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

COST Action TD1105

1ST TRAINING SCHOOL

Universitat de Barcelona, Spain, 13 - 15 June 2013

organized by UB, MIND-IN2UB - Dept. of Electronics and CSIC-IDAEA

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

Year 1: 2012 - 2013 (*Ongoing Action*)

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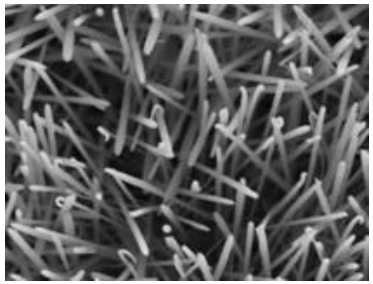
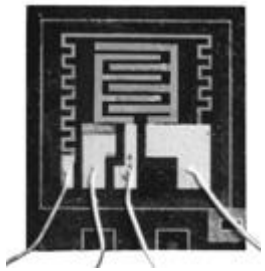
Expertise of the Trainee related to the Action

- Synthesis of nanostructured metal oxides films
- Study of morphology and structural characteristics
- Study of the gas sensing properties of nanostructured materials
  - Chemical and thermal stability
  - High sensitivity
  - Selectivity

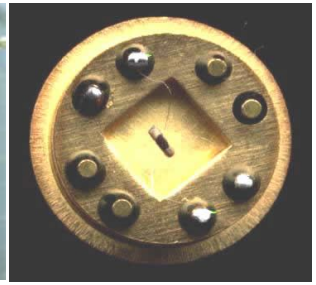
Current research activities of the Trainee (1/2)

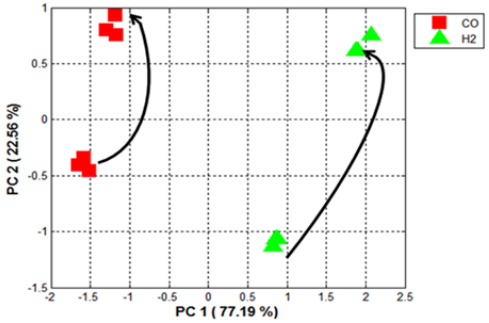
- Design, fabrication and characterization of chemical microsystems





- Research in advanced signal processing techniques for multisensor systems
- Development of applications with multisensor systems and electronic nose instruments

