

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

INTERNATIONAL WG1-WG4 MEETING on

New Sensing Technologies and Methods for Air-Pollution Monitoring

European Environment Agency - EEA

Copenhagen, Denmark, 3 - 4 October 2013

POSTER SESSION

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 2: 2013-2014 (*Ongoing Action*)

**CONDUCTOMETRIC GAS DOSIMETER FOR
NO₂ DETECTION**



FM | **funktionsmaterialien**

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Function in the Action: Early Stage Researcher

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Scientific Context and Objectives

legislation limits given as:

- mean time values (hour/day/year)
- peak concentrations



reliable, direct and long-term detection of lowest analyte levels and analyte dose

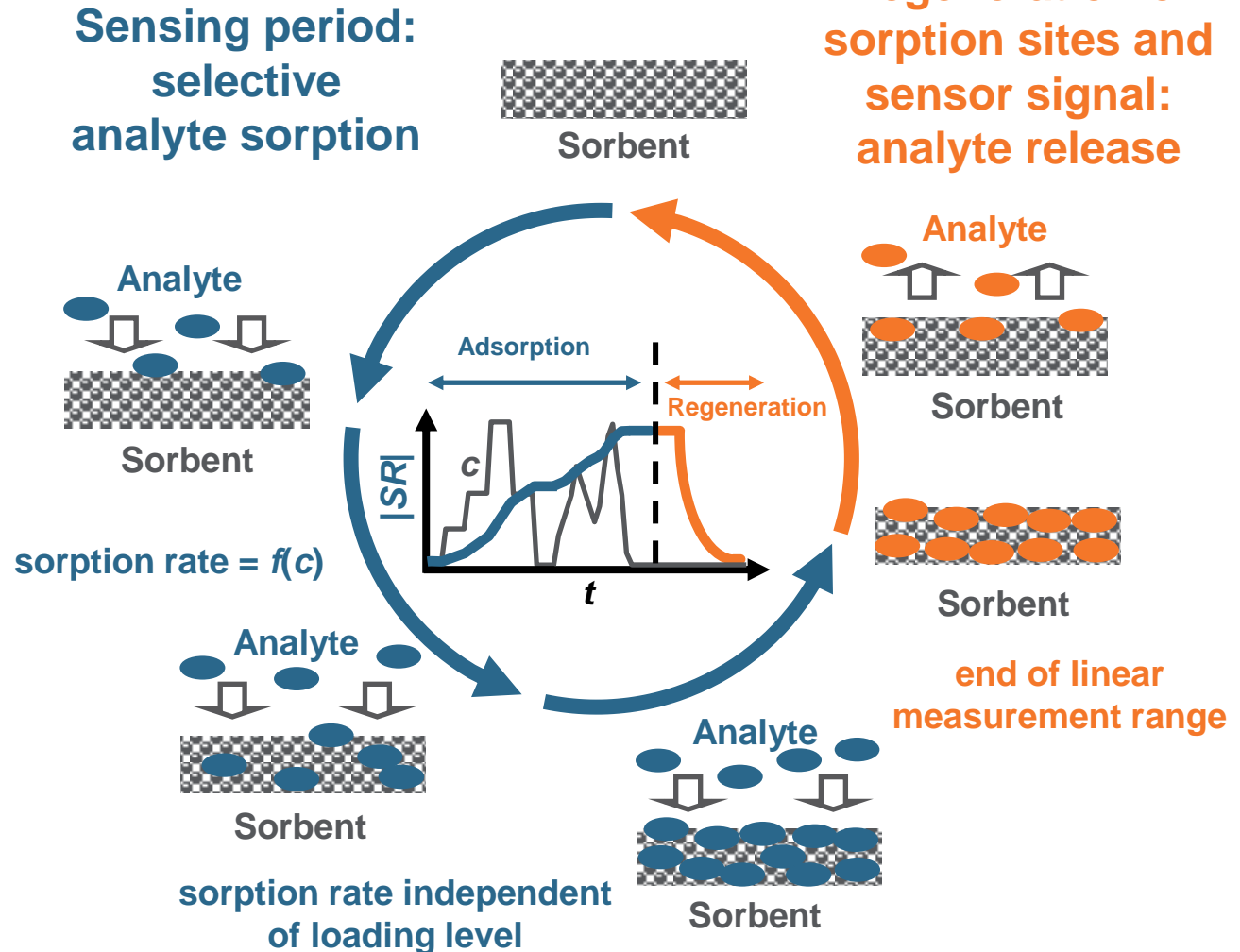


gas dosimeter



EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Dosimeter Principle



RESULTS

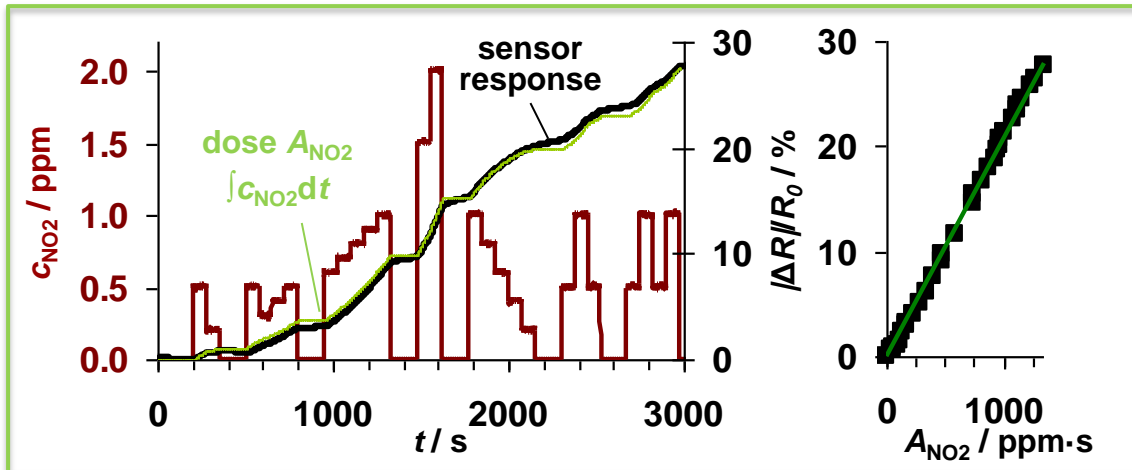
Conductometric NO₂ Dosimeter^[1]

- carbonate-based sensing material → formation of nitrates
- resistance dependent on NO₂ loading level
