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Investigation of Nanotube Growth Mechanisms via *In-Situ* Spectroscopy RAHUL RAO, Air Force Research Laboratory, Materials and Manufacturing Directorate, AFRL/RX, WPAFB, OH 45433, UTC Inc., Dayton, OH 45432, DAVID LIPTAK, Air Force Research Laboratory, Materials and Manufacturing Directorate, AFRL/RX, WPAFB, OH 45433, UES Inc., Dayton, OH 45432, ROBERTO ACOSTA, BENJI MARUYAMA, Air Force Research Laboratory, Materials and Manufacturing Directorate, AFRL/RX, WPAFB, OH 45433, AFRL TEAM — Analysis of single-walled carbon nanotubes (SWNTs) during growth via Raman spectroscopy offers a unique approach to understand their growth mechanism, which remains unclear due to large variability of parameters in synthesis methods. In our technique the SWNTs are synthesized via chemical vapor deposition inside an environmental cell coupled to an automated stage. Growth occurs from catalyst nanoparticles on thermally isolated islands within substrates. *In-situ* micro-Raman spectroscopy 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. Computer control over substrate temperature and position, feed gas composition, and chamber pressure enable rapid real-time exploration of SWNT growth parameter space. Comparison of nanotube nucleation and growth kinetics from various metallic catalyst particles will be presented and implications for nanotube catalyst design will be discussed.

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