

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

COST Action TD1105

1st EuNetAir Air Quality Joint-Exercise Intercomparison

Sensors versus Analyzers for Air-Pollution Monitoring in Aveiro City

Institute for Environment and Development - IDAD

Aveiro, Portugal, 13 - 27 October 2014

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 3: 2014-15 (*Ongoing Action*)

A Silicon-on-Insulator Platform Functionalized By Atomic Layer Deposition for Humidity Sensing

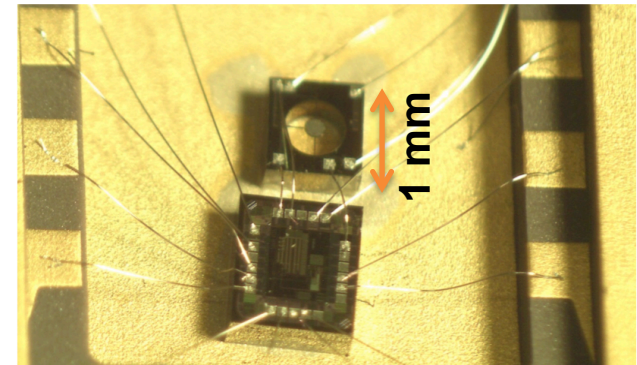
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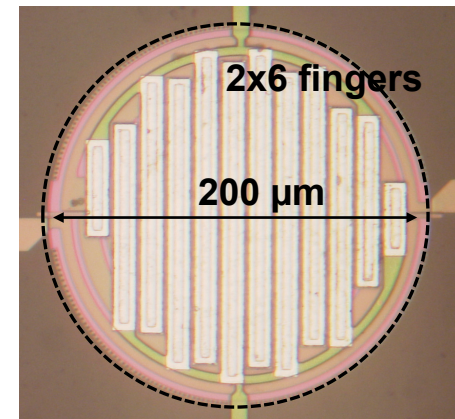
CMOS-SOI platform for %RH monitoring

- In-situ monitoring of domestic boiler, automotive, industrial process control
- Need to develop low cost miniaturized sensors with integrated electronics interface for applications from ambient to above 200°C, able to operate in harsh environments
- Silicon-on-Insulator (SOI) technology to withstand high temperature on the contrary to standard CMOS sensor
- Micro-hotplate gas sensing System-on-Chip (SoC) allows easy expansion into arrays of sensors and CMOS circuitry, able to detect different gases



