Synthesis of Carbon Nanotubes using the CVD method (from 1994 up till now**)**

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Due to the growing technological interest, carbon nanotubes are worth considering in potential applications and large scale synthesis. This presentation will give an overview about the possible production, highlighting the importance of catalytic chemical vapor deposition (CCVD) in the last 25 years. Multiwalled carbon nanotubes (MWCNTs) can be synthesized in a catalytic reaction using proper catalyst support. Impregnating with conventional catalysts (generally Fe and/or Co) enables the production of MWCNTs in a fixed-bed flow reactor at relatively low reaction temperature (~700°C).

Effective and well-reproducible growth of vertically aligned carbon nanotube (VACNT) forests by catalytic chemical vapor deposition (CVD) supposes precise setting of both catalyst thin films and CVD conditions. Current work presents super growth of VACNTs on Al_2O_3 supported Fe-Co catalyst layers which were grown by different techniques such as pulsed laser deposition (PLD), dip coating or manual spray coating onto various substrates (silicon, aluminum, titanium, or AZO).

The thickness and optical properties of the catalyst layers were monitored by spectroscopic ellipsometry. The effect of various parameters during CVD on VACNTs was investigated in detail. As a result, well-aligned, dense and few-walled CNT forests with 10 μm – 1.5 mm height could be deposited by water vapor assisted CVD on the previously treated films. Accordingly, to these observations, Raman spectroscopy showed high degree of crystallinity of as-prepared VACNTs. Both layer building techniques and CVD are widely available, simple and cost-effective techniques and the resulting VACNTs have high quality. Harvesting these advantageous properties of CNTs deposition of inorganic oxide on their surfaces was carried out for further application.

Misconceptions in photocatalysis – real and "imaginary" photocatalysts

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Photocatalysis is among those research areas which is continuously expanding, bringing new approaches, concepts, and potential applications. Of course, the focus is still on photocatalytic degradation of organic pollutants, although H_2 production, CO_2 conversion topics are being hotter than ever. This continuous "production" of scientific papers raised the probability of misconceptions and wrongly approached results, which includes: unrealistic degradation mechanisms, speculations without any kind of theoretical/experimental background or even totally confusing photocatalytic activity with other concentration-decrease associated phenomena, such as adsorption.

One of the materials which is wrongly documented is MoO_3, which is considered as visible-light active photocatalyst, alongside with WO_3. Relatively high number of scientific works are stating that these two materials are indeed extremely photoactive under visible light and under solar irradiation as well. To verify this, MoO_3, was investigated considering as a stand-alone photocatalyst, a composite-component and also as and adsorbent as well. To clarify the results, different characterization techniques were employed to uncover textural, optical, structural properties of these materials and to link them with the observed applicability of MoO_3. Also WO_3, was investigated using the same strategy, but the focus was on the composite component and stand-alone photocatalytic approach.