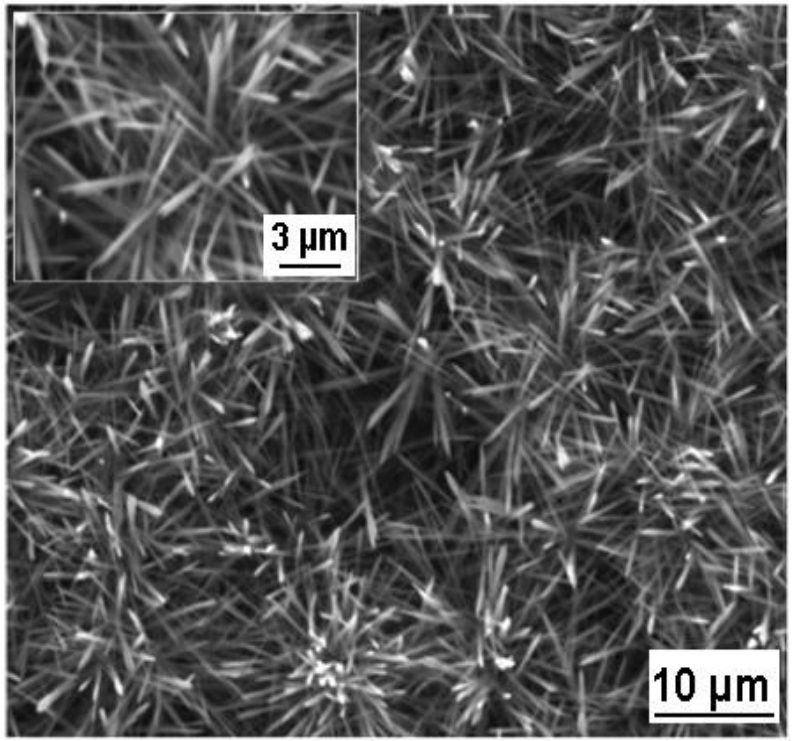




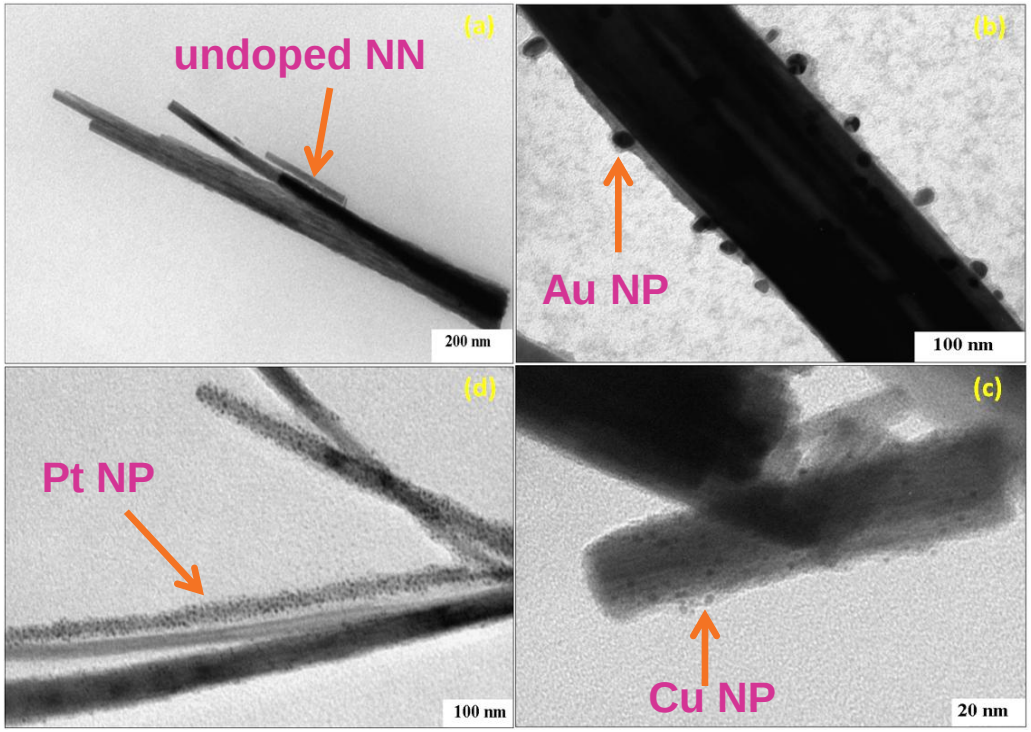
Current research activities of the Trainee (2/2)

- The bottom-up integration of WO_3 nanoneedles in sensor microsystems by using aerosol assisted chemical vapor deposition.
- Morphological and compositional studies using scanning electron microscopy, transmission electron microscopy, X-ray diffraction analysis, Raman spectroscopy and DRIFTS.
- Characterization of gas sensors and their detection of traces of VOCs.

