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

COST Action TD1105

INTERNATIONAL WG1-WG4 MEETING on

New Sensing Technologies and Modelling for Air-Pollution Monitoring

Institute for Environment and Development - IDAD

Aveiro, Portugal, 14 - 15 October 2014

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

AlGaN/GaN 2DEG based NO_2 sensor

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Function in the Action: WG2 Member

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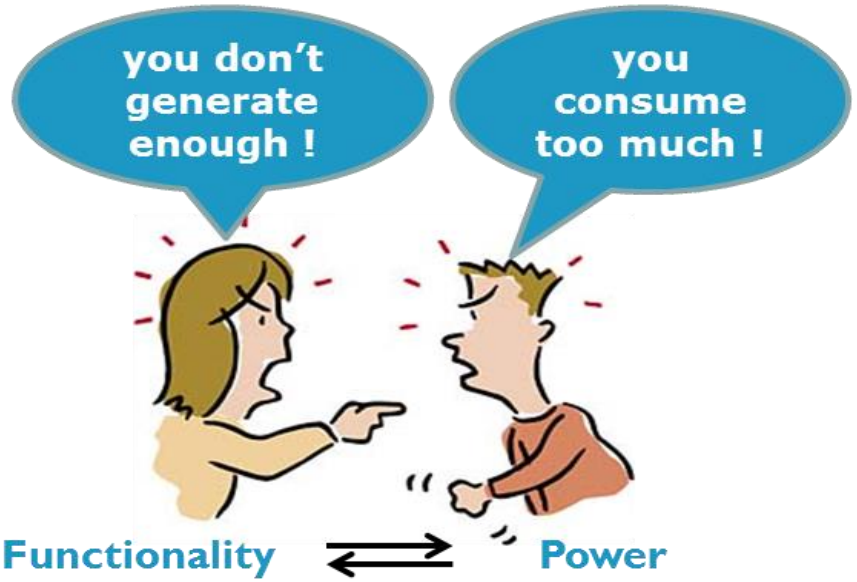
COST is supported by the EU Framework Programme

