



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*)

Special Interest Group 1 : *NETWORK OF SPIN-OFFS*


Agenzia nazionale per le nuove tecnologie,
l'energia e lo sviluppo economico sostenibile

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 COST is supported
by the EU Framework Programme

 ESF provides the COST Office
through a European Commission contract



Context of the SIG-1

- Special Interest Group 1 – Network of spin-off – involve, at present, 11 spin-off and/or start-up from 8 different COST Countries that develop their economic activities on the four principal areas of the Action (Sensor Material and Nanotechnology, Sensors, devices and systems for AQC, Environmental measurements and air-pollution modelling, protocols and standardisation methods) as well as some research groups interested to technology transfer of their results.
- The network **will favour the reciprocal exchanges for knowledge transfer towards industrial and project partnership** and will be useful to **boost the exploitation of the research results** and to promote technology transfer towards new business models based on green economy and environmental sustainability.



Objectives of the SIG-1

Objectives:

- Favour reciprocal knowledge between innovative SME in the field of AQC.
- Contribute to the state-of the art report focusing on actual technology needs, future perspectives, integration possibilities, standards, protocols and guidelines for future agenda.
- Mapping the similar or complementary industrial organizations (i.e., spin-off, start-up, spin-out etc.) in the EU area involved in the fields covered by the Action.
- Define and propose new cooperative instruments for EU spin-offs and innovative SME.
- Support to define Action position papers in the knowledge transfer in air quality control (AQC) issues for future research and innovation agenda.



General needs

- Cooperation (promote the instruments of partnership search and interaction in this action)
- Education (virtual training school for ...)
- Infrastructures (network of sme in ACQ to produce an increase, PRO ECO2, shared calibration, testing and characterization facilities)
- Finance (promote the EU instruments in H2020)
- Legislations (already listed)
- Coaching (already existing)
- Business models



Proposed Activities of the SIG-1

Activities:

- Support to the writing of the State-of-Art planned in the Action for spin-offs activities related to the Action issues.
- Promotion/Definition of EU proposals for funding of new SMEs in the core-business of Action for research and innovation.
- Map of EU Spin-Off in AQC.
- Inform of EU instruments and opportunities
- Create a virtual linked community.



Deliverables of the SIG-1

Deliverables (MoU):

- Reports on mapping of EU spin-offs.
- Reports on proposed Activities to be approved by Action Management Committee.

Suggested **Priorities** for future research to Action SIG1 General Assembly

- Contribute to the state-of the art report focusing on actual technology needs, future perspectives (new customer market) integration possibilities, standards, protocols and guide-lines for future agenda
- Mapping similar or complementary industrial organizations
- Define and propose new cooperative instruments for EU spin-offs and innovative SMEs (screening of available EU instruments and evaluate their effectiveness, etc.)
- Support to define Action position papers in the knowledge transfer in air quality control (AQC) issues for future research and innovation agenda.

Suggested **Priorities** for future research to Action SIG1 General Assembly

Activities as SIG1 PRIORITIES for Action TD1105:

- Odour measurements is not big market due to absence of regulation so harmonization of odour measurements
- Push the creation, extension and adoption of regulations (i.e. methodologies, guidelines) at EU levels
- Low cost devices and easy to use for odour monitoring
- Performance that reduce the cost
- Communication distances for wireless network of sensors
- New sensors for odour assessment
- Air-quality case-studies, stability assessment
- Calibration strategies for low cost sensing devices
- Work on POP detection

Suggested **Priorities** for future research to Action SIG1 General Assembly

Research directions as SIG1 PRIORITIES for Action TD1105:

- Chemical and radiation environmental monitoring
- Ozone sensors, NOx and CO and CO2 sensors for automotive application
- Improve stability of available sensors, compatibility with CMOS microelectronics, soft CMOS post-processing methods for reproducible high throughput manufacturing
- Toxic and explosive (hydrogen) gas leakage
- Biosensor based on enzyme for dioxin and POP, work on POP detection
- VOC detection developing sensors modules and sensor systems
- Indoor air quality control, leak detection
- Odour monitoring system (odour tel)
- Enhancement of the sensing properties by introducing functional receptive groups
- Coupling different transduction modes in the same device

Current research activities of the Partner (1/2)

- **Current research topics at the partner organization / Problem statement:** Validation of our air quality monitor portable sensors system



