

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

INTERNATIONAL WG1-WG4 MEETING on
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New VOC sensor system for Indoor Air Quality Monitoring with first proof-of-concept results



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Motivation and Scope

- Modern buildings are becoming more and more leak proof in order to reach low energy consumption requirements
 - Relevant carcinogenic and toxic VOCs are emitted from carpet, furniture and building materials
- **Need for low cost (and low power) sensor systems serving as a basis for ventilation control beyond or in parallel to CO₂**

Detection limits (derived from WHO and EU recommendations)

Benzene	Toluene	Formaldehyde	Naphtalene	Tetrachloroethylene
5 µg/m ³	260 µg/m ³	30µg/m ³	10 µg/m ³	250 µg/m ³
1,4 ppb	60,8 ppb	22,4 ppb	1,7 ppb	33,8 ppb

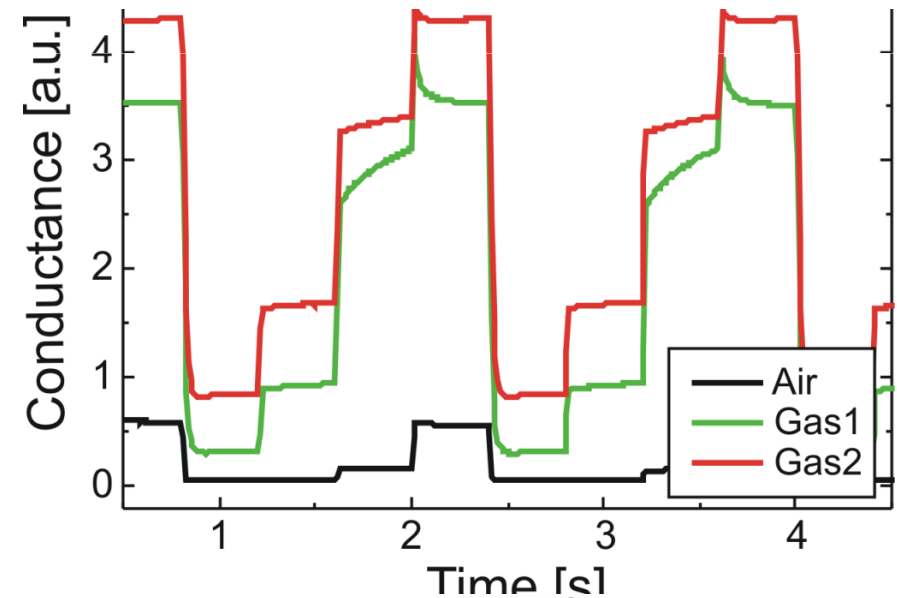
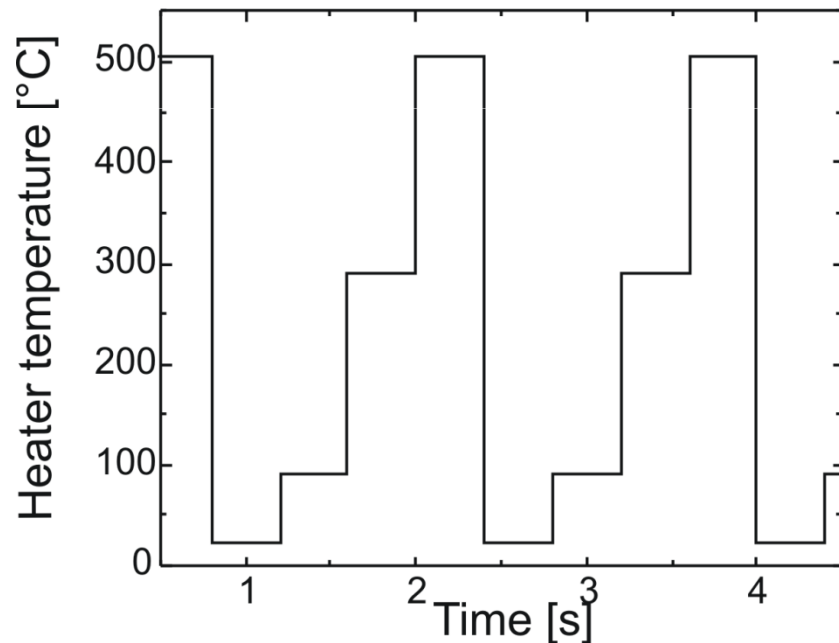
→ **“specifications”**: High sensitivity and selectivity

→ **Development within the scope of era.net-project “VOC-IDS”**

Approach: T-modulation of MOX sensors

- Key issue: metal oxide semiconducting gas sensors combined with a dedicated operating mode
 - Temperature profile as stimulus for one sensing element
 - Response curves show characteristic fingerprints for each gas

