



COST

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

**Gas sensor-systems
for selective pollutant monitoring**

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Several strategies to achieve selectivity

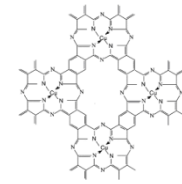
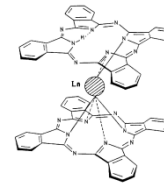
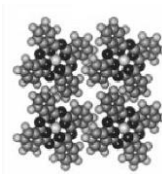
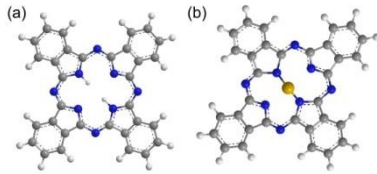
- **Material functionalization**
- **Working conditions modulation**
- **Transduction**
- **Separating structures (filters)**

Our strategies?

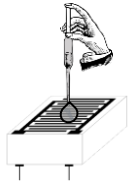
Simultaneous approaches !

Why phthalocyanines as sensitive material ?

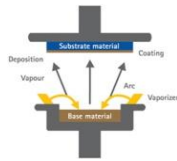
A great diversity of molecule \Rightarrow shaped material to the target gas



Elaboration of thin/thick films



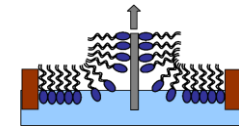
Drop-casting



PVD

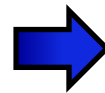


Spin-coating



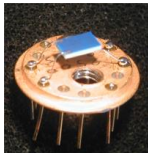
Langmuir-Blodgett

High specific surface area

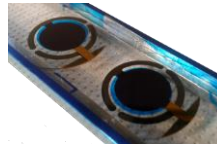


Highly sensitive gas sensors

Compatibility with several transducers



Conductometry



QCM



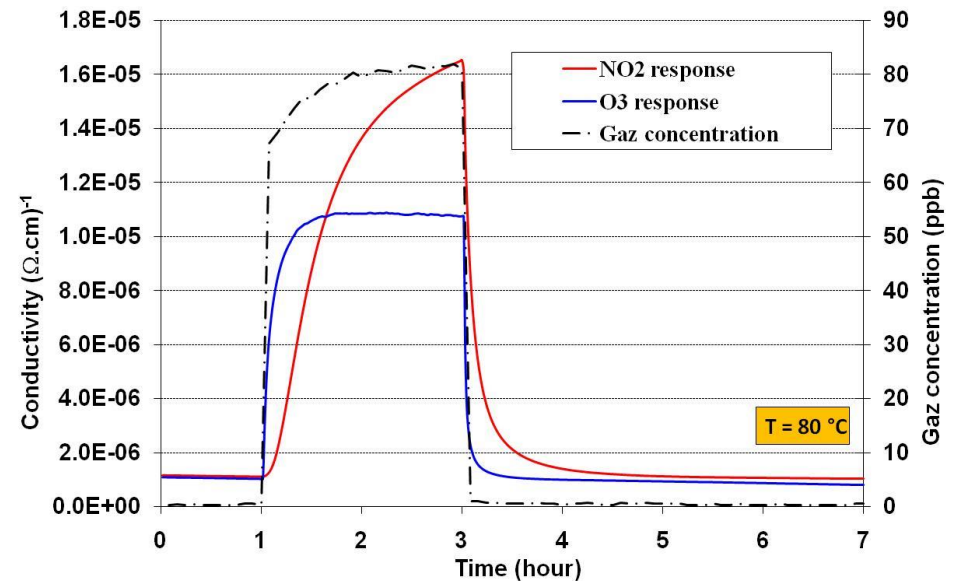
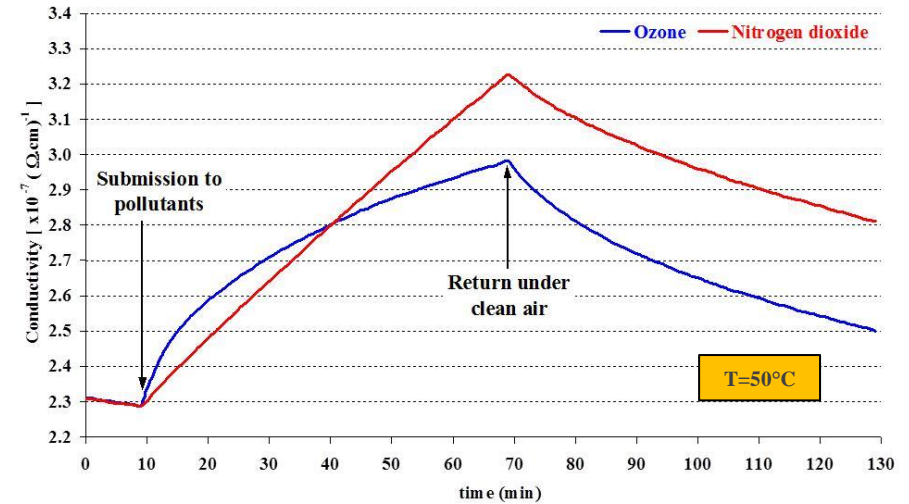
Microwave transduction

