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*)

Zafer Ziya ÖZTÜRK

Function in the Action (MC ,WG 1&2 Member, SIG II Member)

Gebze Institute of Technology/ TURKEY

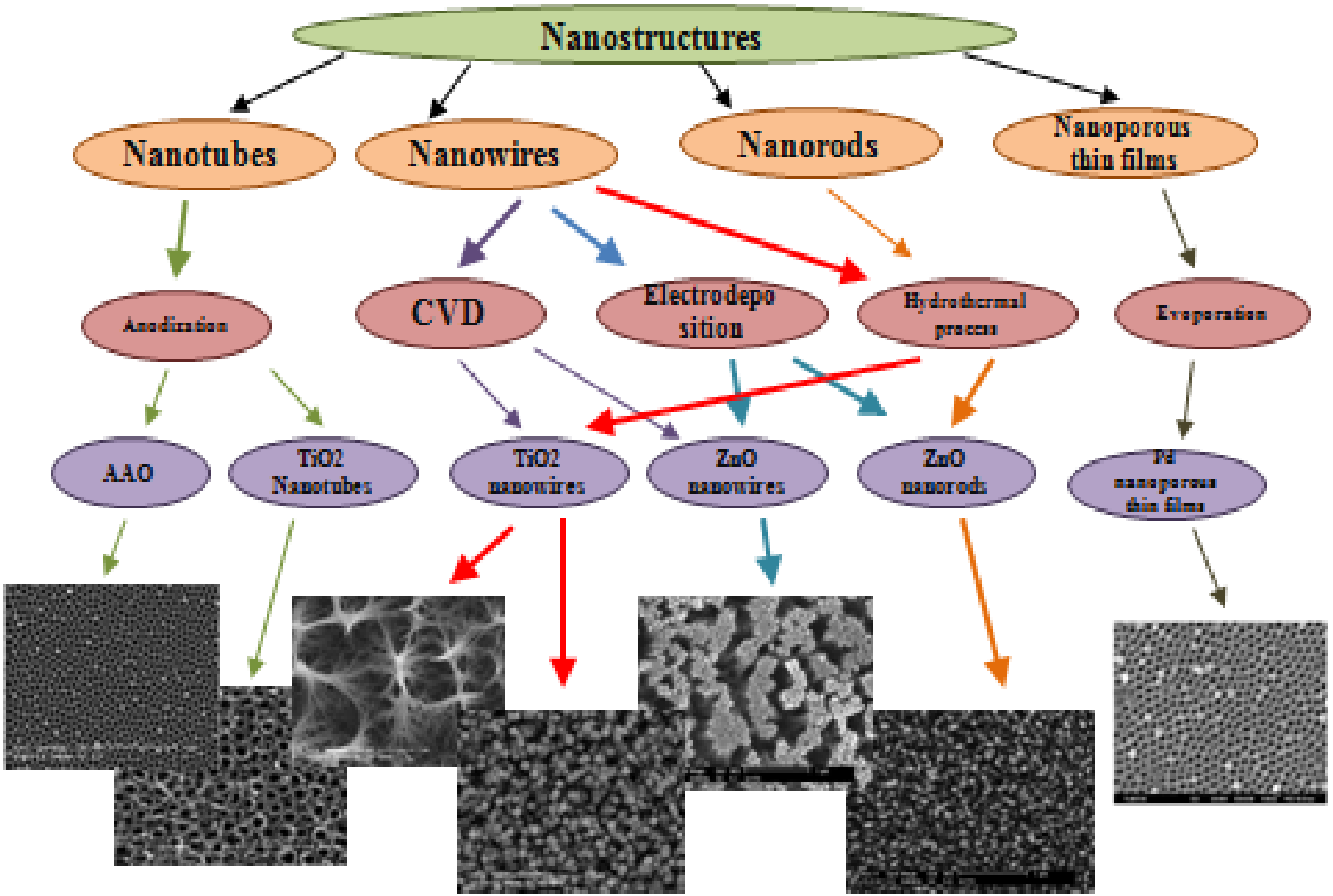
COST is supported by the EU Framework Programme