ESF provides the COST Office through a European Commission contract

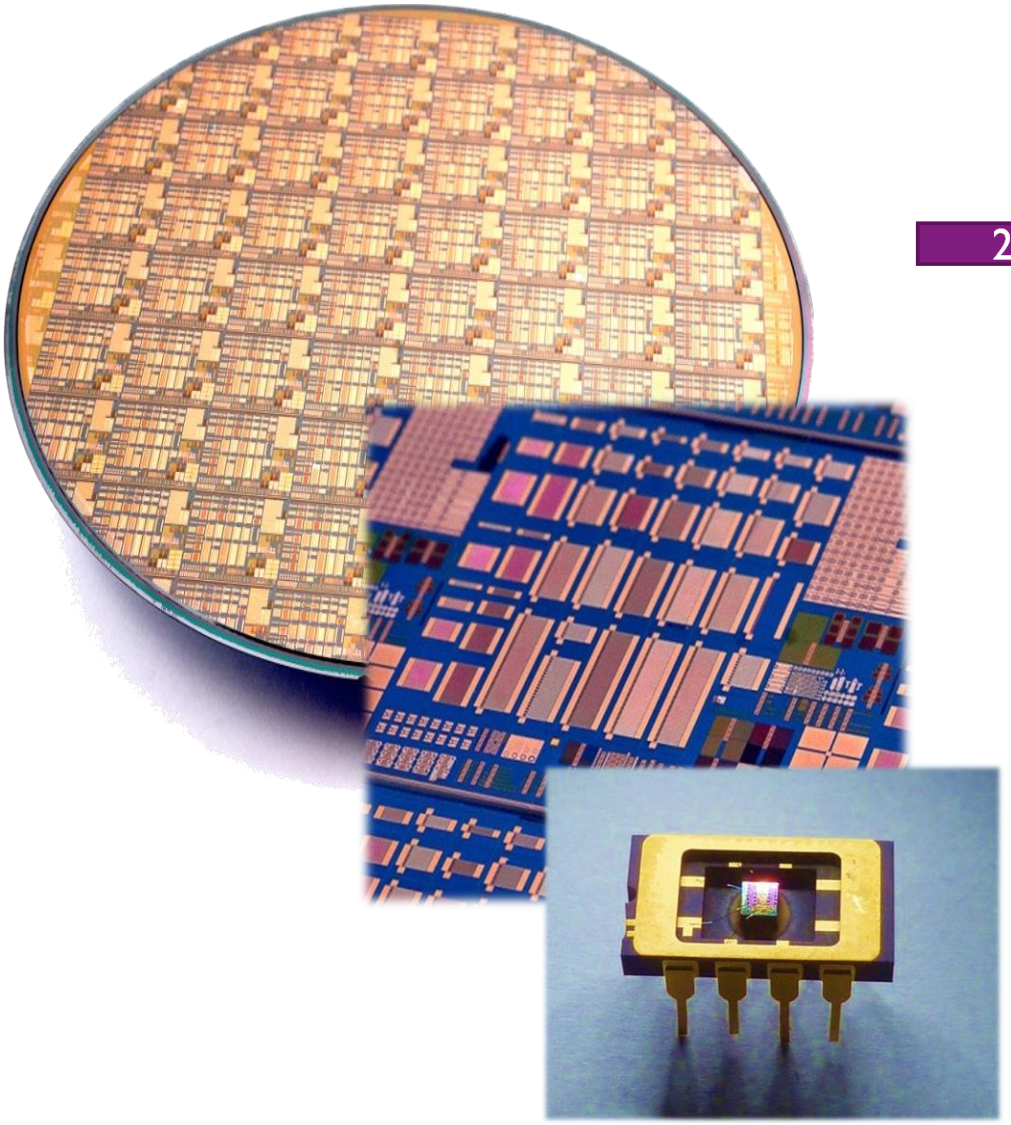
Scientific context and objectives

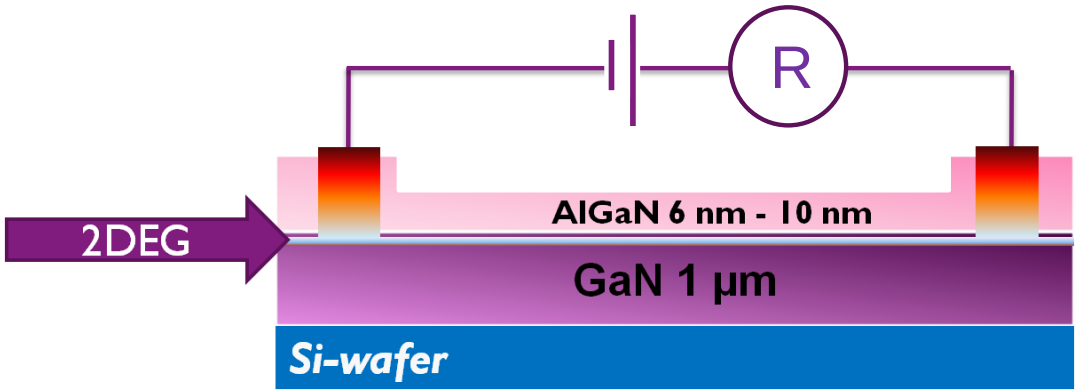
- **Brief reminder of objectives: WG2**
- Sensors, devices and sensor-systems for AQC
  - The development of nanosensors and nanotransducers for portable gas sensor systems, miniaturised systems and microsystems

How to miniaturize sensors without sacrificing sensitivity, achieve low-cost fabrication and low power?



Description of sensor to be used in exercise

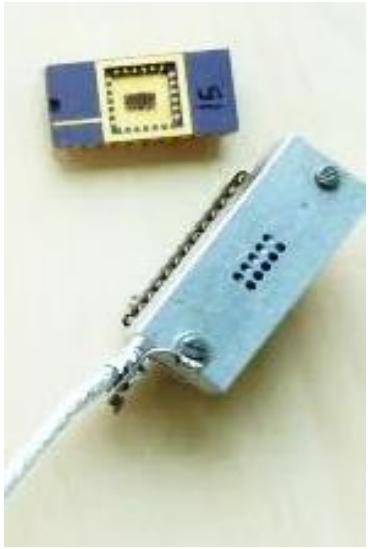




- Sensor based on GaN power HEMT
- 8” GaN-on-Si substrate → lower costs
- CMOS-compatible processing
- Spontaneous formation of a highly mobile, buried 2DEG at interface
- Low noise electrical readout
- Size-compatible with mobile applications

Expected Results

- High sensitivity to NO_2 (LOD < 2 ppb)
- Very little influence of humidity
- Response and recovery times fast enough to measure urban NO_2 variation during the day
- Cross-sensitivity to ozon
- Influence of external flow due to heat loss to sensor package
- Unknown effect of VOCs (i.e. unburnt fuel): we would like to find out if there are interfering species any identify them by correlation of the measured data



Conclusions

- First controlled field test with continuously heated sensors
- The test is considered successful if the real NO_2 concentration can be monitored (confirming the lab results), or if possible interfering gasses can be identified
- The test is considered not successful if the sensor response is disturbed due to current packaging limitations