Figure 1: Nasus IV machine

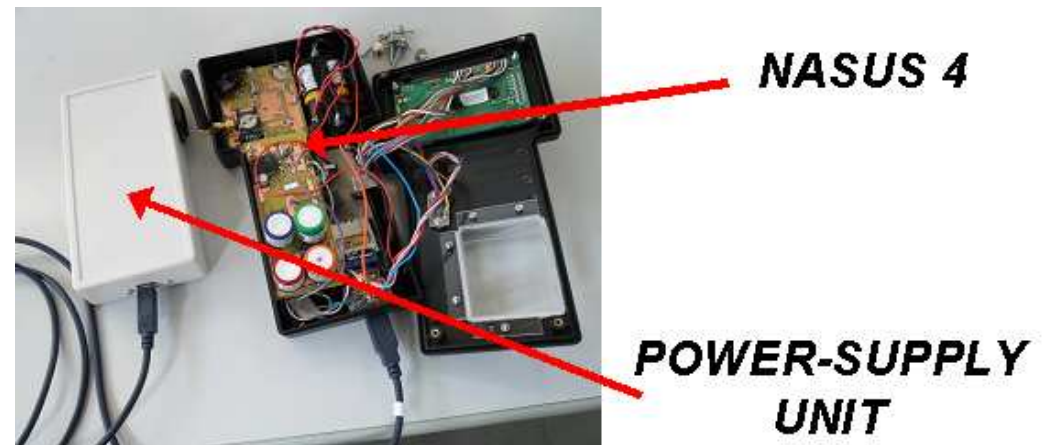


Figure 2: inside Nasus IV

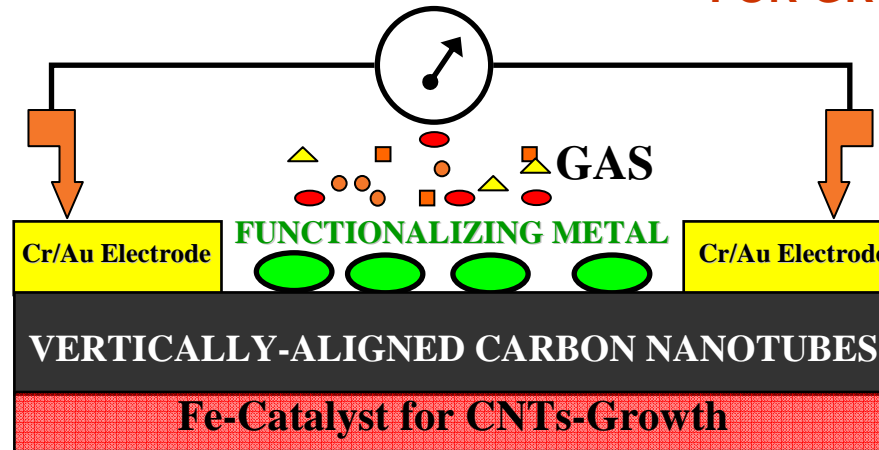
Current research activities of the Partner (1/2)

- Brief list of ongoing activities of the Partner:
 - Smart City Bari - air quality monitoring on local transports
 - Smart Ring L'Aquila
 - PON01_00980 - *Methodology and Instruments of Building Automation and Information Technology* - BAITAH
 - Validation of the portable system with the Reg. Env. Prot. Agency and JRC-Ispra

Research Facilities available for the Partner (2/2)