- steps of 0.2 to 2 ppm NO₂ for each 75 s (2 l/min)

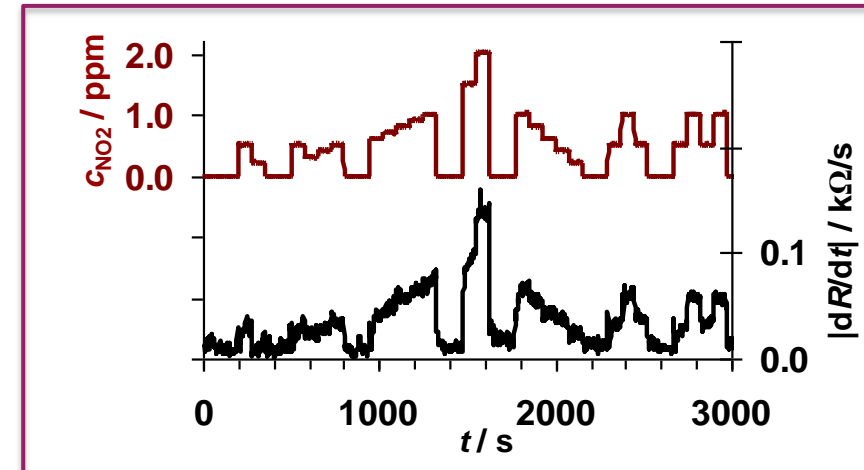
legislation limits given as:

- mean time values
- peak concentrations

direct dose detection



concentration determination via derivative



EU Directive 2008/50/EC on ambient air quality:

- Hourly mean value of $200 \mu\text{g}/\text{m}^3 \cong 360 \text{ ppm}\cdot\text{s}$ (regeneration required every ~ 3.7 h)
- Annual mean value $40 \mu\text{g}/\text{m}^3 \cong 72 \text{ ppm}\cdot\text{s}$ (regeneration required every ~ 18.5 h)

**NO₂ dosimeter
suitable for
air quality monitoring**

CONCLUSIONS and Future Activities

Benefits of Gas Dosimeters for Air Quality Monitoring

- **selective** irreversible analyte **accumulation** by chemical reaction
- **real-time** evaluation of the sensor signal
- direct **amount detection (=dose)**
- actual **concentration** via time derivative
- reliable **low-level** detection due to progressive accumulation
- periodic **regeneration** of material and sensor signal possible
- in agreement with legislative requirements
- further promising materials are under study, also for other analytes