



COST

European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir* COST Action TD1105

WGs and MC Meeting at Rome, 4-6 December 2012

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

Year: 2012-2013 (*Starting Action*)



UNIVERSITÄT
DES
SAARLANDES



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Scientific context and objectives in the Action

- **Sensors and sensor systems for Air Quality Control**
- **WG2: from nanomaterials to sensor systems**
(Sensors, devices and sensor systems for AQC)
- **WG2 objectives:**
- Protocols for fabrication of gas sensors; specifically
 - integration of nanostructures and -materials in AQC gas sensors;
 - design and implementation of new transducers for AQC sensors;
 - device characterization for AQC gas sensors;
- Report for integration of portable gas sensor-systems for AQC;
- Report on integrated intelligence of AQC systems & distr. computing;
- Protocols for development of wireless sensors network for AQC;
- Report on IP Rights of gas nanosensors for AQC.



Current research activities of the Partner (1/2)

- **Saarland University: NanoBioMed is one of three key research areas** (others are computer sciences and Europe)
 - Nanomaterials (materials science, chemical and biological)
 - Nanostructure analysis (physics, materials science, chemistry)
 - Applications of nanotechnology especially for biomedical field, e.g. drug targeting, personalized medicine, environmental issues
- **Lab for Measurement Technology (Dept. of Mechatronics): Intelligent chemical sensor systems**
 - Gas sensing, especially based on “virtual multisensor” approach
 - Liquid media sensing, e.g. oil degradation, fluid mixture analysis

Current research activities of the Partner (2/2)

- **Ongoing research topics at USAAR-LMT:**
 - Safety applications (e.g. fire and leakage detection) with emphasis on high stability and false alarm suppression
 - Modular sensor systems for assessment of smell
 - Sensor (system) self-monitoring by combining TCO and EIS
 - VOC-IDS (MNT-ERAT.NET): indoor air quality control by selective detection of hazardous VOC
- **Research approach:**
 - Close cooperation with sensor and materials providers
 - Integration of complex systems up to field testing



Research Facilities available at the Partner (1/2)

- **Research Facilities at Saarland University:**
 - Comprehensive nanoanalytical tools (REM, SEM, FIB , SXM, XRD, ...)
 - Chemical nanotechnology, such as thin film, sol-gel, etc.
 - Physical micro- and nanostructuring
 - Microtechnology clean room with thin film deposition, lithography (direct laser and mask aligner), anisotropic etching etc.
 - Laser patterning down to sub 100nm structures using three-dimensional two-photon lithography

Research Facilities available at the Partner (2/2)

- **Research Facilities at USAAR-LMT:**
 - Microthermography for analysis of sensor substrates (10 μm resolution, up to 10 kHz image rate)
 - High-res FTIR spectrometer for material and gas analysis
 - Portable FTIR spectrometer for reference measurements
 - Several automated gas mixing systems (up to 6 test gases incl. permeation tubes for ultra low concentrations), controlled r.h., T
 - EIS measurement up to 120 MHz
 - Electronics for temperature controlled gas sensor operation
 - Field test systems for various applications
- **Close cooperation with spin-off 3S GmbH**

Suggested **Priorities** for future research (1/2)

Research directions as **PRIORITIES** for **SENSOR TECHNOLOGY**:

- Versatile μ -transducers for integration of various nanomaterials
 - Allow application specific adaptation and lower cost
- Dynamic operation of gas sensors (temperature, EIS, field effect...)
 - Gain more than one signal from each sensor for higher selectivity and stability as well as possible self-monitoring
- Intelligent sensor modules
 - Electronics combined with sensor elements
- Intelligent sensor nodes and networks
 - Combining several sensor modules in situ or in networks



Suggested **Priorities** for future research (2/2)

Research directions as **PRIORITIES** for **APPLICATIONS**:

- Outdoor air quality monitoring (imission control)
 - Better information for citizens and awareness of pollution
- Indoor air quality monitoring (imission control)
 - Controlled ventilation due to monitoring of hazardous VOC
 - Reduced health hazards plus improved energy efficiency
- Outdoor monitoring of pollution sources (emission control)
 - Identification of sources and minimization of emissions
- Closed loop process control (industrial, transport, home use)
 - Minimization of emissions at source, active countermeasures

Suggested **Priorities** for future research to Action WGs/SIGs General Assembly

- **(2 slides)**
- **Research directions as WGs PRIORITIES for Action TD1105:**
- [Suggest briefly the PRIORITIES for research to be carried out in the Action for future activities.]
- [Highlight the *Innovation* of your suggested PRIORITIES]
- **Please, organize these 1-2 slides AFTER DISCUSSION of your WG or SIG Meeting on 5 December at Rome taking into account various contributions from WG/SIG partners. This Presentation must be given by the WG or SIG Leader to related Action General Assembly.**