ESF provides the COST Office through a European Commission contract

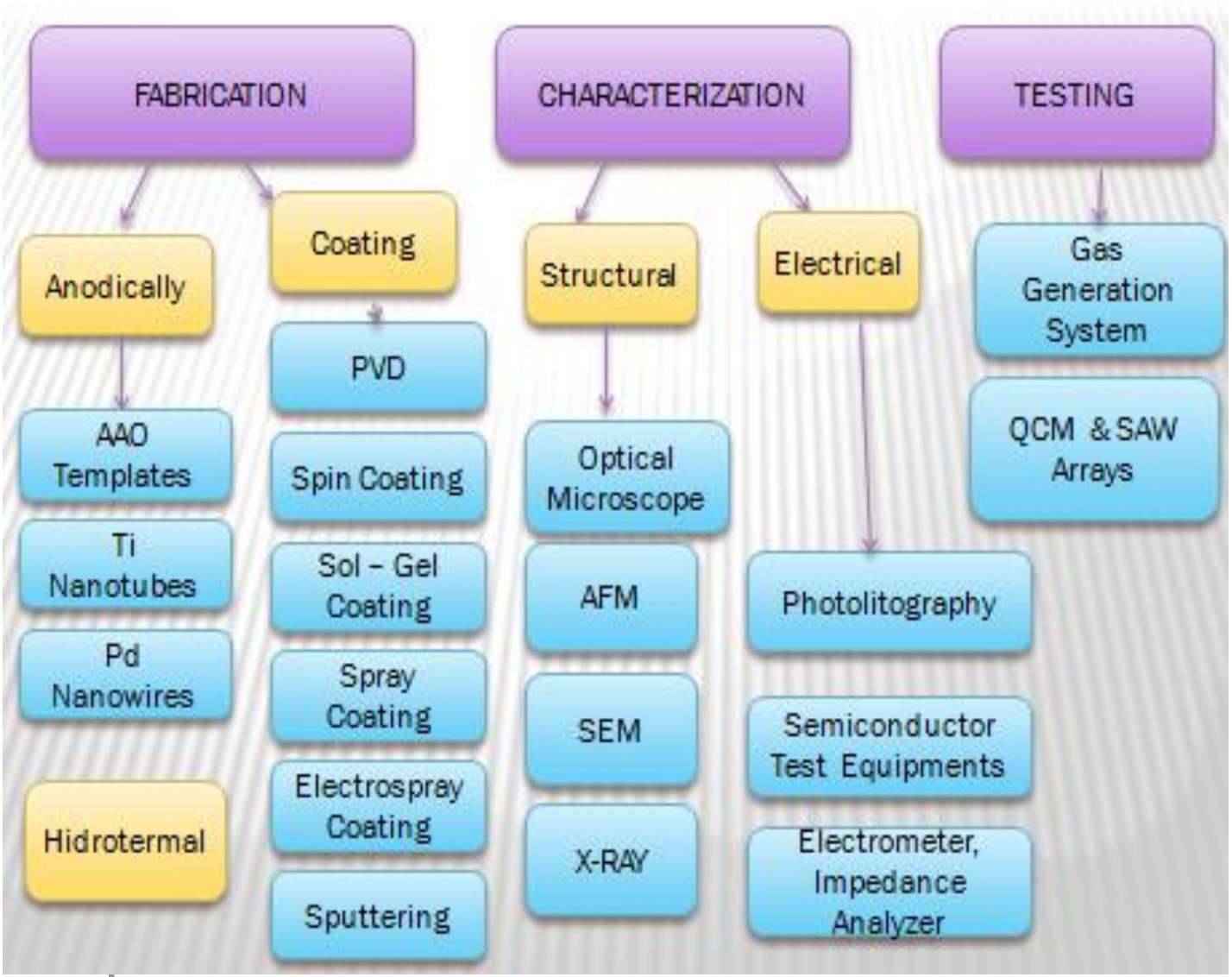
Scientific context and objectives in the Action

- The risky gases which may affect adversely air quality in the car are H_2, CO, H_2S, NH_3, NO_2, CO_2 etc. According to USA EPA standards the limit values of the concentration for one hour exposure are 35 ppm (part per million) for CO, 100 ppb (part per billion) for NO_2, 0,12 ppm for O_3, 75 ppm for SO_2, 10 ppm for H_2S etc.
- Within the frame of TD1105 EuAirNet, nanostructured doped-undoped metal-oxide semiconductor based gas sensors will be developed to control the air quality in car cabin including fuel cell battery operated vehicles.

