

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

COST Action TD1105

WGs and MC Meeting at LINKÖPING, 3 - 5 June 2015

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

Year 3: 1 July 2014 - 30 June 2015 (*Ongoing Action*)

Research and Innovation Needs of WG1: Sensor Materials and Nanotechnology



UNIVERSITY of OULU
OULUN YLIOPISTO

Prof. Jyrki Lappalainen

WG1: Sensor Materials and
Nanotechnology (Vice-Chair)

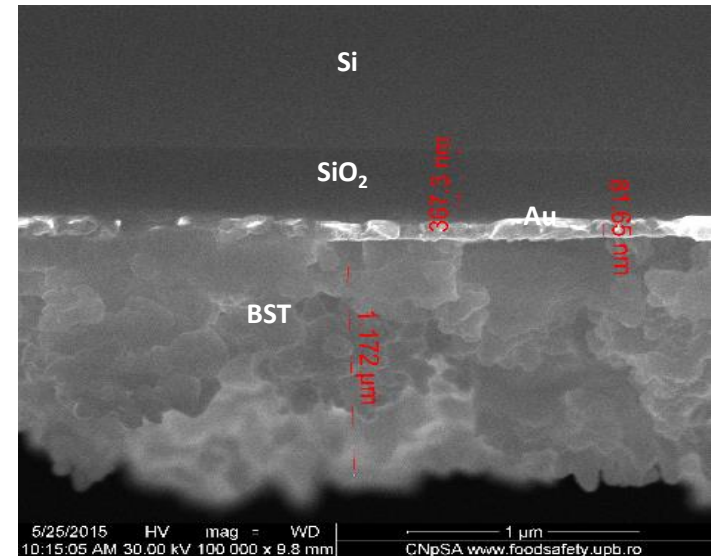
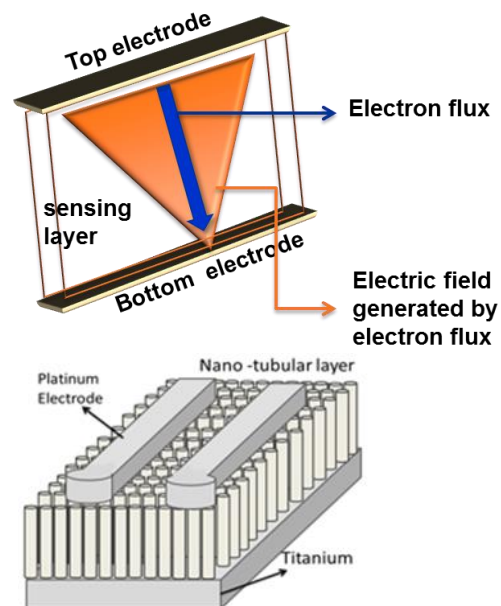
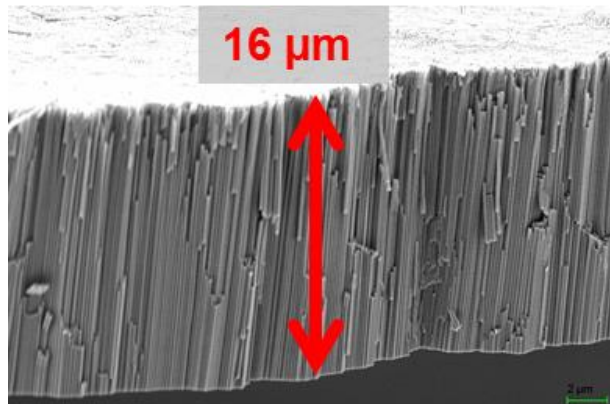
University of Oulu, Finland

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EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



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

- **Research directions as WGs R&I NEEDS for Action TD1105:**
 1. Structural tailoring of semiconductor oxides like TiO_2 by doping and utilizing other functionalities, like polarizing field of MOX perovskite ferroelectric material, e.g. BST and PZT!



