Thin Film Deposition

CVD

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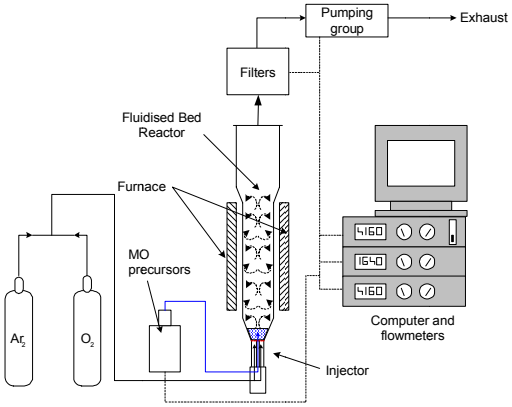
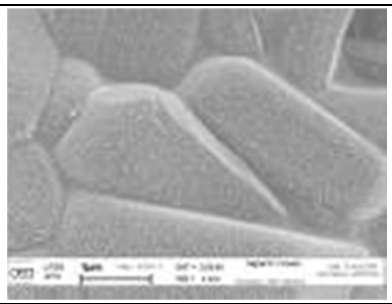
Material class:	Silicon	Polymer X	Metal X	Ceramic X	Glass	Organic	Other
Short technology description:	**Fluidized Bed Deposition (FB-MOCVD)** Compared with wet chemistry methods Chemical Vapour Deposition (CVD) allow avoids various time-consuming oxidation and reduction steps, which might influence the purity of the material obtained. Combined CVD process with fluidisation allows deposit particles on porous powders. The principle of this method is that a bed of solid particles over a gas distribution plate is made to behave like a liquid by passing gas trough it at a flow rate above critical value (value of a gas velocity when forces lifting powders up will be equal to the downward gravitational forces causing the particles to become suspended within the fluid). During fluidisation metal-organic precursor is injected into the bed in form of small drops dispersed in inert gas. The metal-organic precursor diluted in organic solvent (organic solvents are used because they have low temperature of evaporation) is introduced in an evaporator. The drops are instantaneously evaporated and transported to the deposition zone in a flux of gas. The high degree of contact between gases, powders and reactor walls ensure that conditions in the gas-solid bed are isothermal[i]. In consequence, gaseous precursors are frequently wholly consumed within a few centimetres of the fluidised bed reactor entrance. The vigorous mixing of the particles ensures uniform deposition. A schematic graph of apparatus is presented below.  						
Typical structures and designs:	 **Nanoparticles deposition on porous supports**						
Special features:	– Deposition on powders (from 50nm to 2mm diameter) – Flat support						
Limitations, constraints:	– Thermal activation of the support (min. 200°C)						
Material examples:	– Pt[43,ii] and Pd[15,34,35,36,iii] particles						

[i] J-C.Hierso, P.Serp, R.Feurer, P.Klack, Appl. Organomet. Chem. 1998, 12, p. 161
[ii] B.Clemens, L.Yong, Engineering nanostructures for hydrogen storage - report.
[iii] Sh.Mu, H.Tang, Sh.Qian, M.Pan, R.Yan, Carbon, 44, 2006, p. 762