Phthalocyanine-based gas sensors

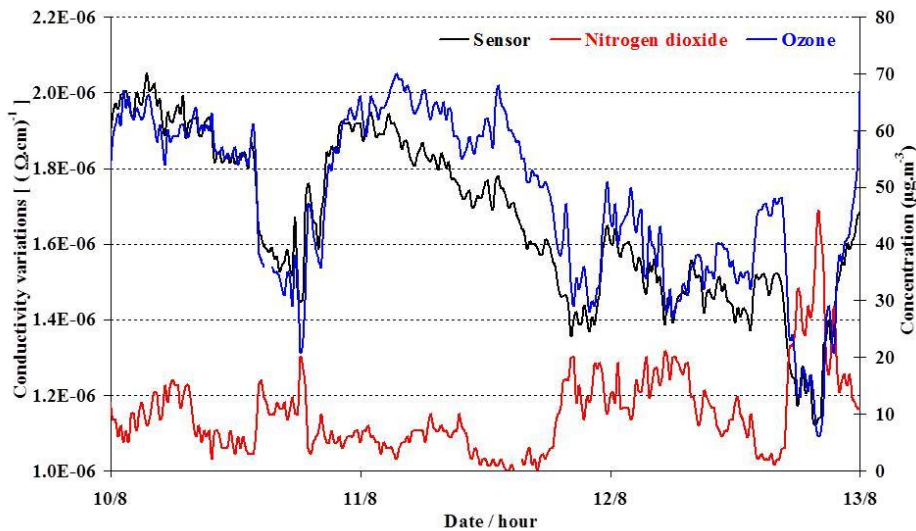
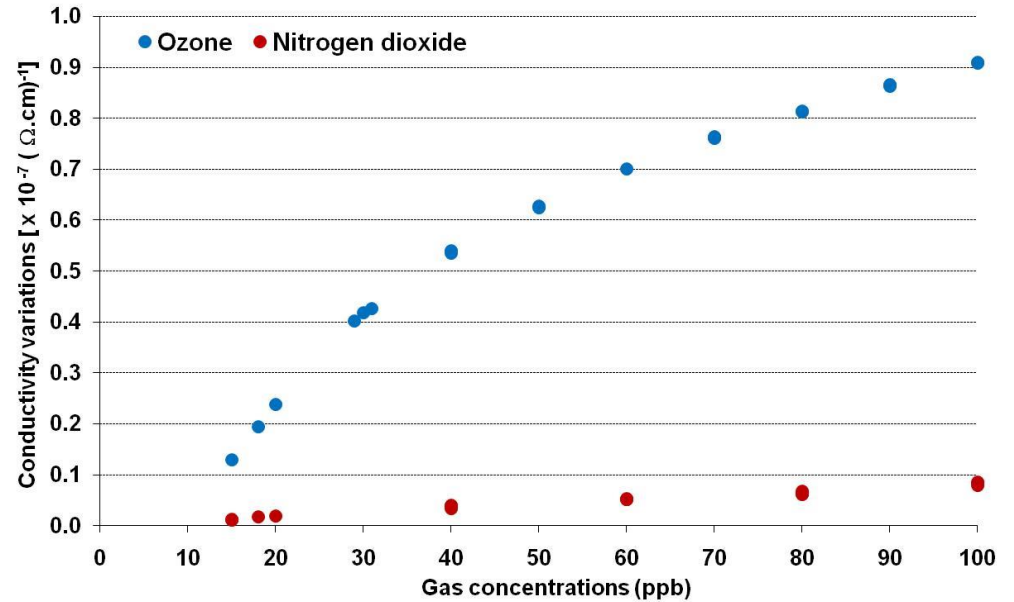
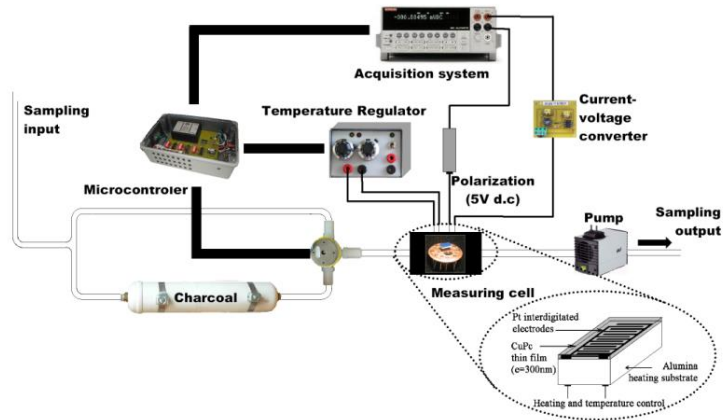
CuPc +
conductometric transduction
= partial selectivity
to oxidizing gases