Current research activities

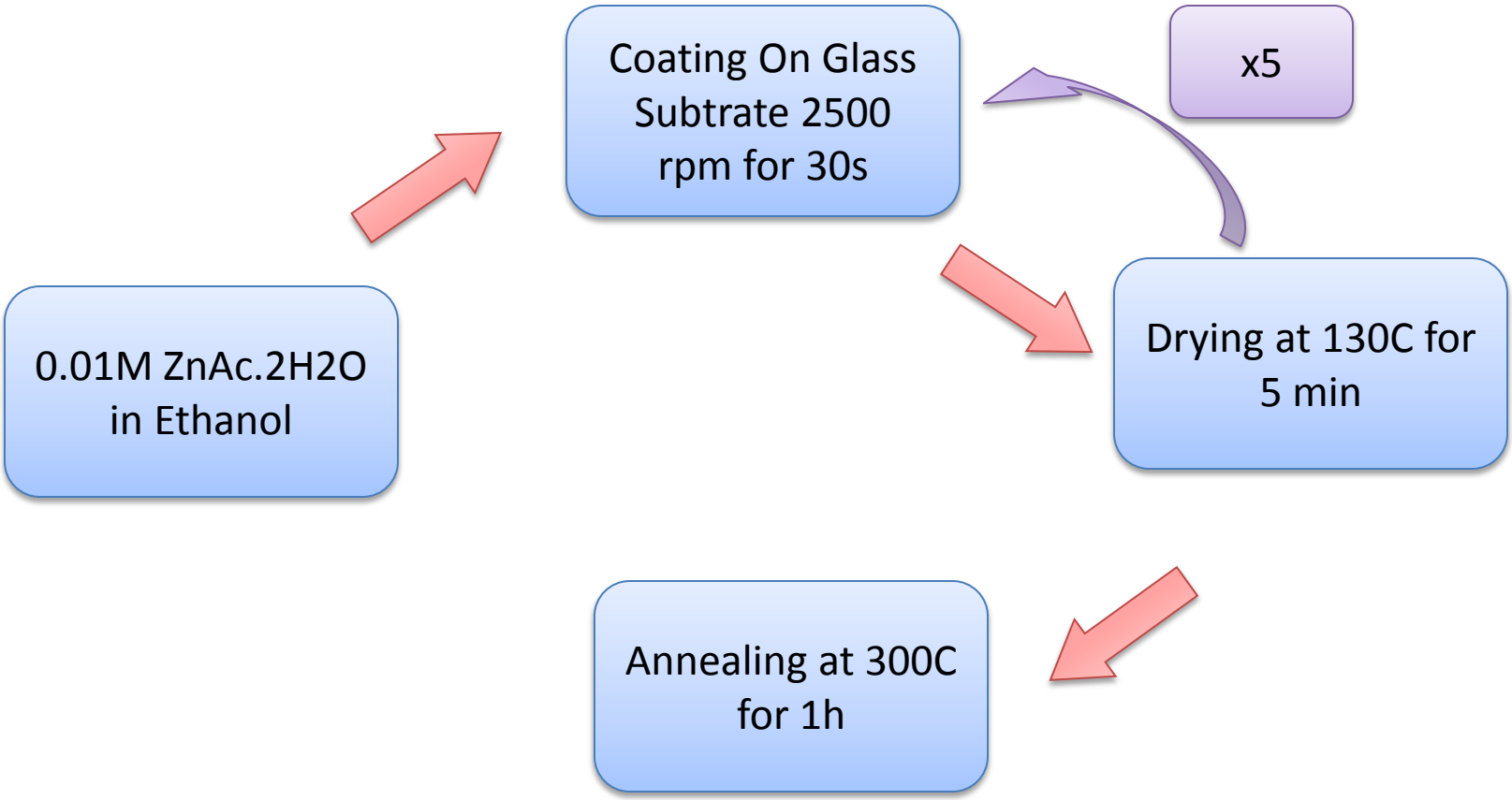


Research Facilities available



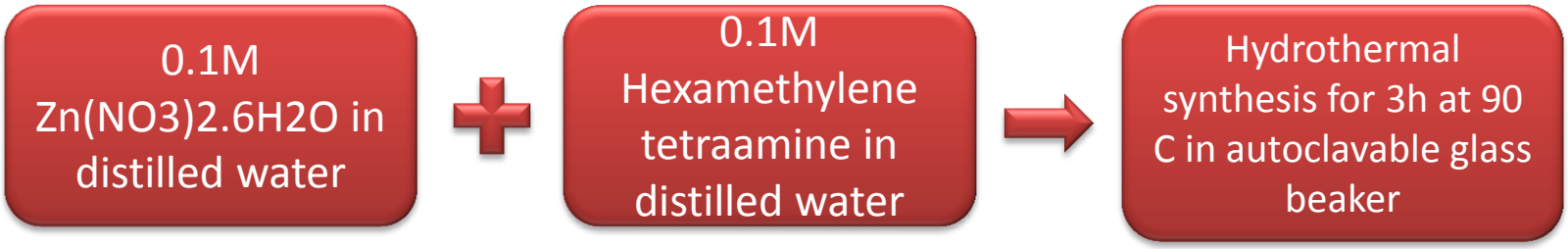
Fabrication of functionalized ZnO Nanorods

