Nanosen-AQM Project : GT2 on nanosensors

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1. SUMMARY:

The main objective of the NanoSen-AQM project (Interreg-Sudoe) is to assess the air quality and to inform citizens in real time in distributed and sustainable way. In the project a new generation of nanosensors for external air quality management (mainly detection of NO2, CO and O3 pollutants) will be developed by the groups of CSIC, CNRS-CIRIMAT and CNRS-LAAS. These partners will develop low cost resistive nanosensors based on nanostructured metal oxide semiconductors (SnO2, ZnO, ZnO:Ga, Co3O4, CuO,...). Sensitive materials nanostructures improve the gas sensing properties such as sensitivity, selectivity and response speed. These nanostructures will be deposited in various forms: nanowires, nanofibers, nanobelts, nanoparticles, thin films … and will be doped with functional materials (graphene, metal nanoparticles) or in the form of nanocomposites. The nanotechnologies that will be used for the fabrication of the sensing materials are low pressure chemical vapour deposition (LPCVD) aerosol assisted chemical vapour deposition (CVD), electrospinning (ES), atomic layer deposition (ALD) and RF-sputtering (RFS). The nanomaterials will be deposited onto silicon micromachined and polymeric substrates. The interest of polymeric substrates is their low cost, however they remain dedicated to measurements at low or moderate temperature. The micromachined heating platform makes it possible to heat from room temperature to 550 °C in few tens of ms, and the cooling time is of the same order of magnitude. This type of platform can thus generate very rapid temperature variations, which is suitable for operating the sensor in a pulsed mode in order to improve the sensitivity/selectivity. Moreover we will prepare multi-sensors on which more than one sensing chip can be obtained in the same device. This type of multi-sensor is especially suitable for operation in complex atmospheres containing various interfering gases and obtaining a good selectivity. Due to the high number of materials studied and the large number of possible combinations between sensitive oxides and dopants (metals or oxides), it will thus be possible to deposit the best combinations on these multi-chip sensors to have efficient and selective sensors for outdoor air quality monitoring..

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