Significant responses
due to NO₂ and O₃
in the context of AQC

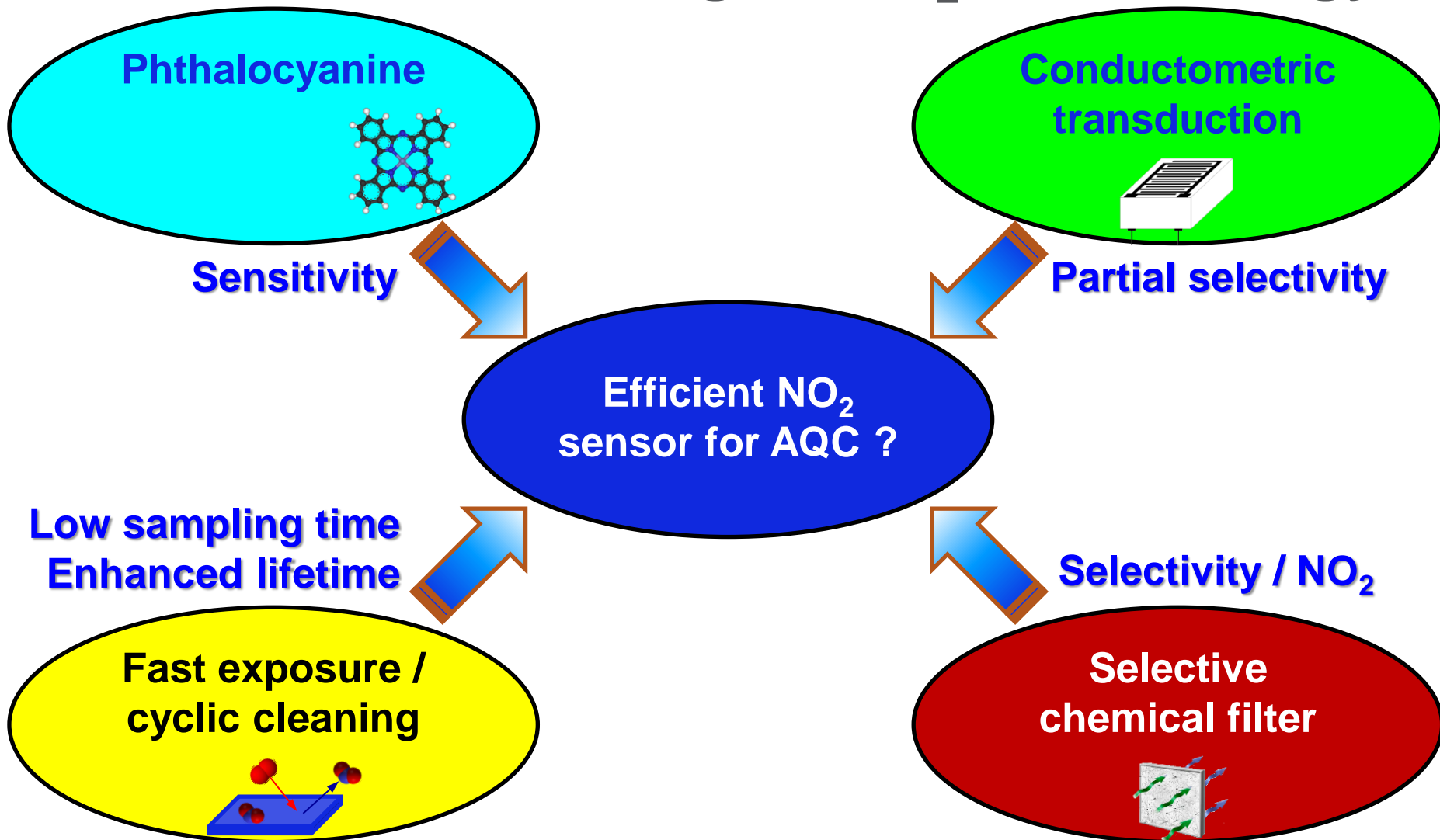


Sensor-system selective towards O₃: our strategy



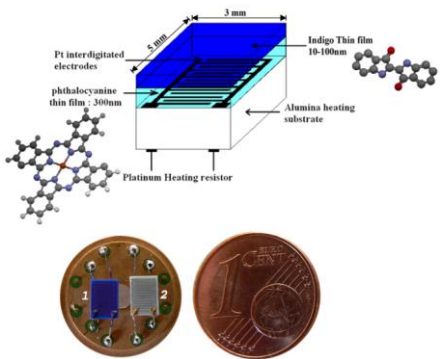
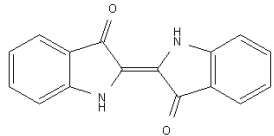
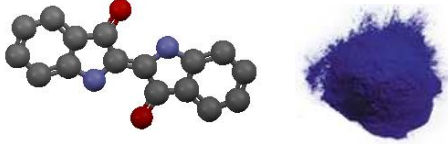
J. Brunet et al., Thin Solid Films 490 (2005)