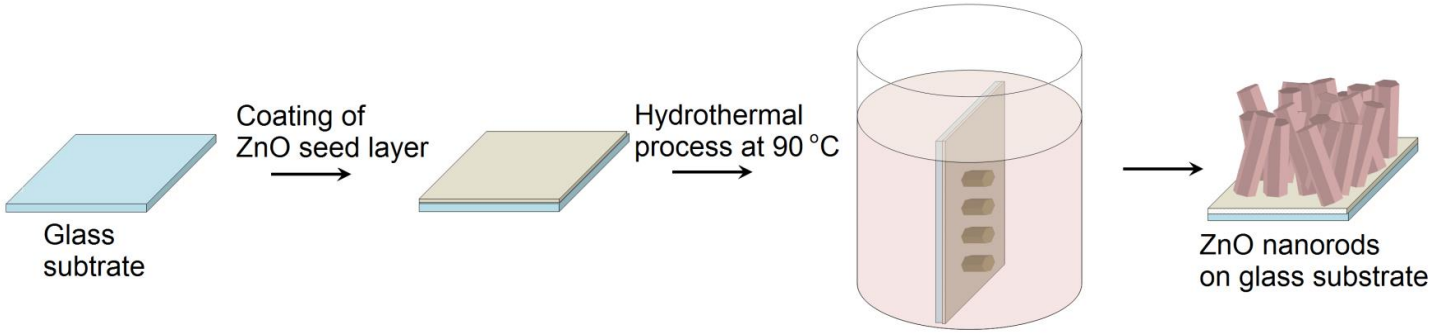
- Coating of ZnO seed layer



Hydrothermal Synthesis

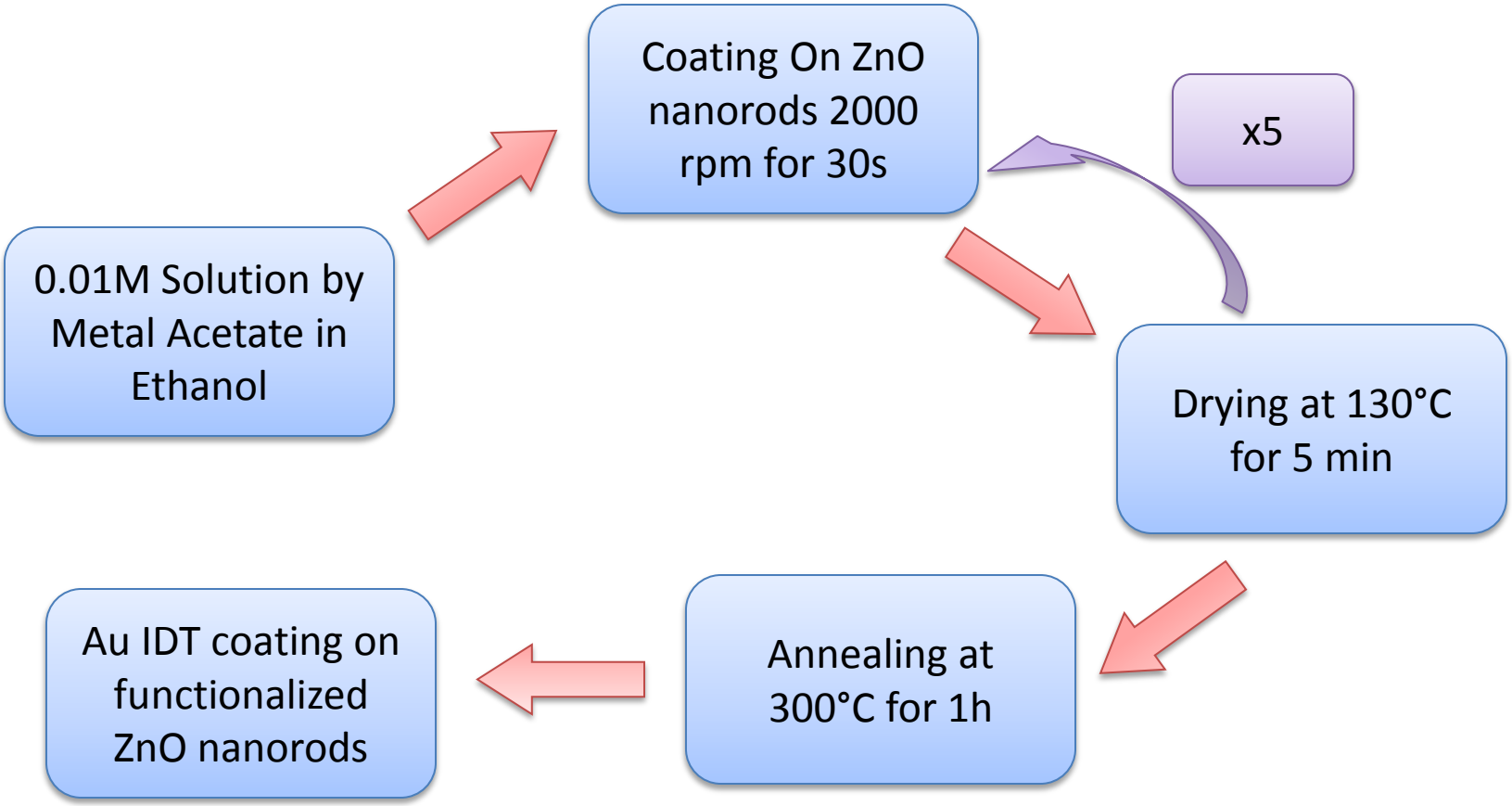
- Synthesis ZnO nanorods on seed layer coated glass substrate



