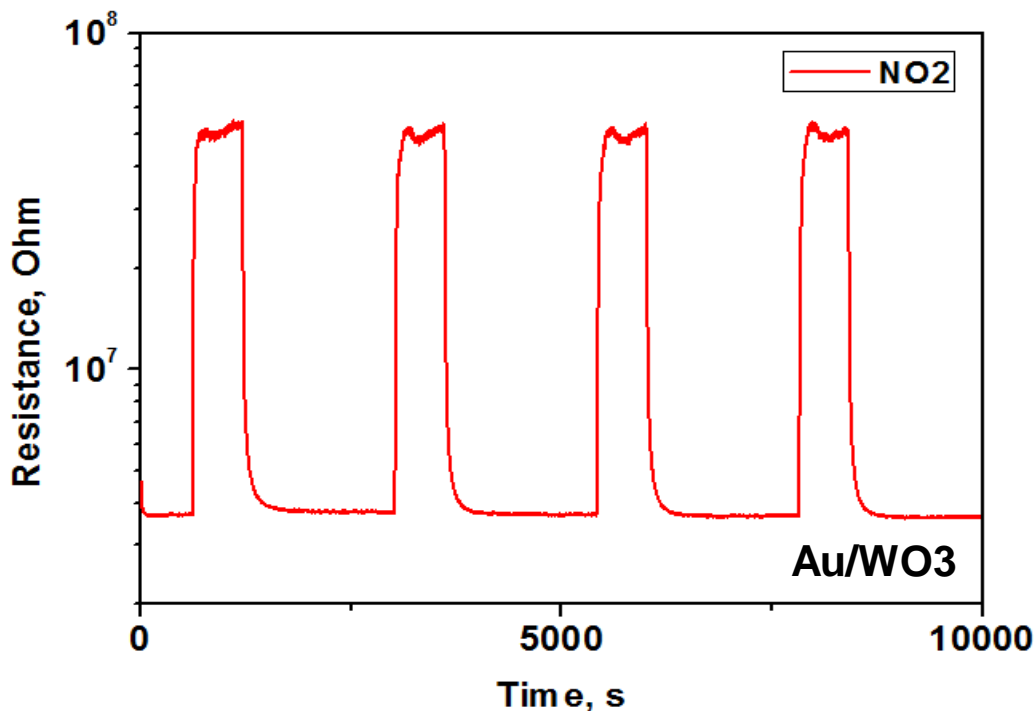
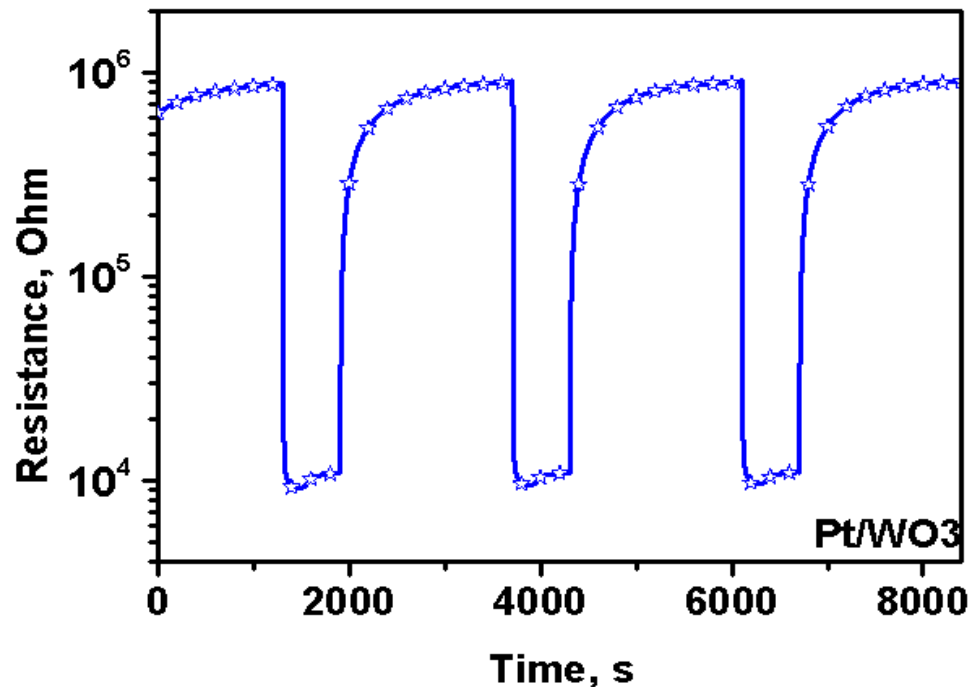
Growth duration: 10 min.



