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*)

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ESF provides the COST Office through a European Commission contract

Scientific context and objectives in the Action

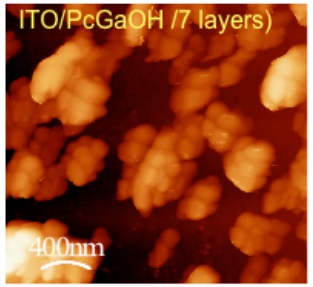
Sub-WG 1.3: Emerging sensor materials for air-pollution detection
molecular materials, organic/inorganic, hybrid, nanocomposites, polymers …

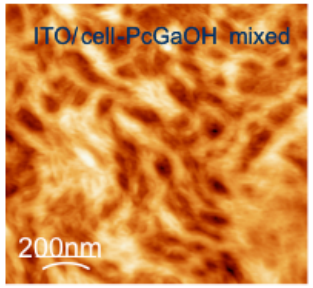
- **Background / Problem statement:**

  - Interest: The tuning of properties by molecular engineering

  morphology, roughness and specific surface, hydrophilicity or hydrophobicity, processability, electrical properties

  - One way: to combine materials for improving chemosensing





AFM images (1 mm x 1 mm) of a pure HOGaPc film (left) and a hybrid film cellulose/HOGaPc film;

Langmuir 23 (2007) 3712-3722

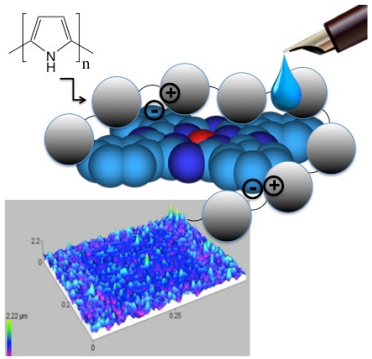
- **Brief reminder of MoU objectives:**

  selectivity, low-cost: solution processing (e.g. printing techniques …)

Current research activities of the Partner (1/2)

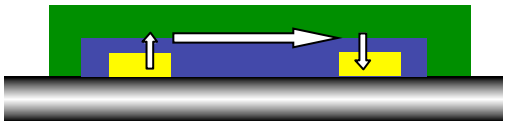
- **Current research topics at the ICMUB:**

  - New materials

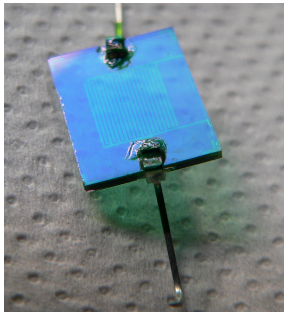


J. Mater. Chem. 2012

  - New transducers



MSDI



- **Brief list of ongoing research topics of the ICMUB:**

  - Humidity-insensitive ammonia sensors

  - Molecular Semiconductor- Doped Insulator (MSDI) heterojunctions as new conductimetric transducers

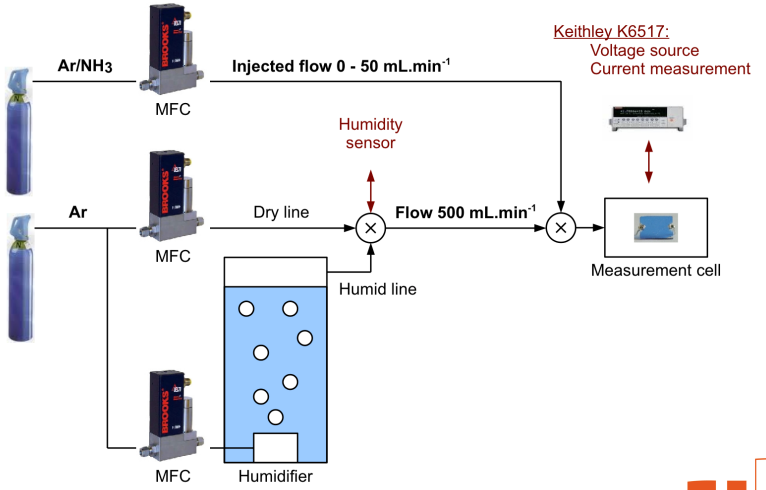
  - New polymer/macrocycle hybrid materials (e.g. PPy/sulfonatedPc)