Selective monitoring of NO₂: our strategy

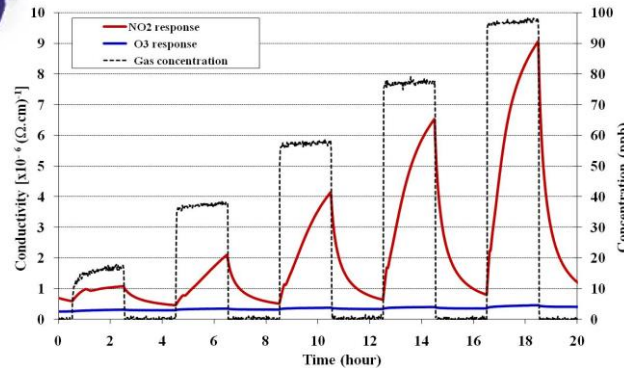
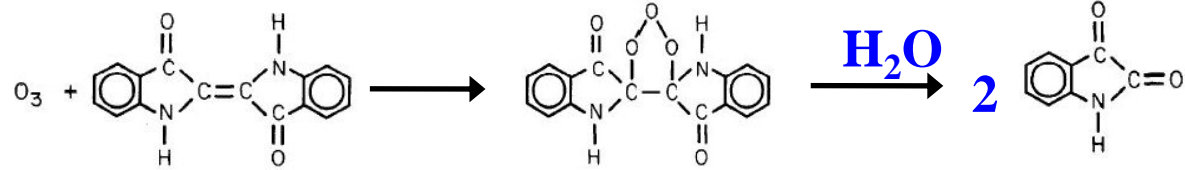


Gas sensor-systems selective towards NO₂

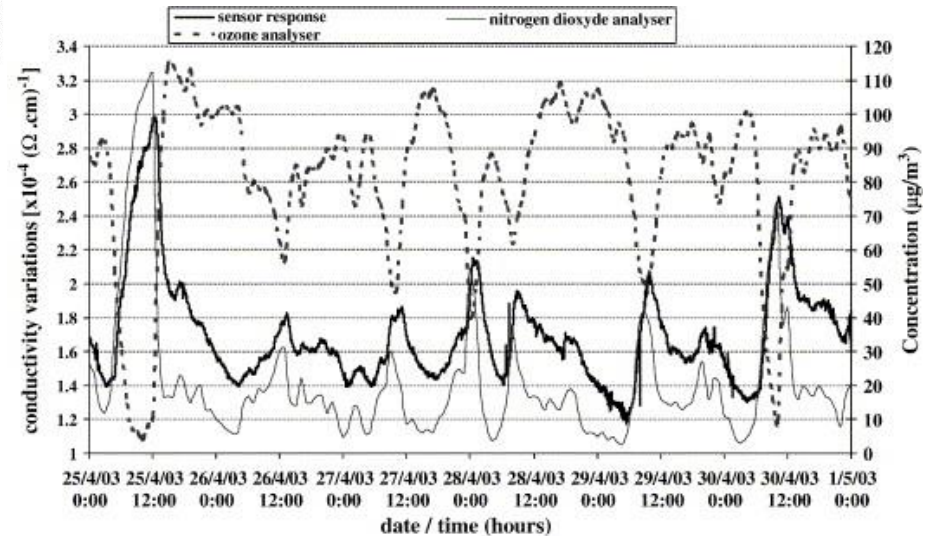
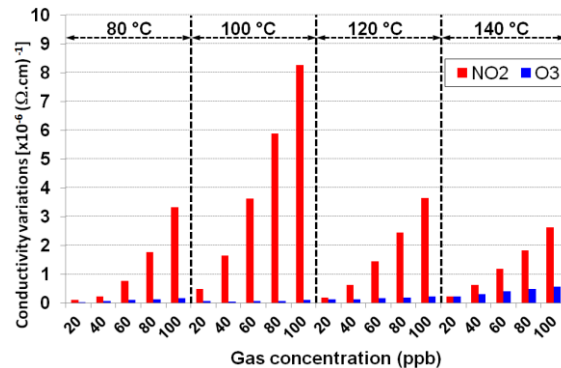
Powdered & layered indigo