- FUNCTIONAL CHARACTERIZATION
- ELECTRONICS



METAL NANOCLUSTERS FOR GROWING CNTs LAYER



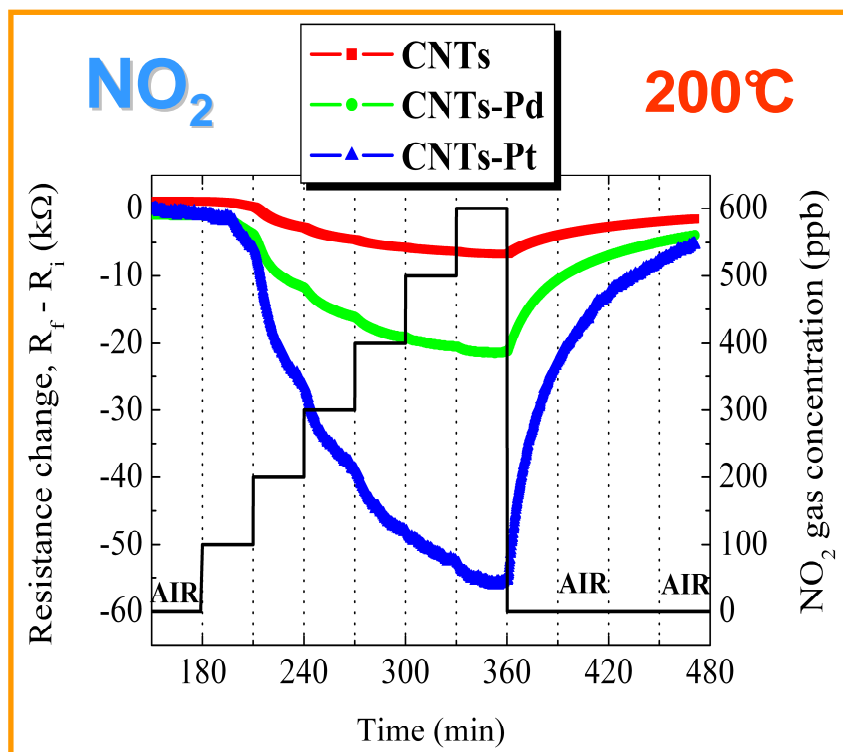
← METAL FUNCTIONALIZATIONS AND ELECTRICAL CONTACTS

CNTs GROWTH →
by RF-PECVD TECHNOLOGY



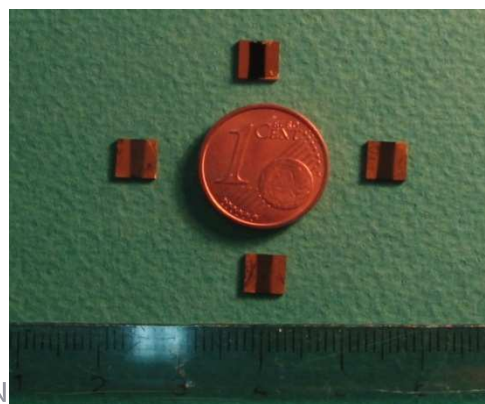
Current research activities of ENEA (1/2)

INNOVATIVE GAS SENSORS BASED on **CNT LAYERS FUNCTIONALIZED by Pt and Pd** NANOCCLUSERS for AIR QUALITY CONTROL of **NO₂ POLLUTANT at PPB LEVEL**



Gas	Limit of Detection calculated by measurements of CNT-SENSORS (ppb o ppm)		
	CNTs	CNTs:Pd	CNTs:Pt
NO ₂	19 ppb	9 ppb	3 ppb
H ₂ S	46 ppb	23 ppb	4 ppb
NH ₃	3.8 ppm	1.7 ppm	0.2 ppm
CO	90 ppm	32 ppm	4 ppm

ATTENTION LEVEL = 100 ppb NO₂
ALARM LEVEL = 200 ppb NO₂
 (Italian Law DM 15 April 1994 and daughters)



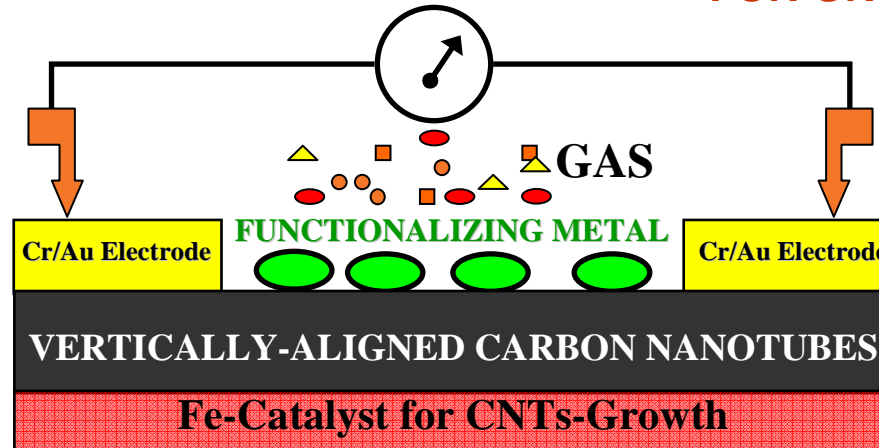
IT PATENT ENEA BO2008 A000100

**Conductometric Gas Sensor
based on Carbon Nanotubes**

Research Facilities available for the Partner (2/2)



- FUNCTIONAL CHARACTERIZATION
- ELECTRONICS



METAL NANOCCLUSERS
FOR GROWING CNTs LAYER



Lab THIN FILMS



Lab THIN FILMS

← METAL FUNCTIONALIZATIONS
AND ELECTRICAL CONTACTS

CNTs GROWTH →
by RF-PECVD TECHNOLOGY



Lab CVD



Industrial Liason Office

Technology Transfer Activities:

- Scouting of research activities
- Market research
- Mapping of research results
- Matching the industrial needs with the Enea technology offer
- Support on licensing
- Regional, national and international networking (i.e. Enterprise Europe Network)
- Pushing researchers to “Spin Off” their results
- Support on collaborative research contract