Thin Film Deposition

DLI - MOCVD

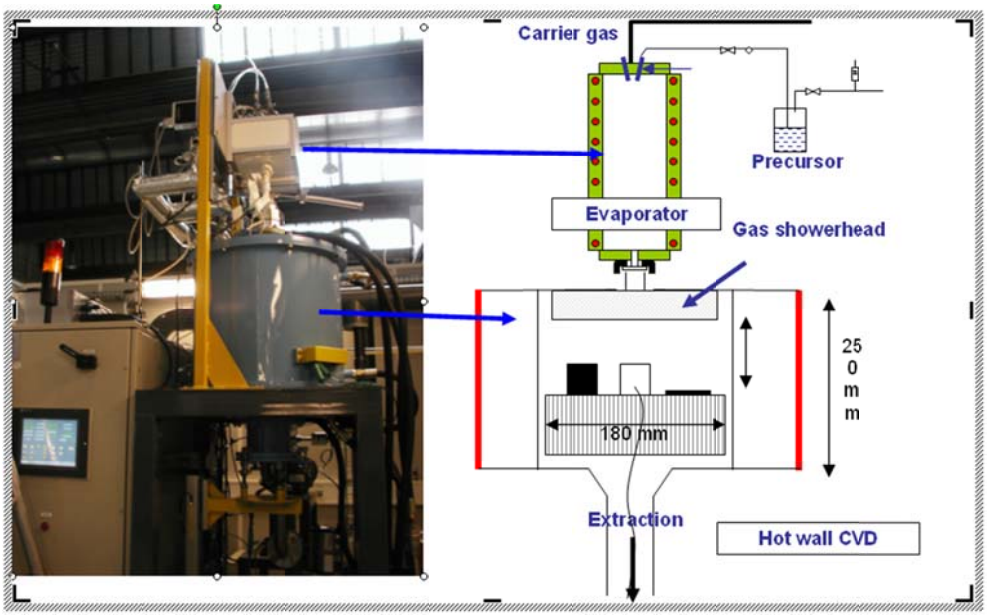
CEA-LITEN, France

Contact:	**Pascal Fugier** Email pascal.fugier@cea.fr • Phone +33(438) 782876						
Material class:	Silicon X	Polymer X	Metal X	Ceramic X	Glass X	Organic	Other

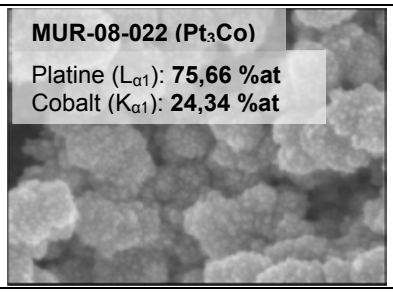
Short technology description:

Silver, Platinum or Titanium-based nano structured materials (TiO_2/metals) have been prepared by a non conventional CVD process, i.e. direct liquid injection metal organic chemical vapour deposition technique (DLI-MOCVD) which allows a precise control of precursor flows well suited for nano structured catalysts synthesis (low content of catalytic element (<0.1% wt). The schematic representation of the reactor is shown below page. This reactor is a hot-wall vertical reactor fit with a liquid injection system which allows the generation of a stable gas phase from unstable organometallic compounds with an accurate control of the content of these precursors. Depositions are usually carried out under low pressure (500-1000 Pa).

In PLI-MOCVD, the solution is injected directly by a micro-valve. The injector injects micro doses (a few microliters) of an organic solution containing a dissolved mixture or pure MO liquid precursor. After flash evaporation, the resulting vapour mixture is transported by gas towards the heated substrate. The frequency, the opening time and the solution concentration are the main parameters controlling the growth rate.
Actually, on the basis of this new liquid delivery system, high quality of noble metals nanoparticles or oxide films has been obtained in our laboratory. This method is very versatile and thus suitable for in situ deposition of thin films or complex systems such as composites Metal/Oxide, NTC, nanoparticles, multilayers…



CEA MOCVD apparatus and schematic representation

Typical structures and designs:	 **Nanoparticles deposition on porous supports**
Special features:	– Deposition on powders **(**from 5nm to 2mm diameter) – Flat support – Curve support (tube inside outside) – Thin film or Nano particles deposited – Oxide or metals particles – Many tested of precursors
Limitations, constraints:	– Thermal activation of the support (min 200°C) – Max temperature: 800°C – Work pressure from 100T to 0.1T – Possible coating in 2D and 3D
Material examples:	– Pt and Pd particles – Ti / Tio_2 – Ag – Pt / Rh – Co and Pt/Co