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***In situ* Optical Monitoring and Modeling of Vertically-Aligned Carbon Nanotube Array Growth During Chemical Vapor Deposition**[1]

A. A. PURETZKY, D. B. GEOHEGAN, H. CUI, G. ERES, I. N. IVANOV, Condensed Matter Sciences Division, Oak Ridge National Laboratory, and Dep. of Mat. Sci. and Eng., Univ. of Tennessee — A detailed experimental study of vertically aligned carbon nanotube array (VANTAs) growth by chemical vapor deposition (CVD) based on time-resolved reflectivity and direct remote microscope imaging as a diagnostic to measure and control the length of VANTAs *in situ* was performed. The VANTA growth was investigated between 500 $^{\circ}$C and 900 $^{\circ}$C on Si substrates with different evaporated multilayer catalysts and different feedstock gases. Nanotube lengths were controlled by rapid evacuation of the chamber. A kinetic model was developed to explain the observed growth kinetics, to discuss the main processes responsible for the growth of VANTAs, and to predict optimal growth conditions for single-wall carbon nanotube (SWNT) arrays. High quality VANTAs containing SWNTs were synthesized and characterized using Raman Spectroscopy.

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David Styers-Barnett
Oak Ridge National Lab

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