



COST

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

COST Action TD1105

WGs and MC Meeting at Cambridge, 18-20 December 2013

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

Year 2: 1 July 2013 - 30 June 2014 (*Ongoing Action*)

Research and Innovation Needs of SIG3



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 **cost**
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



Challenges in Air Quality Control

- **Background / Problem statement:** [What is the scientific context and what **challenges** are the Action WGs/SIGs addressing?]
- Develop stable transducers by mass production methods.
- What is the effect of temperature and humidity on the transducers?
- Develop active materials by easy scalable methods.
- Integrate active materials in transducers reliably and inexpensively.
- Finding a rationale for choosing active material and transducer according to the target pollutant(s).
 - **Which physical parameters change and which are measured ?**

Research Goals in Air Quality Control

- **Background / Problem statement:** [What is the scientific context and what **research goals** are the Action SIG3 addressing?]

Pollutant	Transducer	Physical parameter
SO ₂	Conductimetric (resistor, ChemFET)	Conductivity, Gate work function, Impedance spectroscopy
NO _x		
O ₃		
CO		
CO ₂	Resonant sensors (SAW, QCM, cantilever)	Mass, stiffness
NH ₃		
H ₂ S		
VOCs (BTX)	Electrochemical	Redox process
PM	Optical	Absorption, Emission, Dielectric constant
Mould		

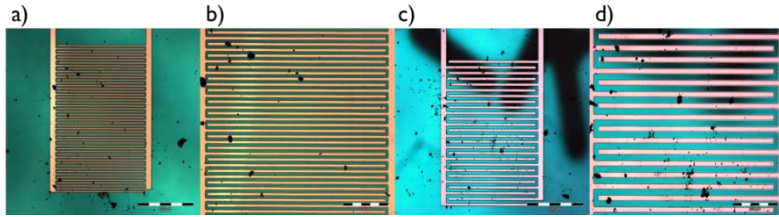
How a pollutant affects the physical parameter measured by the transducer ?

Multi-modal sensor arrays:

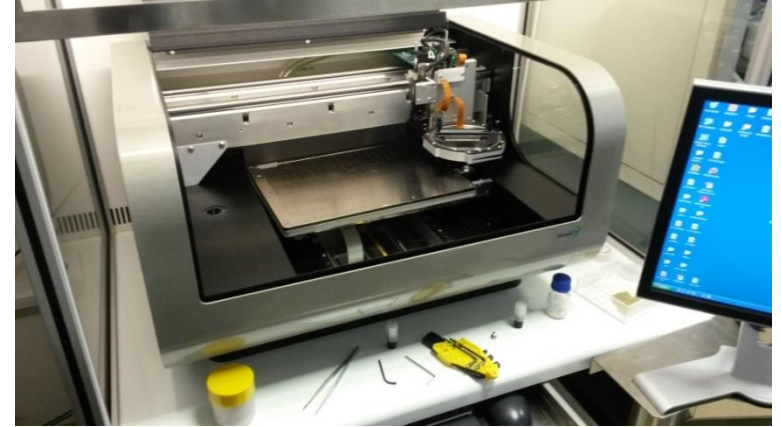
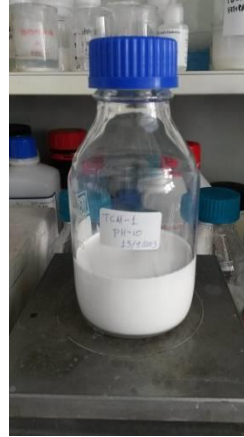
- # materials
- # transducers
- # operation modes

Research Goals in Air Quality Control

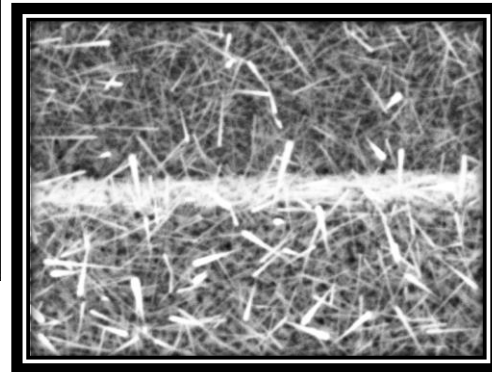
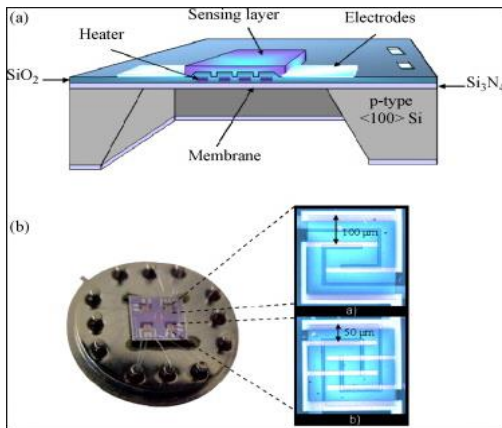
- **Background / Problem statement:** [What is the scientific context and what **research goals** are the Action SIG3 addressing?]



Impedance changes when NPs get stuck at IDE (U Oulu, Finland)



Ink preparation and inkjet printing of sensing materials (FORTH, Greece)



Direct growth and metal decoration of MOXs on silicon or polymeric u-hotplates (URV, Spain)

Priority Innovation Requirements in Air Quality Control

Background / Problem statement: [What is the scientific context and what **priority innovation requirements** are the Action SIG3 addressing?]

- Possibility of detecting VOCs at ppb levels.
- Need for detecting PM with affordable sensors.
- Sensing materials based inks for fully printed sensors.
- Appropriate testing of sensors under realistic conditions to speed up development time.

WGs Recommended Literature in Air Quality Control

- **Background / Problem statement:** [What is the **recommended literature** of the Action SIG3 ? Please, **web-links** of webpages, databases, reviews, papers, etc. are highly appreciated]
- This is to be compiled in Jan-Feb 2014.

CONCLUSIONS

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

Research directions as SIG3 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.