Selective reaction of O₃ on indigo : ozonolysis



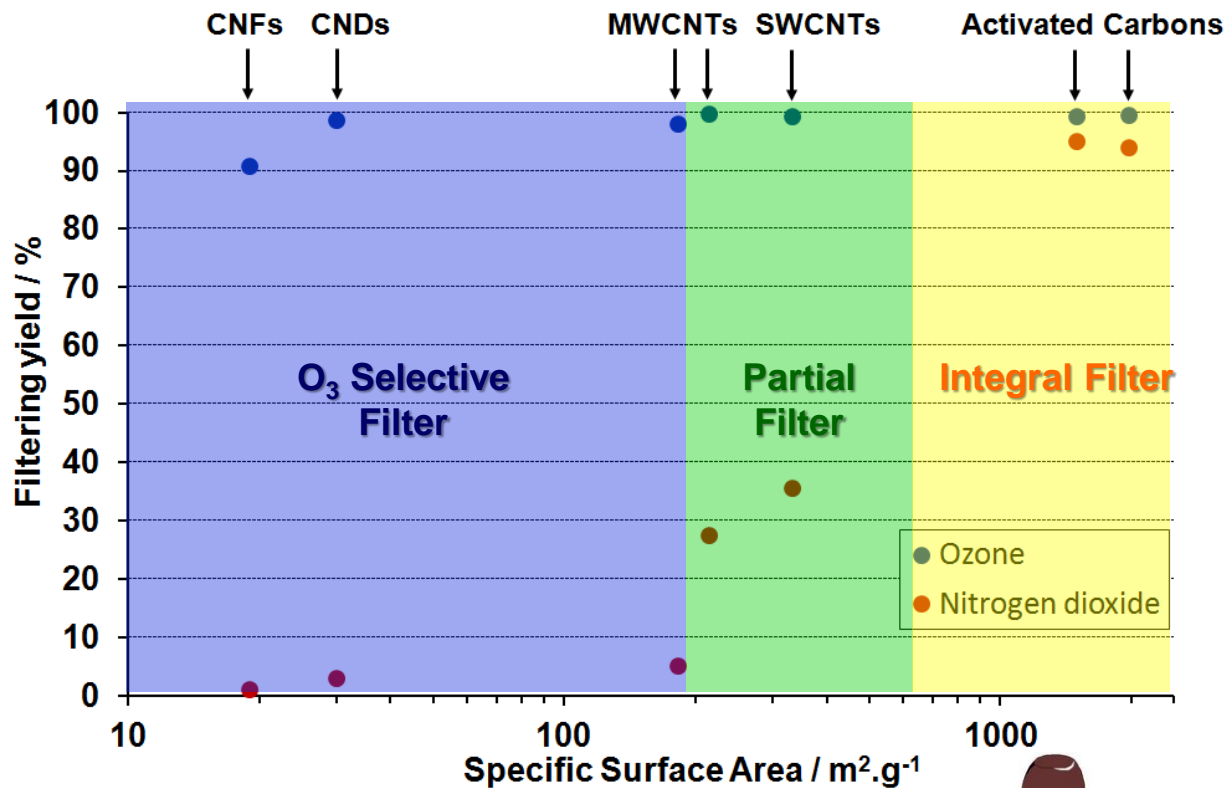
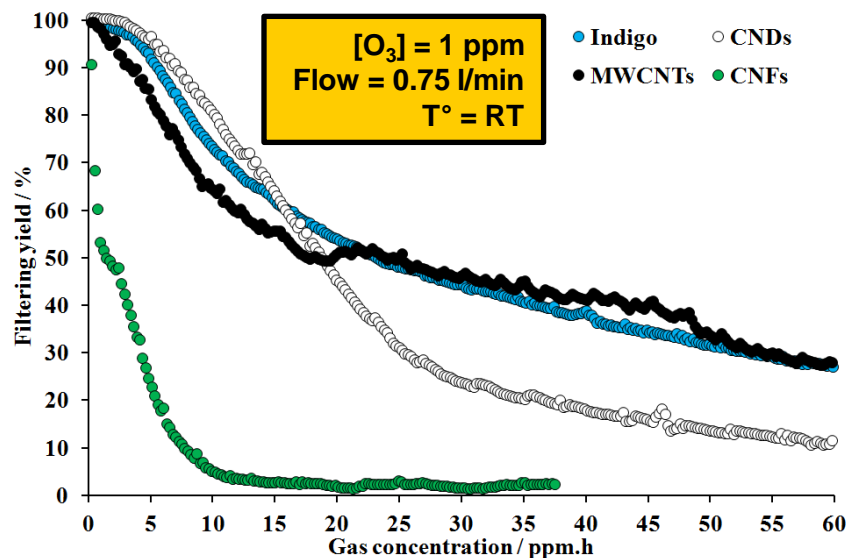
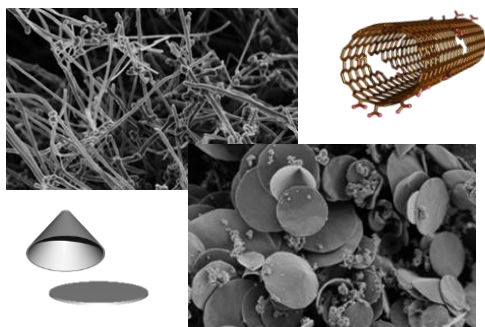
Organic Electronics 11 (2010)



