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

COST Action TD1105

WGs and MC Meeting at Rome, 4-6 December 2012

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

Year: 2012-2013 (*Starting Action*)

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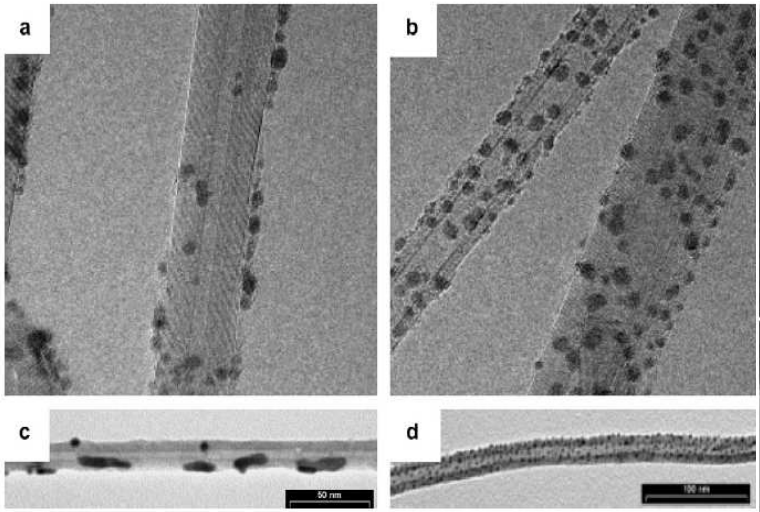
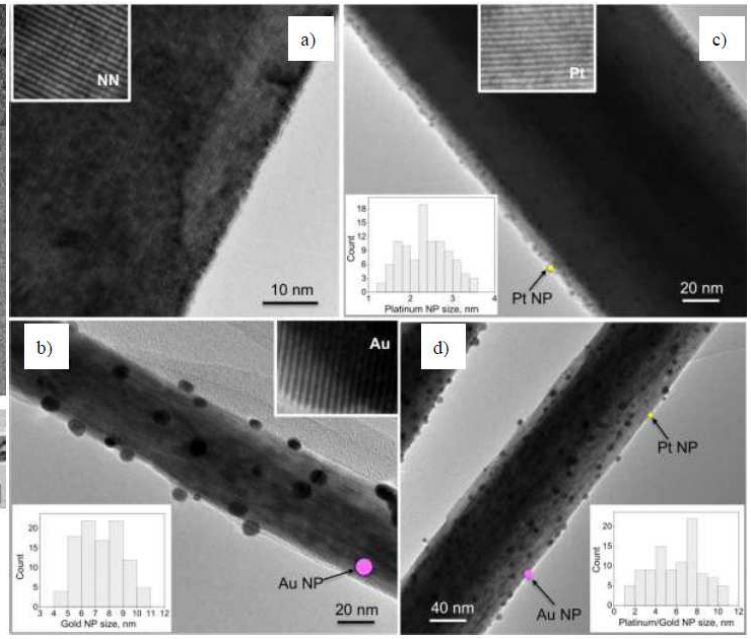
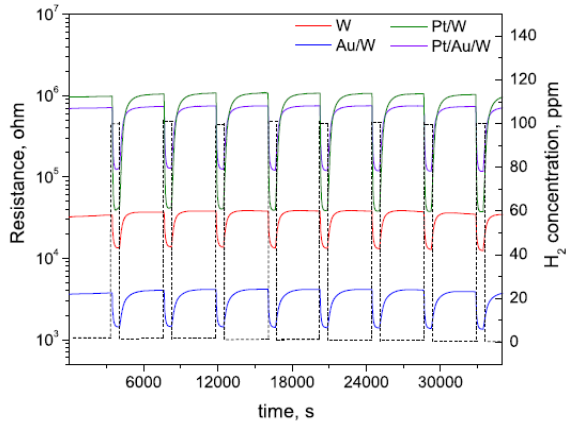
Scientific context and objectives in the Action

- **Background / Problem statement:**
  - "The production of high quantities of high quality raw materials with uniform structure and properties and their optimal integration in actual devices are the two most important issues to be solved".
  - "Better controlling electrical contacts between the electrodes and the nanostructures"
- **Brief reminder of MoU objectives:** (within WG1)
  - Synthesis of gas-sensitive nanomaterials (MOX and carbon nanomaterials, PVD and CVD);
  - Synthesis of functionalized nanostructures for enhanced gas detection at ppb level (cold plasma treatments);
  - Protocols for integration of nanomaterials into micromachined devices and gas sensors

Current research activities







Pd (top) and Au (bottom) decorated MWCNTs a) & c) pristine; b) & d) oxygen plasma treated

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- **Plasma treatment and metal decoration of CNTs and graphene and integration in silicon or flexible u-hotplates**
- **Growth, integration, characterization and modeling of low-dimensional MOXs**
- **Selective detection of benzene traces in air**

Research Facilities available at the URV

- **Material's characterization**
  - TEM, SEM, EDX, XRD, AFM, Confocal microscopy, Raman FTIR
  - Surface-sensitive spectroscopy (DRIFT, PM-IRRAS)
  - Clean room facility with Nanolithography and standard lithography
- **Film growth**
  - DC and RF multi-target magnetron sputtering
  - LP-CVD, AA-CVD
  - Anodization set-up
- **Sensor characterization**
  - Computer-controlled gas-mixing rig based on mass-flow controllers
  - Headspace auto sampler
  - Mass spectrometer

Suggested Priorities for future research

- **Research directions as PRIORITIES:**
- Further explore AA-CVD as a flexible and scalable method to produce metal nanoparticle-decorated single-crystalline MOX NWs in a single step.
- Explore self-assembly of nanostructured materials (template-assisted growth, direct dielectrophoresis)
- Further study cold-plasma treatments of carbon nanomaterials and MOXs as a controllable way to graft functional groups and tailor surface properties