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**A SWNT Synthesis Apparatus for Multivariate Analysis of Nucleation and Growth Factors** R. ACOSTA, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson AFB and Wright State University, Department of Physics, D.C. LIPTAK, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson AFB and UES, Inc., R. RAO, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson AFB, P. CACERES-VALENCIA, University of Puerto Rico, Department of Mechanical Engineer, J. DEIBEL, Wright State University, Department of Physics, B. MARUYAMA, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright-Patterson AFB — A Multivariate analysis of various factors that influence the nucleation and growth of single-walled nanotubes (SWNTs) is demonstrated. The SWNTs are synthesized via thermal chemical vapor deposition on silicon substrates inside an environmental cell coupled to an automated stage. In-situ micro-Raman spectroscopy and imaging is performed on the radial breathing mode and D/G bands of the growing SWNTs where the excitation laser also serves as a localized heat source for SWNT growth. The SWNTs are grown on thermally isolated islands within the substrate and data can be collected by varying growth conditions in real time across each region. Computer control over substrate temperature, feed gas composition, chamber pressure and substrate position enable rapid exploration of the SWNT growth parameter space and the establishment of a robust database for comparison with theory.

R. Acosta  
Air Force Research Laboratory, Materials and Manufacturing Directorate,  
Wright-Patterson AFB and Wright State University, Department of Physics

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