Device ready for testing

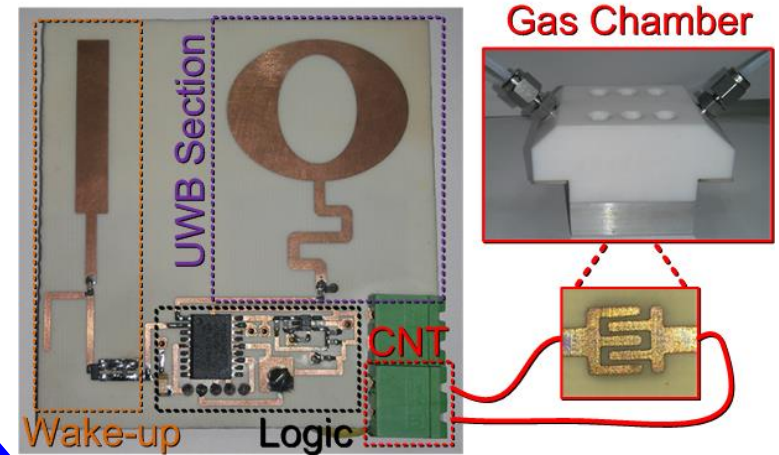
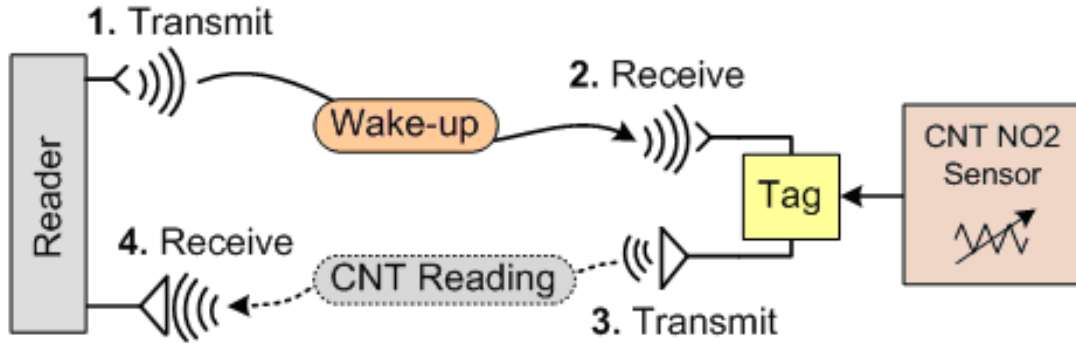


Fully printed sensors (EPFL-URV)

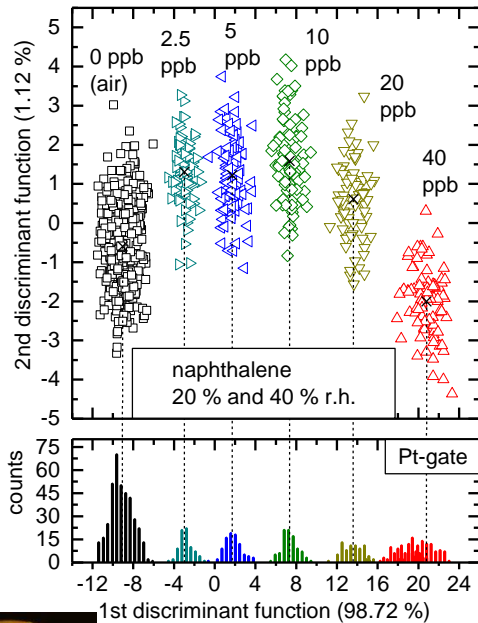


Response and recovery cycles of sensors (heater power 50 mW) in the presence of hydrogen (500 ppm) and nitrogen dioxide (500 ppb) (R.H. 10% @ 25°C)

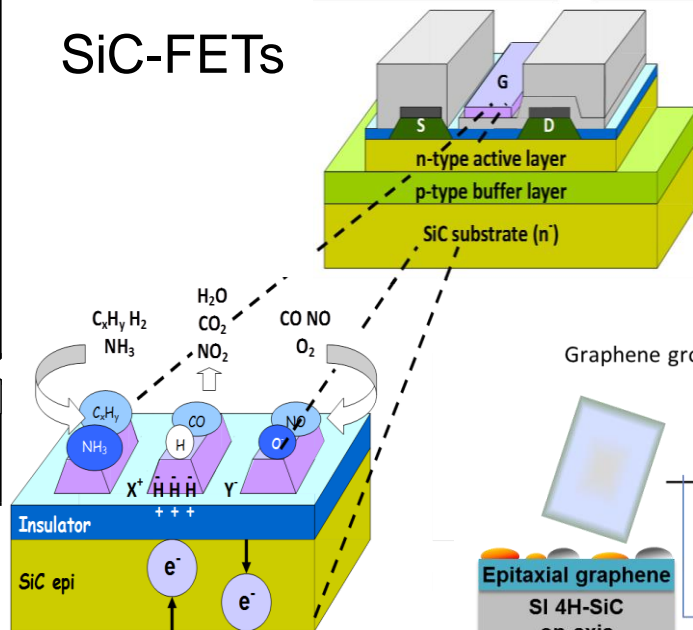
Transducers and nanomaterials



Linköping U, Saarland U, Oulu U



SiC-FETs



Decoration of graphene with metal/ metal oxide nanoparticles