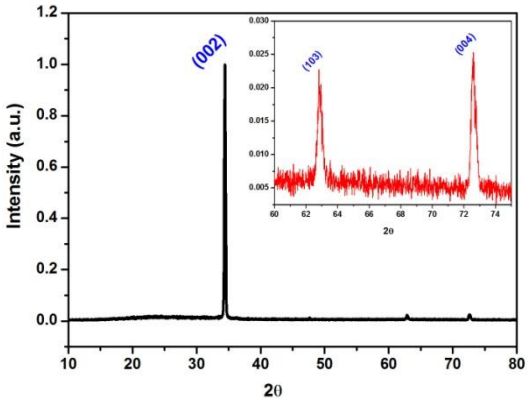


Functionalization of ZnO nanorods

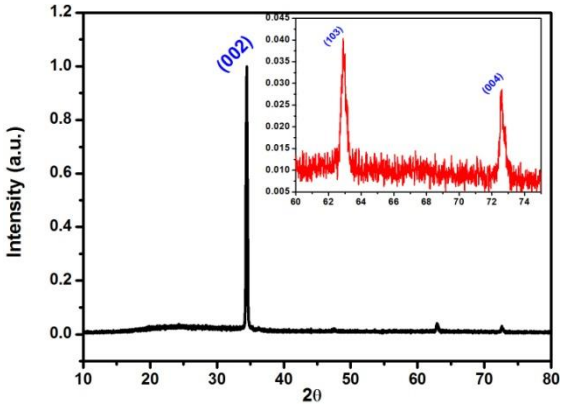
- Sol-gel Process



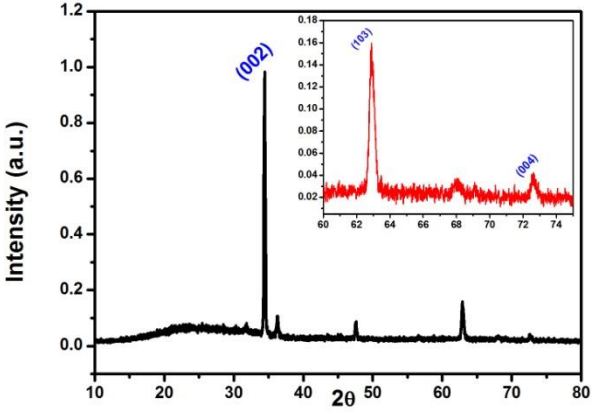
Structural Characterization: XRD



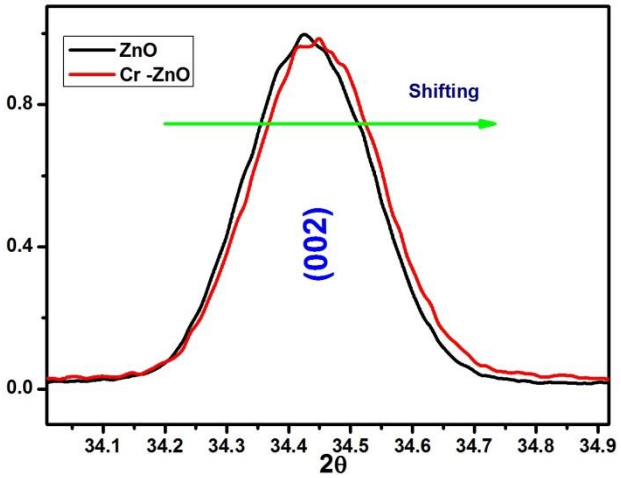
ZnO nanorods;

