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7. Brief account of your research interests with special focus on Nano Science and Technology (strictly within 300 words):

Carbon nanotubes (CNTs) exhibit a unique combination of physical and chemical properties, which promise a wide range of potential applications in key industrial sectors. An essential step towards the application of nanotubes is a thorough understanding of the effect of process variables on CNT growth and the role of the metal catalyst involved in the synthesis procedure.

I have studied the synthesis of multi-walled carbon nanotubes (MWCNTs) by chemical vapor deposition (CVD). The effect of CVD process variables such as temperature, choice of catalyst, etc on the growth behavior of nanotubes has been examined to understand the catalytic growth of CNTs. The transition metal catalysts, Fe and Ni, were used in both elemental metal form and in a metal complex form. In the case of elemental metal catalysts, the respective metals were deposited over the Si substrate using thermal evaporation following which nanotubes were synthesized by means of CVD. Subsequent studies of the synthesized carbon nanostructures employing elemental metal catalysts revealed a significant influence of the temperature and the catalyst material on the structure of CNTs. The CNTs synthesized using Ni catalyst were bamboo-like whereas the CNTs developed employing Fe catalyst were straight tubes with partial metal filling. Consequently, growth models for the different growth mechanisms have been developed. Certain limitations of the above process have been overcome by employing spin-coating of a metal complex catalyst material on the Si substrate. The CVD synthesis of nanotubes using metal complex catalysts always resulted in partially catalyst filled CNTs. More importantly, the metal complex catalyst could be easily patterned on the Si substrate

using spin-coating and photolithography, which resulted in site-selective growth of partially catalyst filled MWCNTs. The metal filled MWCNTs show ferromagnetic behavior with large coercivity providing interesting possibilities for further applications in many potential areas, especially as magnetic recording media.

8. Keywords related to your research interests (maximum 10, different lines separated by commas)

Carbon Nanotube (CNT),

Filled CNT,

Bamboo-like CNT,

Photolithography,

Site selective growth,

Chemical vapor deposition (CVD),

Catalyzed growth,

Atomic force microscopy (AFM),

Micro Raman spectroscopy,

High resolution transmission electron microscopy (HRTEM)