Mat. Sc. & Engineering :C, Vol. 26 (2006)

Gas sensor-systems selective towards NO₂

Nanocarbons

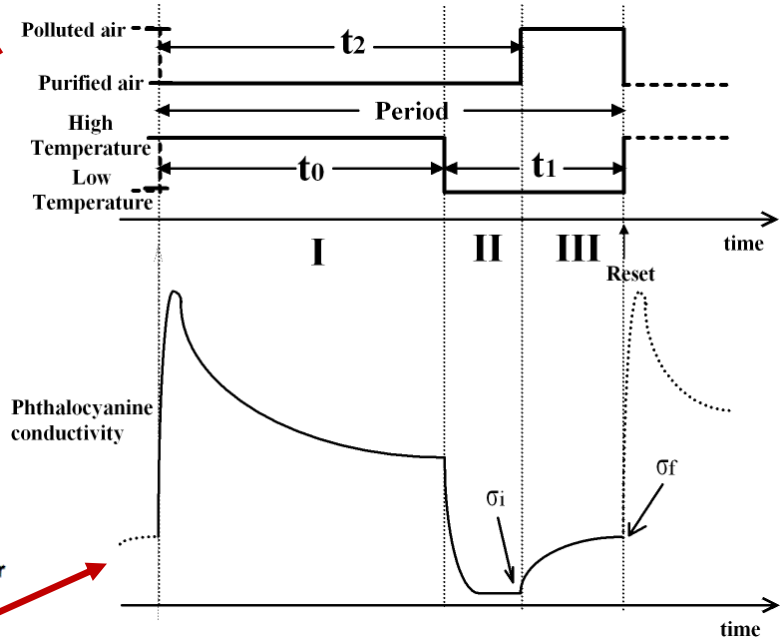
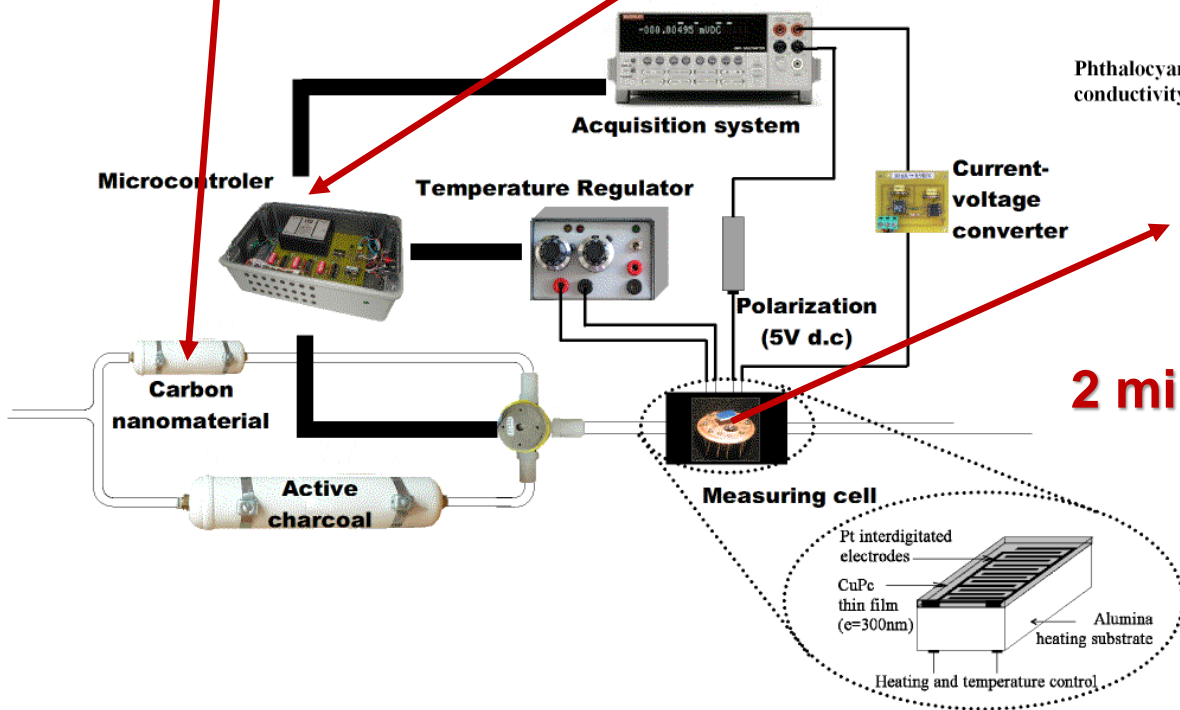
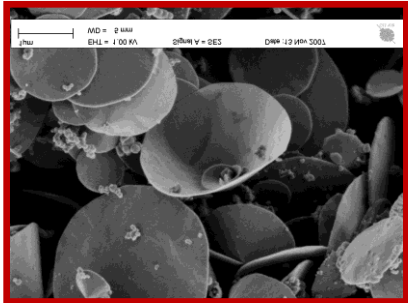


