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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CEIT – TECNUN (University of Navarra) / Spain

COST is supported by the EU Framework Programme

ESF provides the COST Office through a European Commission contract

Expertise of the Trainee related to the Action

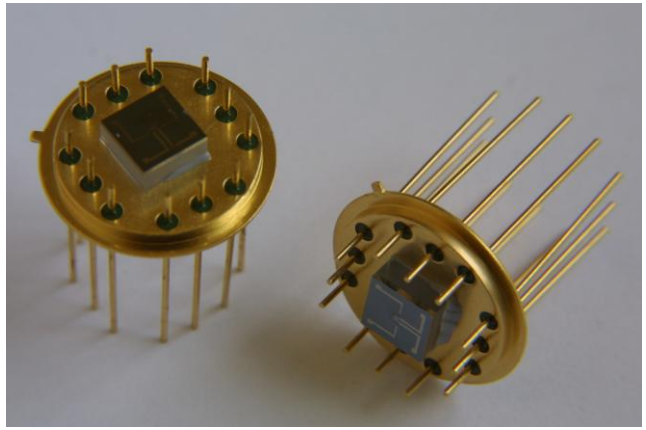
- **Solid state electrochemical sensor based on YSZ electrolytes**

- **Microfabrication processes:**
  - UV photolithography
  - Physical vapour deposition techniques (sputtering)

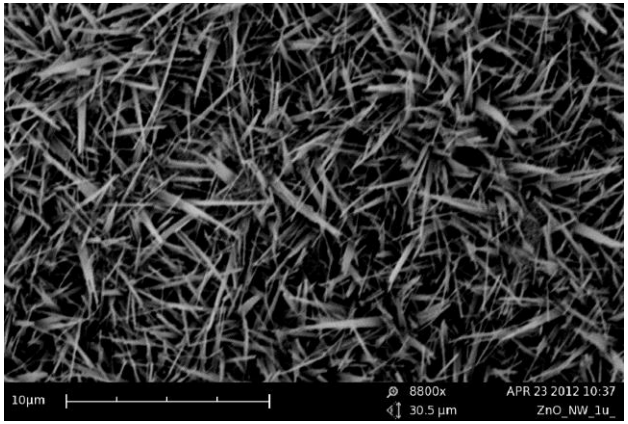
- **Characterization methods**
  - Profilometry
  - Electrochemical impedance spectroscpy
  - Gas chromatography

Current research activities of the Trainee (1/2)

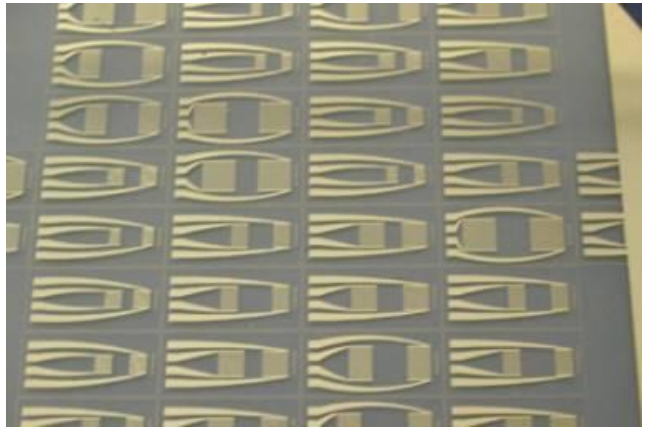
- **Microelectronics and Microsystems Unit of CEIT:**



