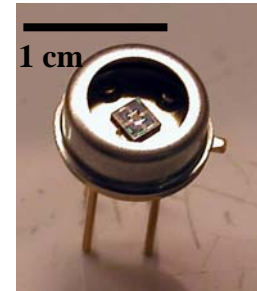
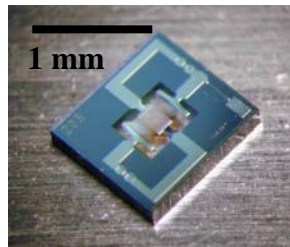
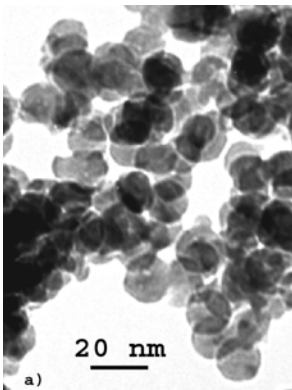


## Nanomaterials and microgas sensors

The chemical approach developed in our group to synthesize metals and metal oxides, with an accurate control of morphology at a nanometric scale, have been successfully applied in the field of semi-conducting gas sensors to design sensing as well as filtering materials.

### *Nanomaterials for sensitive layers of gas sensors*

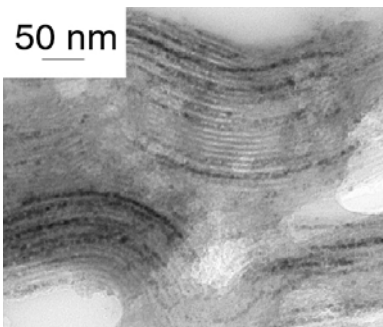
The synthesis of tin nanoparticles,<sup>[1]</sup> their doping with noble metals, their integration on silicon platforms<sup>[2]</sup> and their implementation as gas sensors sensitive layers have been developed in our group through a multidisciplinary approach involving industrial and academic partners (E.U. program NANOSENSOFLEX). A first generation of micro gas sensors, presently under manufacturing exploitation, results from this work.



The tin dioxide nanoparticles (HRTEM image), the silicon platform on which the nanoparticles are deposited and the sensor ready to use

### *Nanomaterials for catalytic filters of gas sensors*

New hybrid materials combining a mesoporous membrane in which nanoparticles of an oxidation catalyst, like ruthenium dioxide, have been developed in our group. After their implementation at the surface of the sensitive layer of a micro gas sensor, the ability of these hybrid materials to selectively filter reducing gases like carbon monoxide and hydrocarbons have been studied. Improvement for the detection of traces of flammable gases in presence of interfering gases (CO, NO<sub>2</sub>) constitutes a significant result in this field.



a)

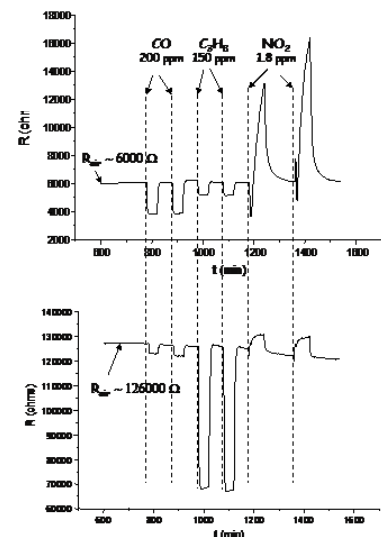
a) Example of material for catalytic filter constituted of RuO<sub>2</sub> nanoparticles in a functionalized mesoporous silica membrane.  
b) The influence of a catalytic filter on the sensor response to various gases

Sensor without filter



b)

Sensor with filter



<sup>[1]</sup> C. Nayral, A. Maisonnat, B. Chaudret, P. Fau, european patent EP 0947245, US patent 6395053 (28/05/2002)

<sup>[2]</sup> B. Chaudret, L. Erades, P. Fau, A. Maisonnat, C. Nayral, J.-L. Simon, PCT WO 2001002844 (11/01/2001)