  - Bioelectrochemical sensors for detection of odorants with OBP

Research Facilities available for the Partner (2/2)

- **Research Facilities:**
- Synthesis
- Solution processing and vacuum chamber
- Electrical and electrochemical measurements set-ups
- Workbenches: O_3 (generator/analyser, ppb range), NH_3 (ppm range), BTX (ppm range), humidity

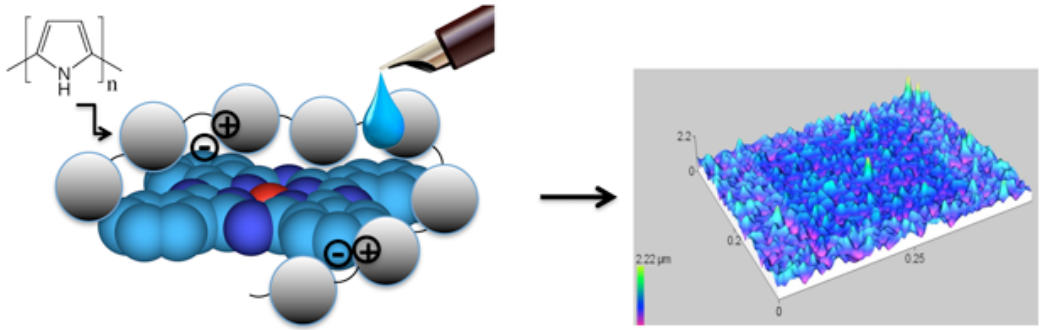
chemistry
electronics
biology

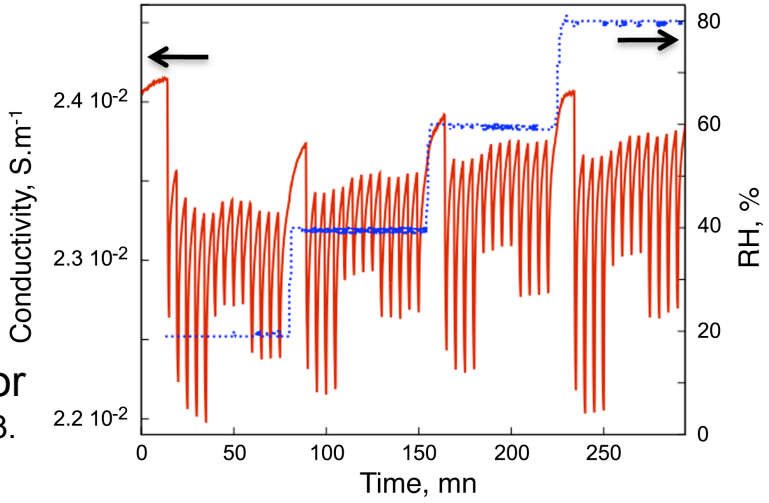


cost
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

Suggested R&I Needs for future research

- **Research directions as R&I NEEDS:**
  - to stabilize the structure and morphology of sensing materials for a higher stability of the response of sensors
  - to study the compatibility with humidity (a key species in AQM)
- The effect of RH on the response of sensors must be studied, not only at one particular value, but also in a broad RH range





Response to NH_3 of an electrodeposited s-CoPc-PPy resistor

T. Sizun, T. Patois, M. Bouvet, B. Lakard, J. Mater. Chem. 22 (2012) 25246-25253.

Suggested R&I Needs for future research to Action WGs/SIGs General Assembly

- **Research directions as WGs R&I NEEDS for Action TD1105:**
- In order to obtain a confident opinion on the performance of a material, in terms of stability and reproducibility of the sensing response, the **inter-laboratory reproducibility of materials** should be studied
- Few materials should be chosen, e.g. one metal oxide prepared as nanoparticles and one molecular material deposited as thin films

- **Please, organize these 1-2 slides AFTER DISCUSSION of your WG or SIG Meeting on 19 December**