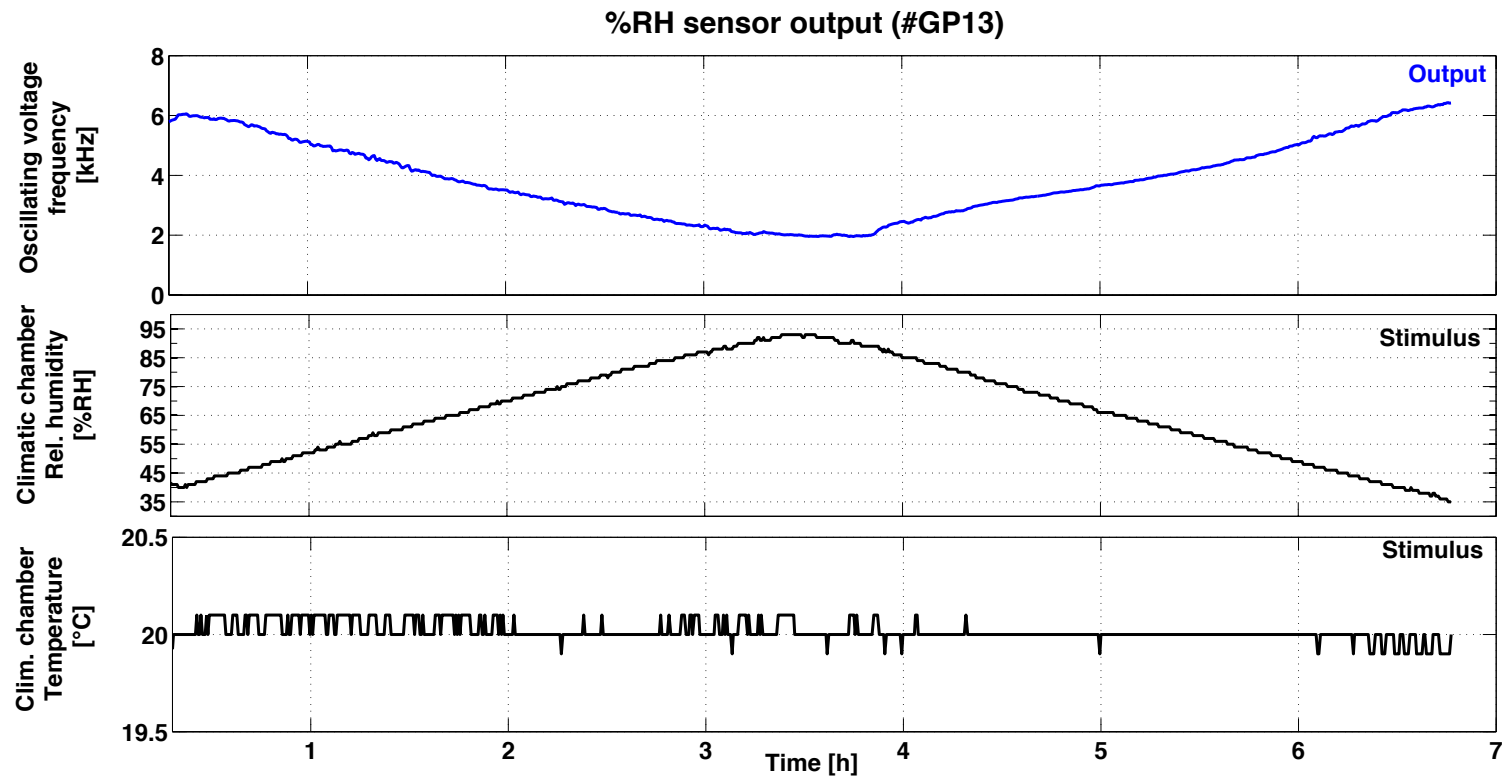
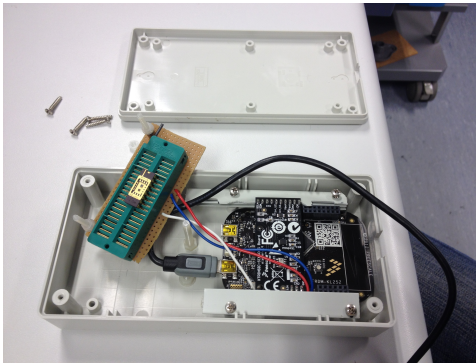
CMOS-SOI platform for %RH monitoring

- The interdigitated electrodes (IDE) constitute a %RH-variable impedance which is part of a closed looped ring oscillator (RO) in order to establish frequency oscillating voltage signal
- To measure relative humidity level (0-100%, 1% precision, 1s resp. time)
- Aluminum oxide (Al_2O_3) has been demonstrated to be an excellent material, even in most industrial gases
- Principle: thin adsorbed water layer at the surface: R \searrow , C \nearrow



CMOS-SOI platform for %RH monitoring

- Portable system = Micro-hotplate + Read-out circuitry + Freescale KL25Z[®] + Acer[®] Netbook
- The datalogger is powered by 5 V USB
- The PC is powered by 220 V or 19 V directly



CONCLUSIONS

- %RH monitoring during 15 days with max. precision and accuracy requires
 - Small drift and hysteresis
 - No datalogging failure (sensor bug, OS bug, cabling bug)
- In any case, a good experience for us and the occasion to go out the lab with sensors!