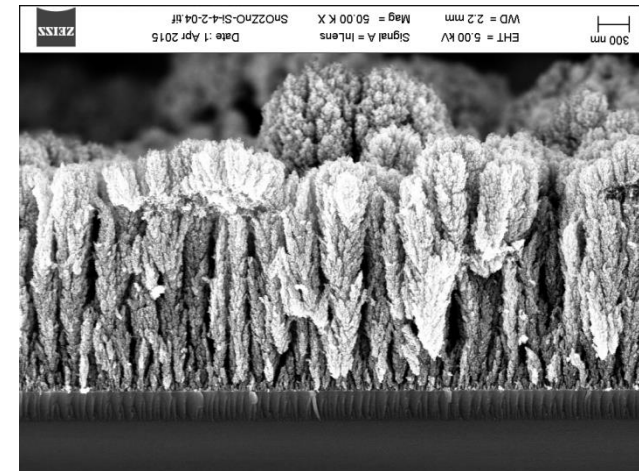
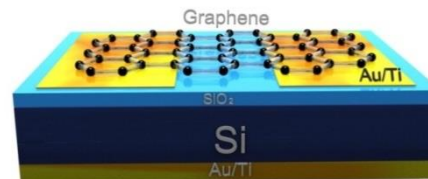
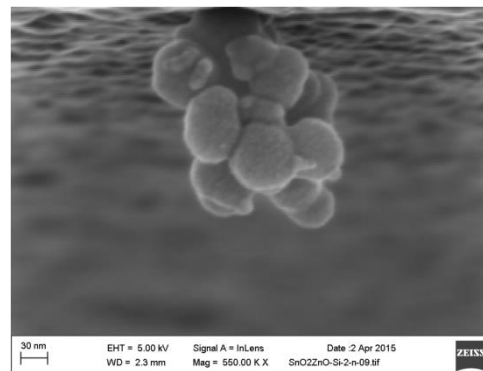
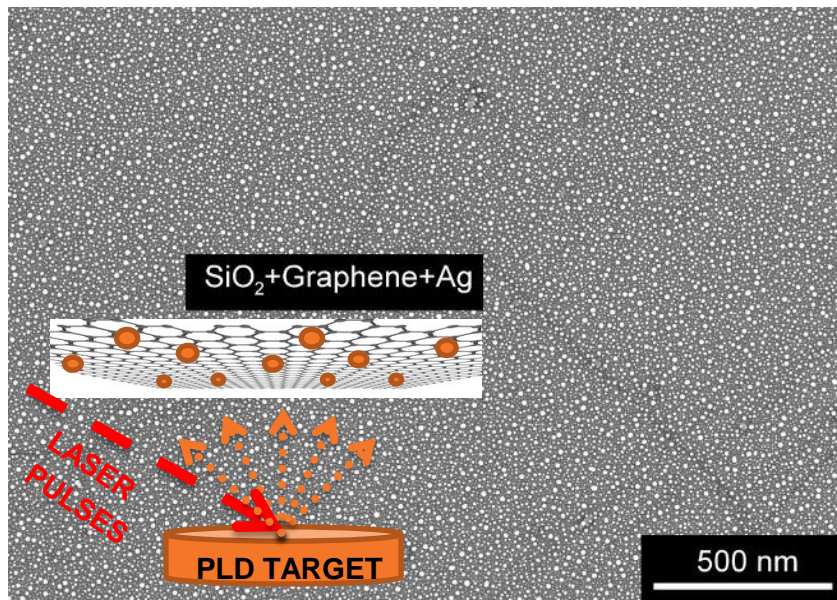
SEM images of BST layer H-E deposition on $\text{Si}/\text{SiO}_2/\text{Ti}/\text{Au}$