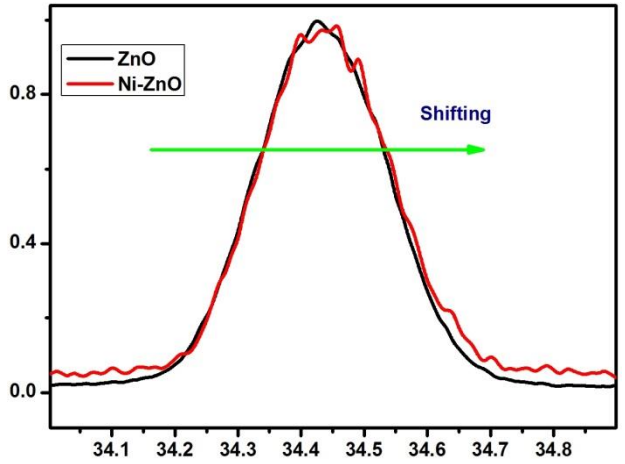


Cr-ZnO nanorods;

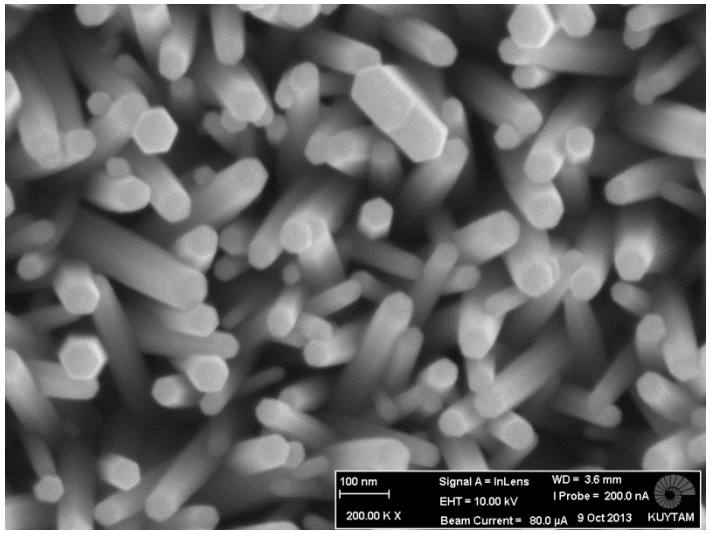


Ni-ZnO nanorods



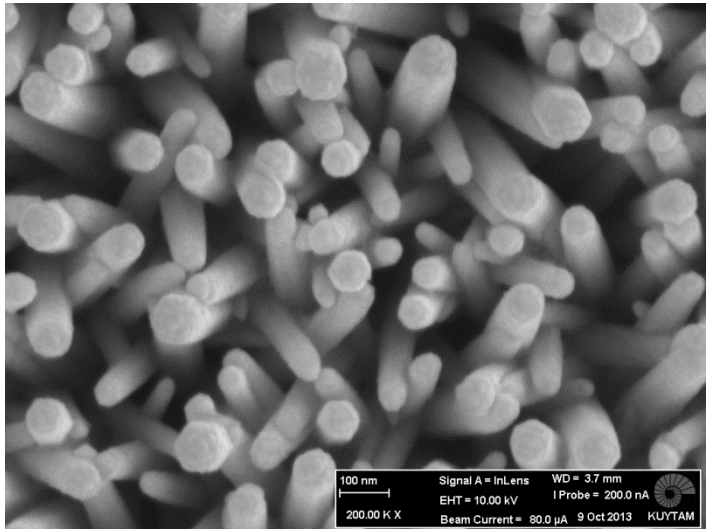


Structural Characterization: SEM

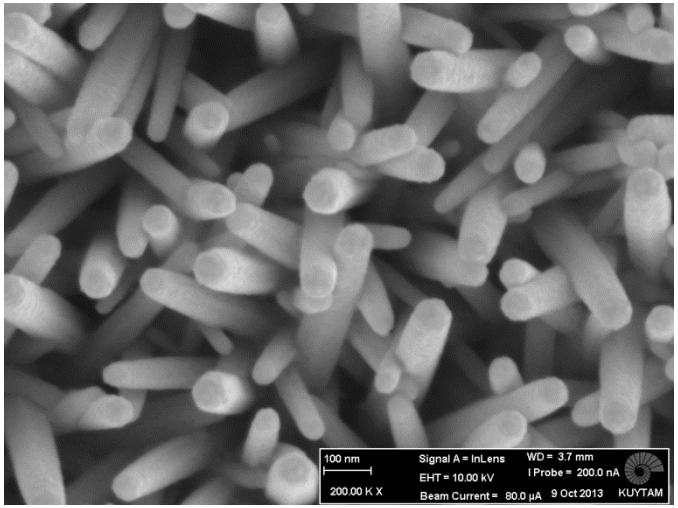


ZnO nanorods

❖ Pure ZnO nanorods have smooth surface but, Ni and Cr ZnO nanorods have rough surfaces