Durability ?
Selectivity / O₃ ? **CNDs**



Sensor and Actuators B, Vol. 173 (2012)

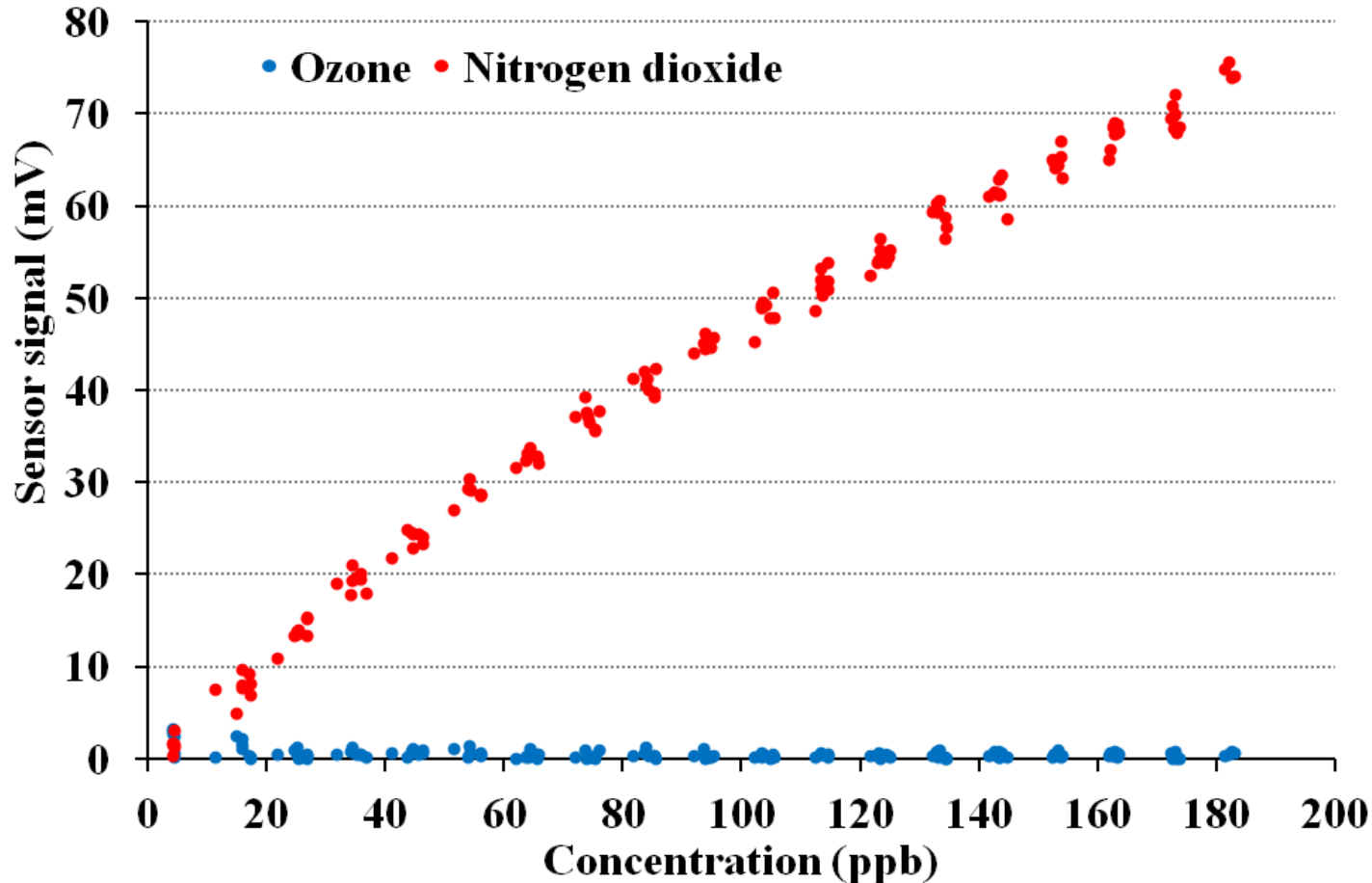
Gas sensor-systems selective towards NO₂



2 minutes of pollutant exposure during one cycle !

