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Understanding Chiral-Selective Growth of Carbon Nanotubes: In-Situ Raman Studies of Individual Single Walled Carbon Nanotube Growth RAHUL RAO, DAVID LIPTAK, TONYA CHERUKURI, DAYLOND HOOPER, Air Force Research Laboratory, BORIS YAKOBSON, Rice University, BENJI MARUYAMA, Air Force Research Laboratory — In-situ Raman scattering has been used to obtain growth kinetics of individual single-walled carbon nanotubes (SWNTs) using a custom designed cold-wall chemical vapor deposition (CVD) chamber coupled to a Raman spectrometer. Raman spectra are collected during SWNT growth and plots of the G band area versus time are fitted to self-exhausting exponential curves, from which we obtain SWNT growth rates and catalyst lifetimes (time constant). Chiral index assignments are made for several individual SWNTs via analysis of the radial breathing modes. The growth rate of the SWNTs is shown to be proportional to the chiral angle. In addition we find a positive correlation between SWNT length (obtained from SEM analysis) and the growth rate. This confirms the model put forth by Ding *et al.* [1] which links SWNT growth rate to the chiral angle. A growth model based on our results illuminates an as-yet unexplained distribution in the chiral yield of typical CVD-grown nanotubes as being driven by chiral-selective growth kinetics. [1] Ding, F; Haturyunyan, A; Yakobson, B, I; Dislocation theory of chirality-controlled nanotube growth, Proc. Natl. Acad. Sci., 106, 2506, 2009

Rahul Rao
Air Force Research Laboratory

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