R. Feynman in 1950's: "There is plenty of room down there"

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

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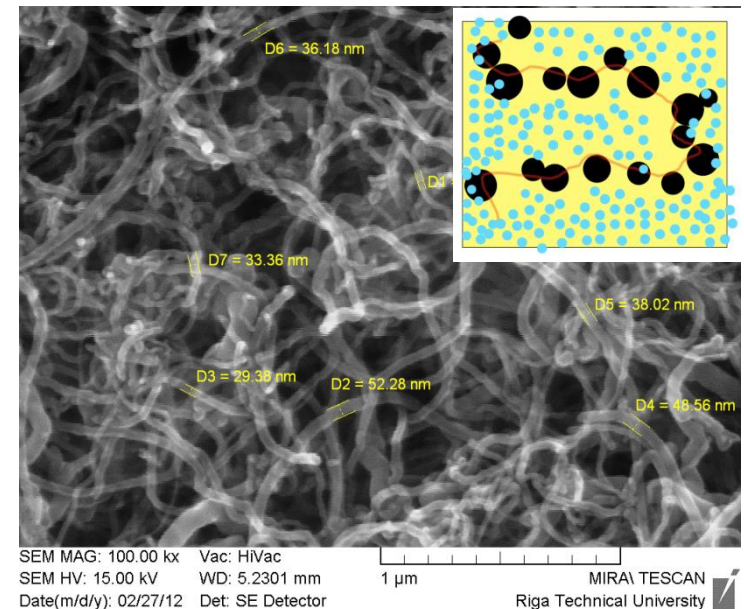
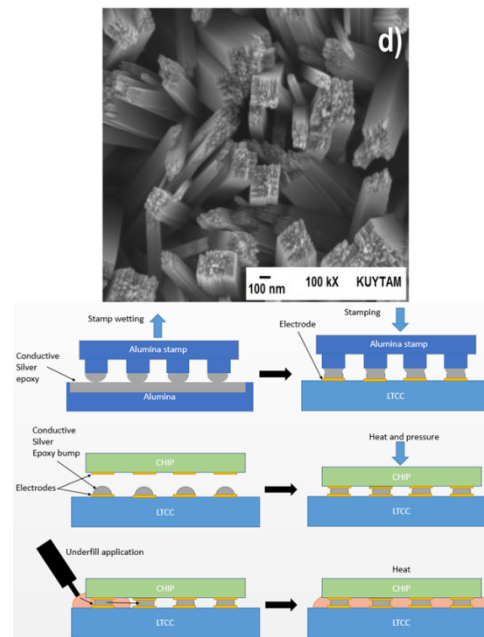
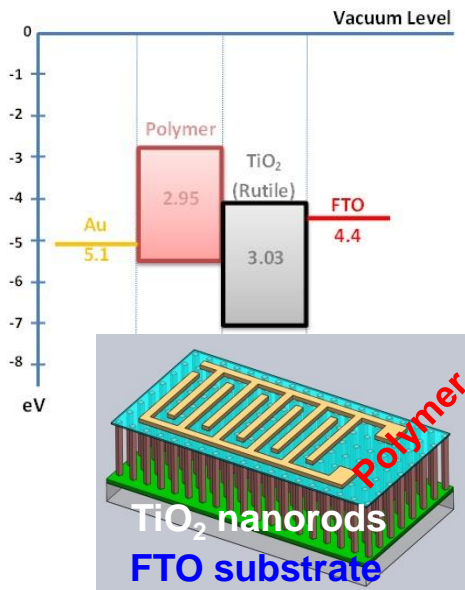
2. Going really nano with 2D and fractals! Using pulsed laser deposition (PLD) in fabrication of nanostructured sensing layers of graphene and metaloxide nanoparticles in the range of 1-20 nm!



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

- Research directions as WGs R&I NEEDS for Action TD1105:**

3. Utilization of interfaces of complex structures, and new material compositions. Easy of fabrication of chemiresistive polymers promising for low-cost massproduction, and packaging.





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

- Explore further the nanostructures and nanoparticles of MOS's, CN's, and metals. *New phenomena!*
- Detailed structural modification and characterization of MOS's in order to *optimize sensitivity and stability*.
- *Utilization of mixed-phase- and heterostructures, composites,* and utilization, for example, *p-n junctions* in gas sensing process.
- Converging towards standard methods for *integration into low-cost mass-production processes*.