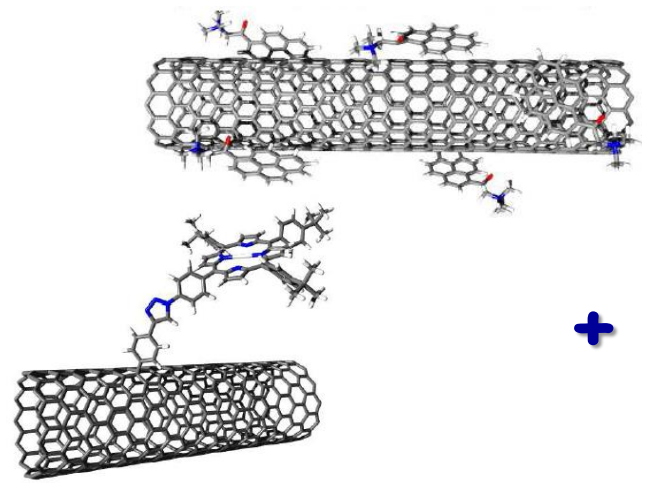
One measurement each 15 minutes !

Gas sensor-systems selective towards NO₂



Sensing device lifetime = 45 days for a continuous O₃ exposure close to 50 ppb

Gas sensor-system for BTX detection: in progress

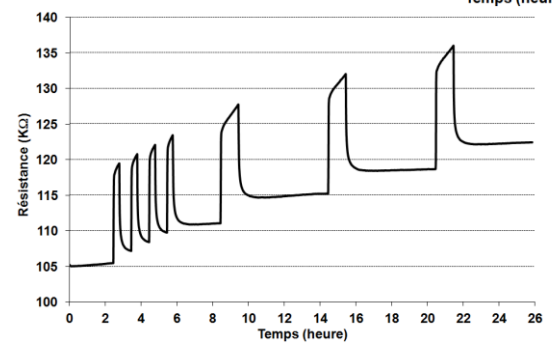
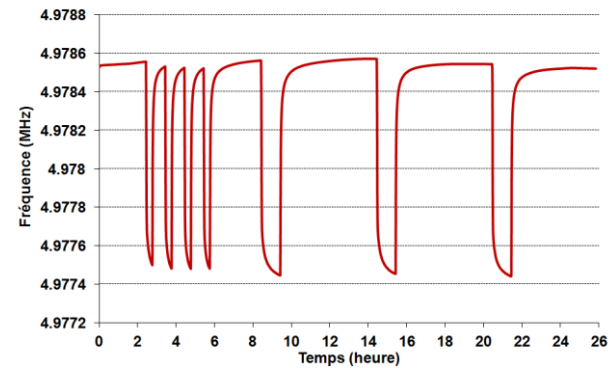
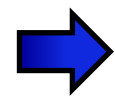


Functionalized material

+



Multi-transducers



French project CAP-BTX (ANR financial support)



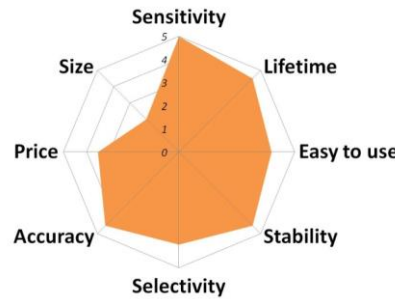
Gas sensors for AQC: a brief marketing study

Marketing Study about Gas Microsensors for Air Quality Control

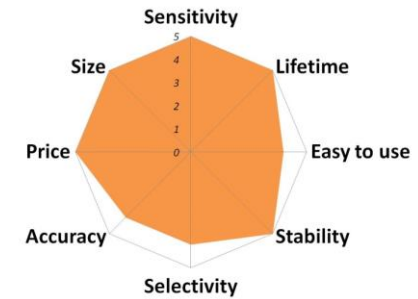


Expected characteristics

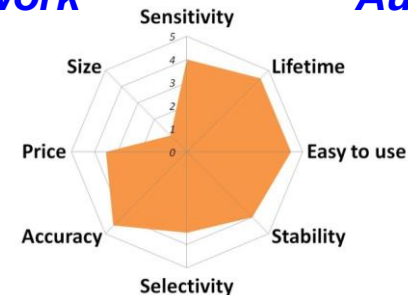
Potential users



AQC network



Automotive



Park & tunnel

+ Low energy
+ Autonomous



Automotive industry



AQC network



Tunnel & park management