→ Selectivity (and stability) improvement



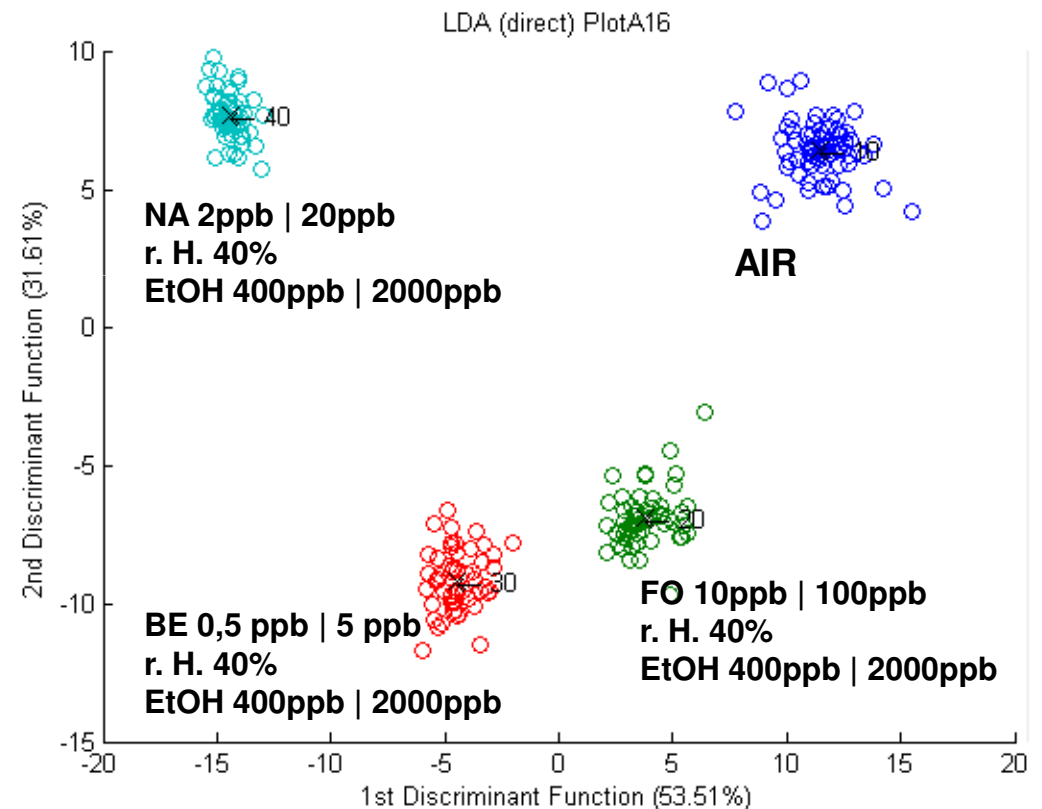
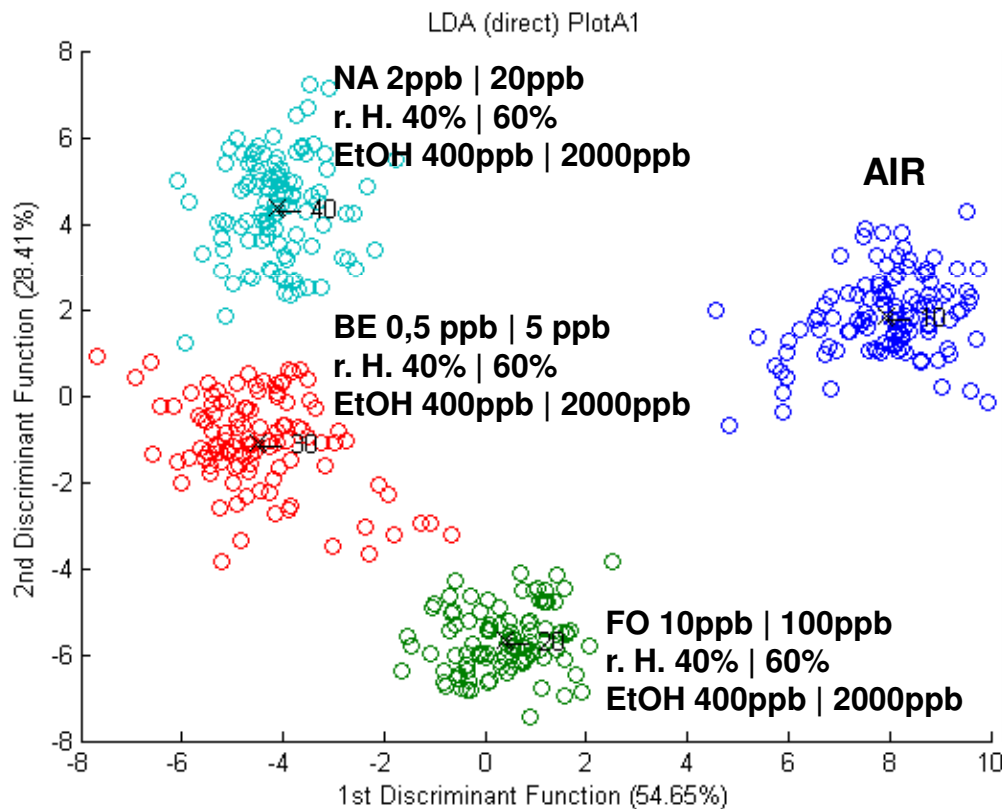
IAQ-Monitoring field test system

- Modular system for two MOX gas sensors
 - CO₂-sensor und r. H.-sensor also incorporated
 - SD-card for raw data collection in field tests
 - Bus interface for ready results communication and power supply
- Application specific sensor systems



First proof-of-concept results

- Scenario I: separation of rel. VOCs within varying humidity and background TVOC-level
- Scenario II: separation within a hierarchical approach with r. H. Sensor
- Quantification is done in a separate step following VOC identification



Conclusion and Outlook

Conclusion:

- Need for low cost and low power devices in IAQ-monitoring
→ systems based on MOX-sensors
- Flexible system for field tests and short time-to-market
- Proof-of-concept lab measurements are promising
→ ppb-level discrimination of hazardous VOCs has been achieved

Outlook:

- Proof-of-concept of quantification
- Field tests will provide real background situations
- Calibration strategies are being tested