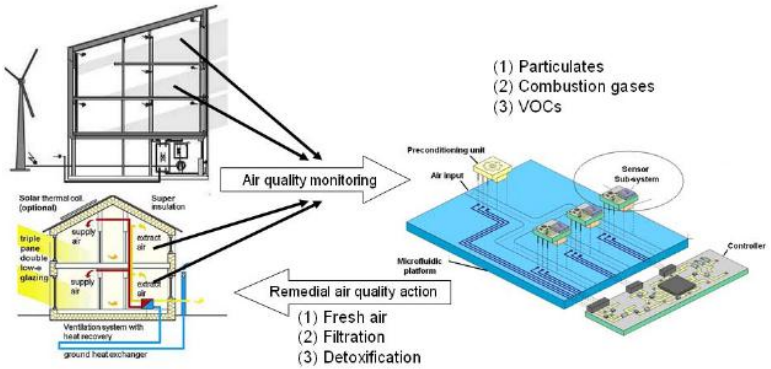
Conductometric gas sensors



Nanowire growth



Gas quality sensors

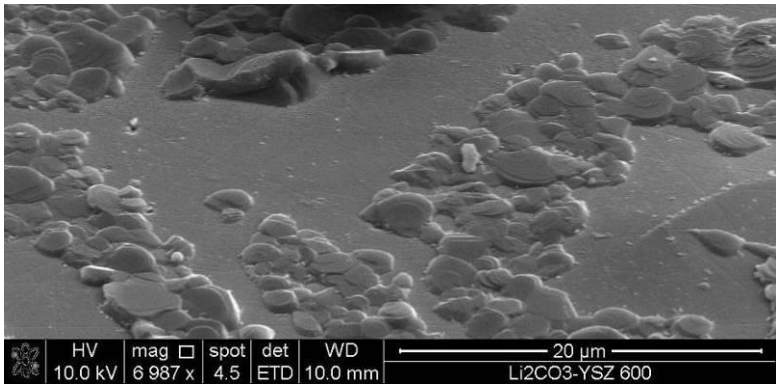


Indoor air-quality

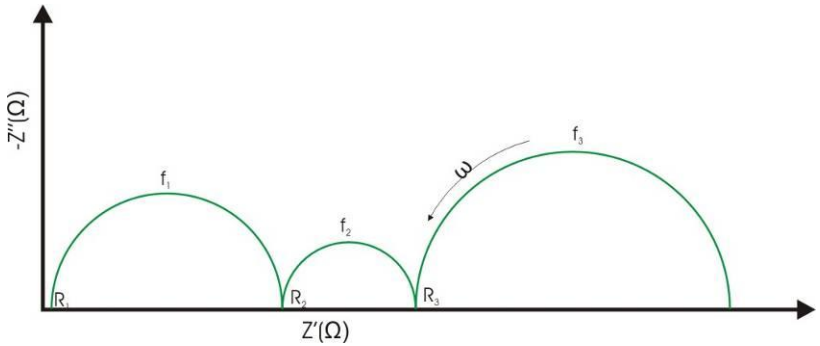
Current research activities of the Trainee (1/2)

- Thin film fabrication process

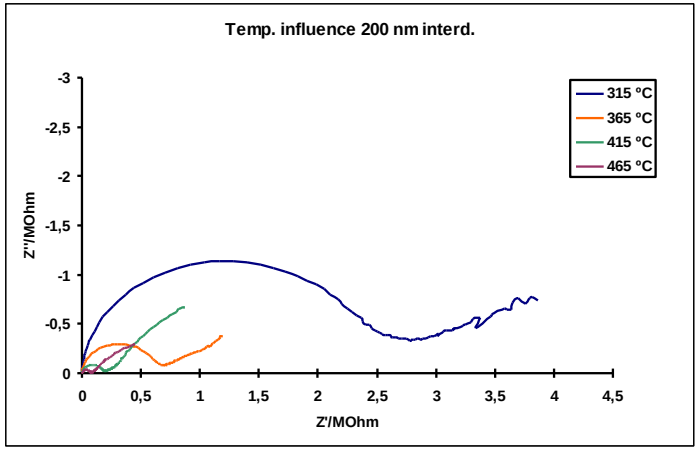
- CO_2 electrochemical sensors
  - Electrolytes for electrochemical sensor