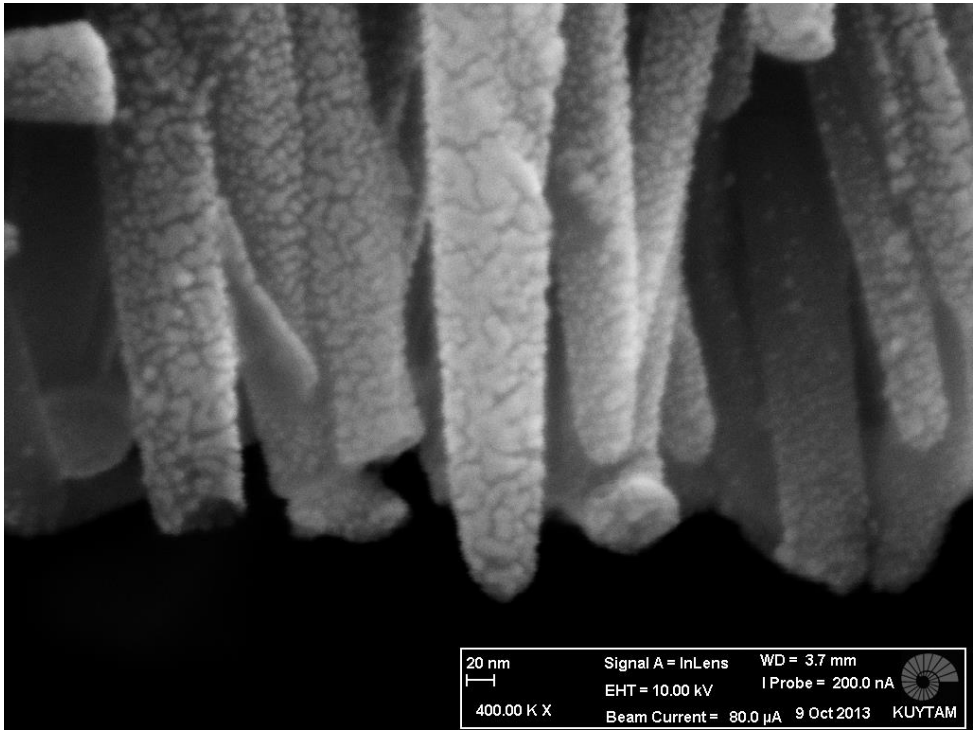


Cr-ZnO nanorods;



Ni-ZnO nanorods;