Achieved **RESULTS** and future activities

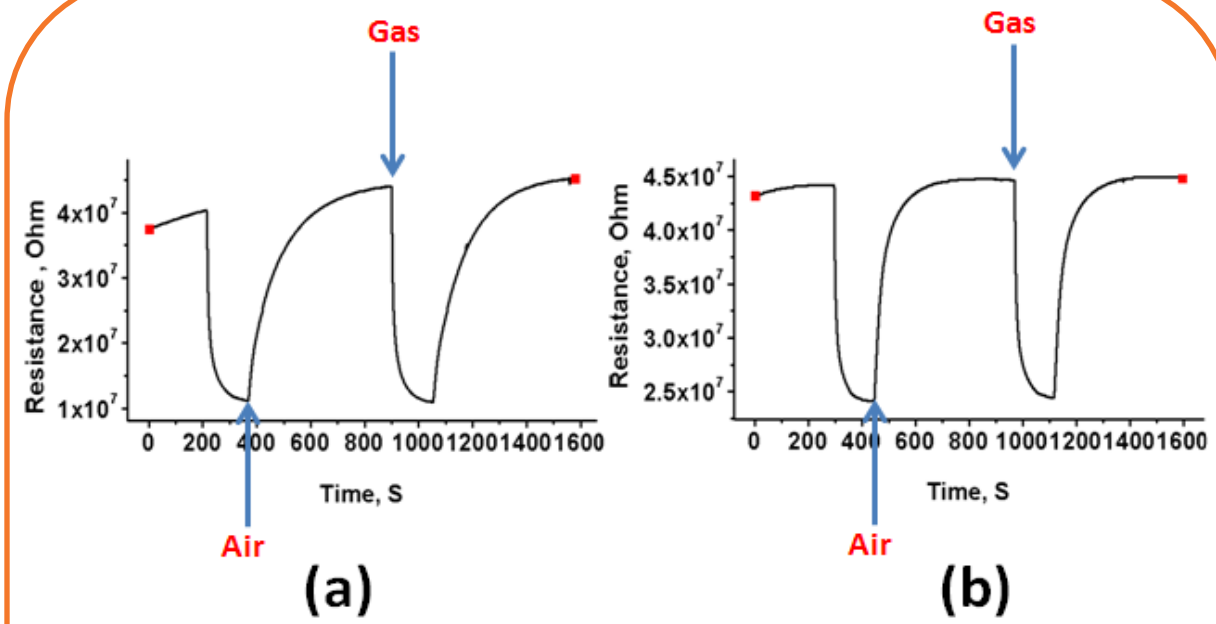


SEM image of the obtained WO_3 nanoneedles

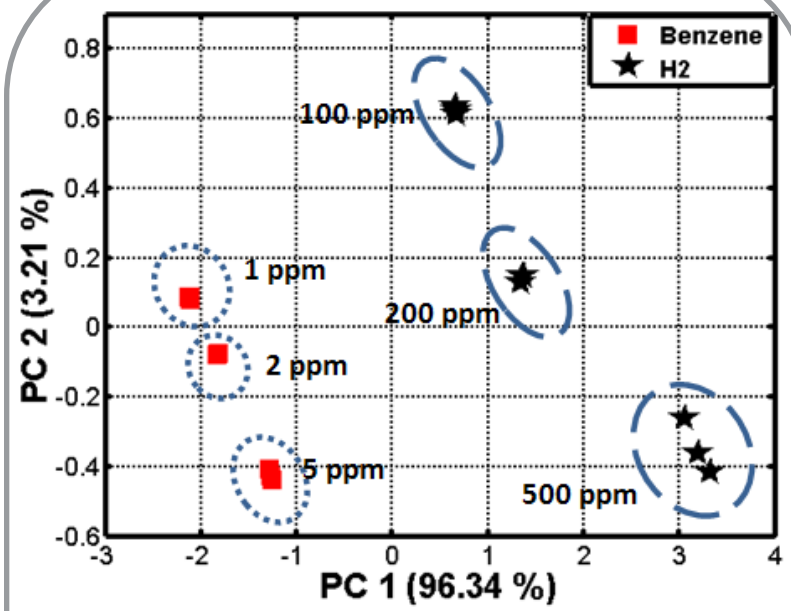


TEM images of WO3 nanoneedles decorated with metal nanoparticles.

Achieved RESULTS and future activities



Resistance responses (in Ohms) Of Pt/WO_3 sensor toward: (a) 500ppm H_2 and (b) 500 ppm CO at 300 °C



PCA results using WO3, Au/WO3, Pt /WO3 and Au/Pt/WO3 sensors responses toward Benzene and H2

Future work

- Fabrication of sensors based on aligned Nanoneedles.
- Studying the effect of humidity on the sensor responses.

CONCLUSIONS

- AA-CVD is a flexible technique that allows for obtaining low dimensional nanomaterials functionalised with nanoparticles of different metals in a single step;

- Easy implementation- the deposition temperature is compatible with microelectronic gas sensor substrates;

- The use of nanostructured materials (CNT, nano-MOX, etc.) opens many opportunities for a new generation of gas sensors. The sensors can run at much lower temperatures than conventional ones.