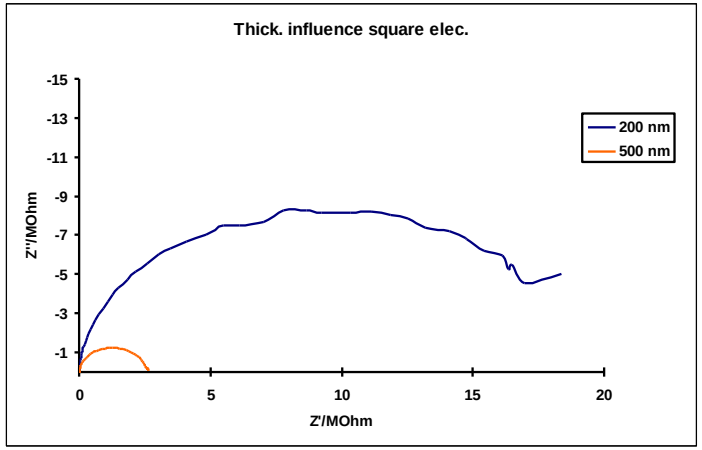


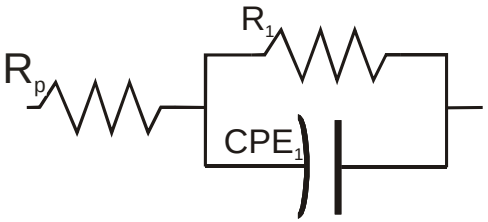
- Electrochemical impedance spectroscopy (EIS) characterization
  - Electrode
  - Electrolyte
  - Sensing electrode



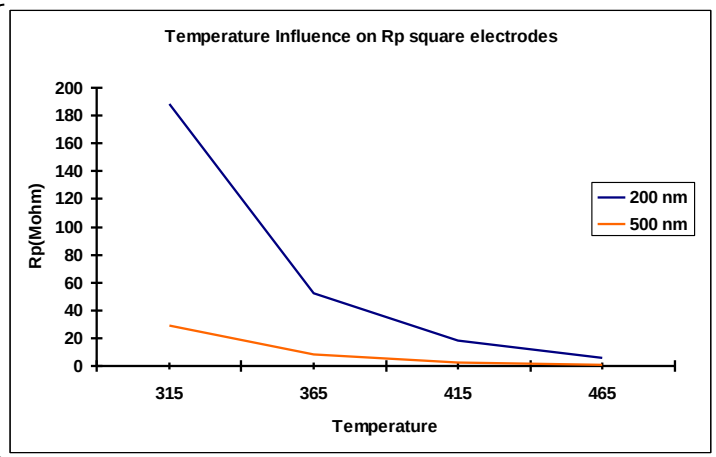
Achieved **RESULTS** and future activities