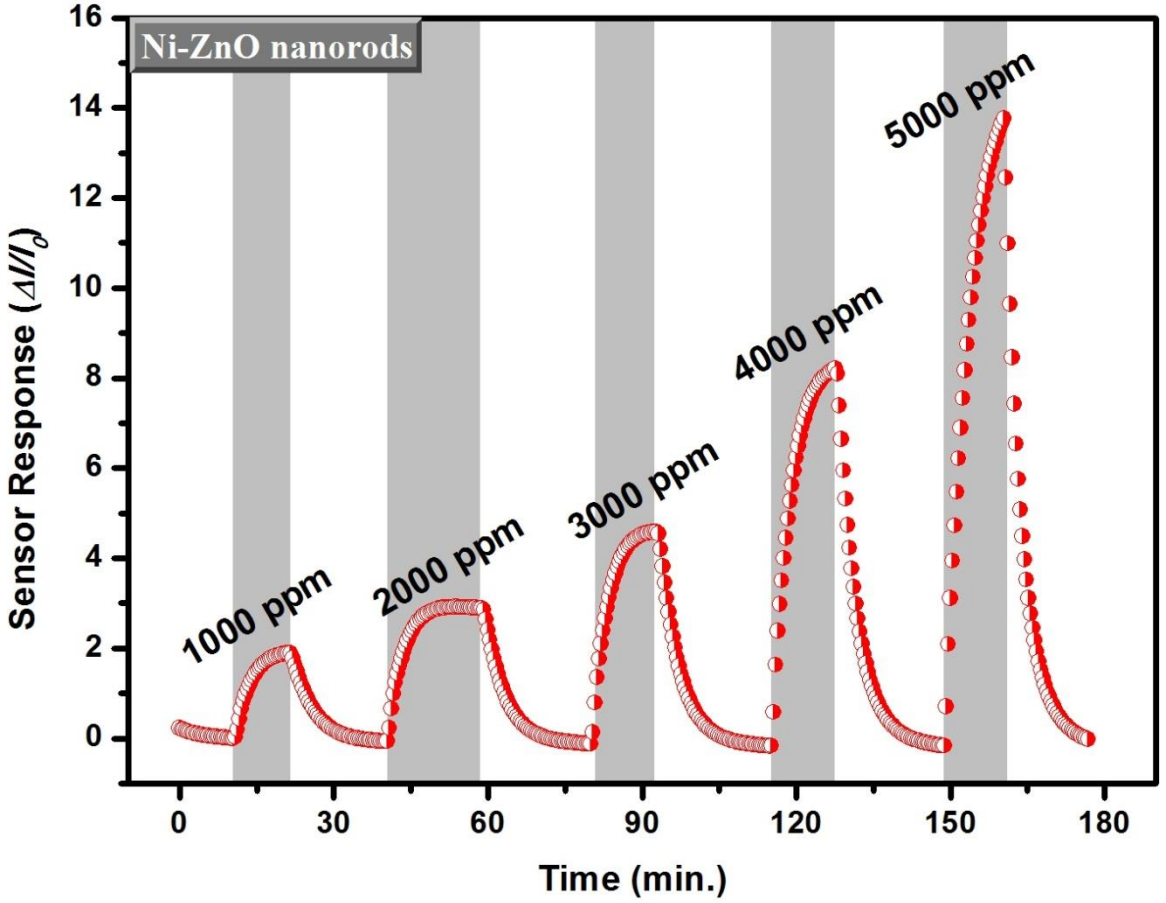
Structural Characterization: SEM



Cross Sectional high resolution view of Cr-ZnO nanorods

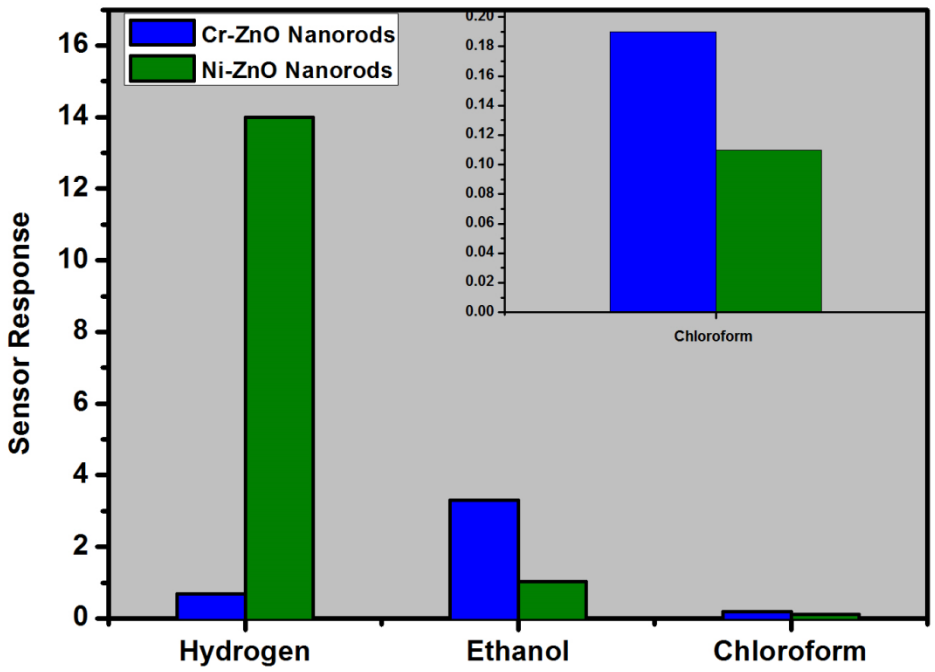
- Particles on surfaces of ZnO nanorods belongs to Cr

H_2 responses of Ni Functionalize ZnO Nanorods at 200°C



Sensor Responses of ZnO Nanorods Functionalized with Cr and Ni

- H2, Ethanol and Chloroform responses at 200°C and concentration is 5000 ppm



Conclusion

- ZnO nanorodes has been fabricated and functinalized with Cr and Ni
- SEM and XRD
- Sensor responses of functinalized nanorods H2, ethanol and chloroform have een measured
- small sensor response for ethanol, chloroform.
- Ni functionalized ZnO nanorods are Highly Selectivity for H2.

Acknowledgement

- This work has been funded by The Scientific and Technological Research Council of Turkey ***(TUBITAK)***, Project Number: 111M261.

- COST Action TD1105 EuNetAir

- Organizing Committee