New Routes in Carbon Nanotube Synthesis by Means of a Modified Hot Filament Chemical Vapor Deposition Technique

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Our Hot Filament Chemical Vapor Deposition (HFCVD) apparatus, modified by the introduction of a powder flowing system, allows the use of different kinds of solid powders as reactants. By the use of $Fe(NO_3)_3$ in acetone as a catalyst, and carbon nanoparticles as reactants, we successfully synthesized Single Wall Carbon Nanotubes (SWNTs). We proved able to control orientation of the deposit as well as the area of growth [1]. By slightly varying experimental conditions, we obtained a nanocrystalline diamond coating on SWNT wall [2]. The use of diesel soot as SWNT precursor has been investigated, too: highly oriented growth of tubular structures through catalysed reaction occurs all over the substrate with abundance of coiled, intriguing structures. Commercial graphite with powders' size in the micron range, in the same experimental conditions, lead to Multi Wall Carbon Nanotube rich deposits. Selected area growth of nanotubes can be achieved by means of catalyst dispersions on Si/SiO_2 patterned substrates or from selectively sputtering metallic iron

[1] Orlanducci S., Sessa V., Terranova M. L., Rossi M., Manno D., *Chem. Phys. Lett.,* 2003, **367**, 109S. [2] Terranova M.L., Orlanducci S., A.Fiori, Tamburri E., Sessa V., Rossi M., Barnard A.S., *Chem Mater*., *submitted*.

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