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The evolution of helical forms in nanotube and nanofiber growth: Thermodynamic Model and Experiment PRABHAKAR BANDARU, Materials Science, UC, San Diego, APPARAO RAO, Department of Physics, Clemson University — Several models, none of them completely satisfactory, have been proposed to understand the synthesis of nanotubes and nanocoils. In this presentation, we first briefly review the models in vogue and point out their shortcomings. Second, we introduce a thermodynamic model, based on exclusion volume principles, common in chemical and biological systems that could potentially explain coiling in nanostructures. Here, the observation of helices and coils in nano-tube/-fiber syntheses is explained on the basis of the interactions between specific catalyst particles and the growing nanostructure. Third, we make specific predictions for the optimal growth of nano-coils/-helices with the hope that these could be used as a guide for rational synthesis. Finally, our own experimental results conforming to the above model, on the role of Indium catalyst particles and local CVD reactor temperature in influencing the coil pitch in coiled nanostructures, will be presented.

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