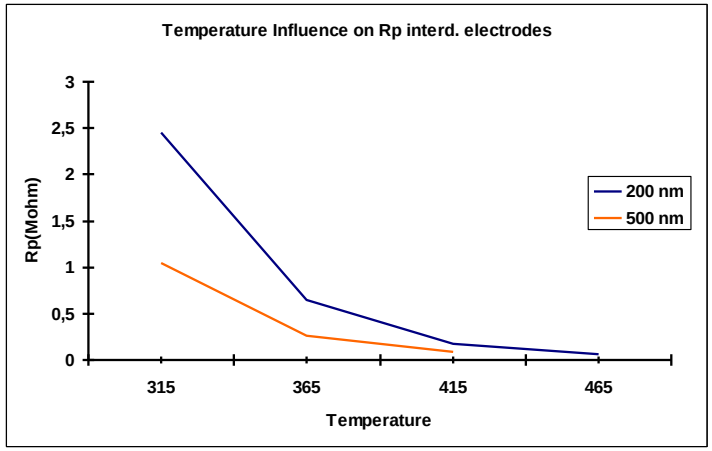






Rp

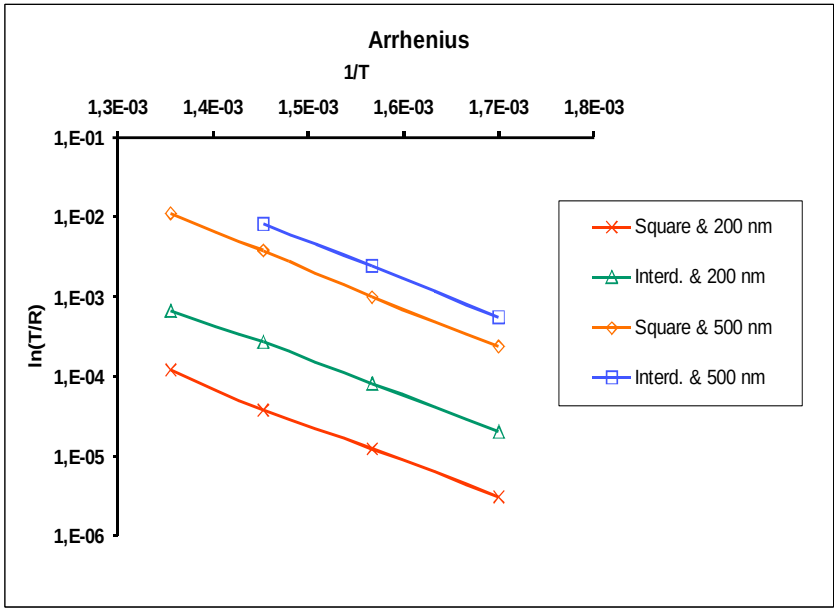




Optimal param.:

- **500nm**
- **Interdigitated elec.**
- **465ºC**

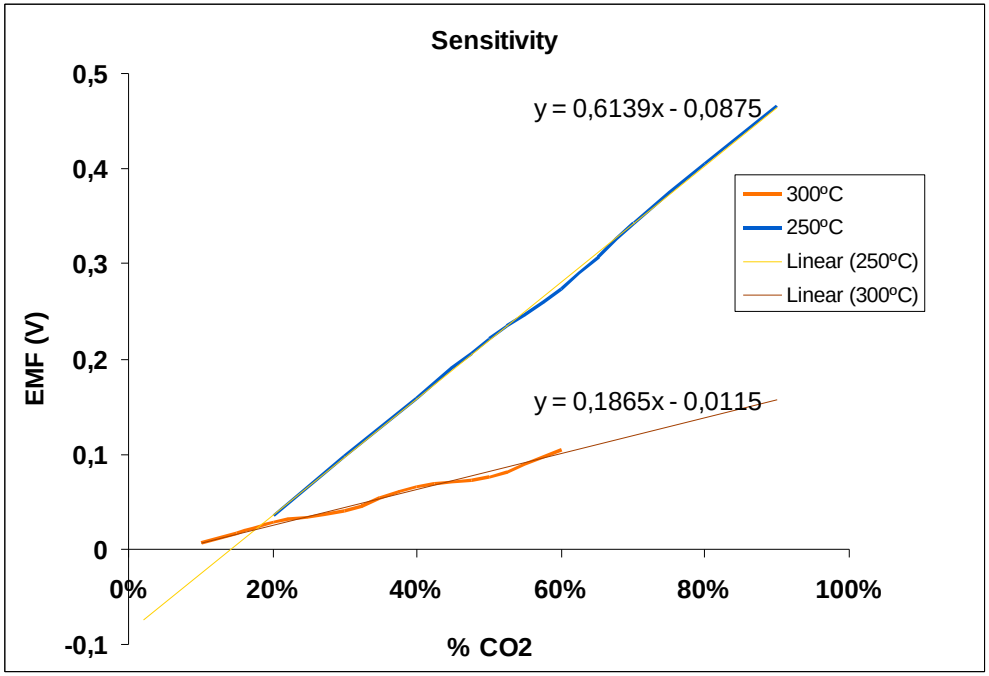
Achieved **RESULTS** and future activities



Activation energy = 0.9 eV

$S_{(250^oC)}$ = 6.1 mV/%

$S_{(300^oC)}$ = 1.9 mV/%



CONCLUSIONS

- A thin film electrochemical CO_2 sensor has been fabricated
- The fabricated thin film electrochemical sensor detects CO_2 in the required detection range (2.5%-55%)
- An electrical characterization has been performed with EIS technique
- Optimal fabrication and test parameters has been proposed
- The fabricated sensor represent a low cost alternative in comparison with other detecting techniques (e.g. optical detection or chromatography)

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EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY