

ACCVD による垂直配向単層カーボンナノチューブ合成のアセチレン増進

Acetylene-Accelerated Growth of Vertically Aligned Single-Walled Carbon Nanotubes by ACCVD

東大工 〇項 榮, 大川 潤, 張 正宜, エリック エイナルソン, 宮内 雄平, 村上 陽一, 丸山 茂夫

The University of Tokyo 〇Rong Xiang, Jun Okawa, Zhengyi Zhang, Erik Einarsson, Yuhei Miyauchi, Yoichi Murakami, Shigeo Maruyama

E-mail: xiangrong@photon.t.u-tokyo.ac.jp

Using an *in situ* optical absorption measurement [1], we studied the influence of various additive molecules on single-walled carbon nanotube (SWNT) synthesis by alcohol catalytic chemical vapor deposition (ACCVD). An interesting growth acceleration phenomenon was observed with the introduction of acetylene. Fig. 1 shows that the growth rate (solid line) was enhanced almost 10 times by adding only 1% acetylene. However, pure acetylene of the same partial pressure deactivated the catalyst in a couple of seconds, regardless of whether or not ethanol had been used for the initial cap nucleation. When ethanol was re-supplied, the activity of these partially poisoned catalyst particles could be recovered. Therefore, the importance of the presence of ethanol throughout ACCVD was demonstrated, and a detailed mechanism will be discussed. Other recent results [2, 3] on the growth mechanism and structure control of vertically aligned SWNTs by ACCVD will also be presented.

[1] S. Maruyama, E. Einarsson, Y. Murakami, T. Edamura, *Chem. Phys. Lett.* 403 (2005) 320.

[2] R. Xiang, Z. Zhang, K. Ogura, J. Okawa, E. Einarsson, Y. Miyauchi, et al., *Jpn. J. Appl. Phys.*, in press.

[3] R. Xiang, Z. Yang, Q. Zhang, G. Luo, W. Qian, F. Wei, M. Kadowaki, et al., submitted to *J. Phys. Chem. C*.

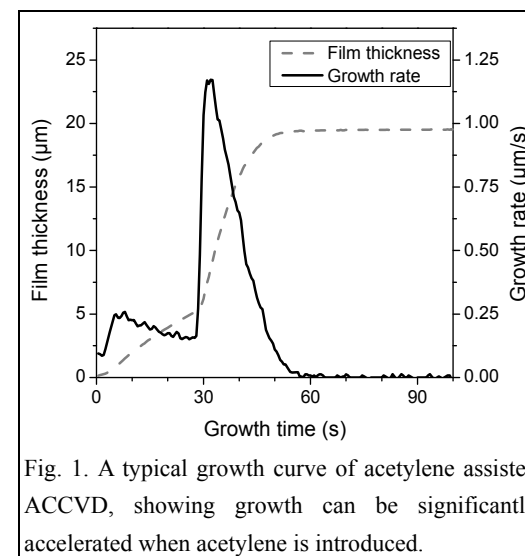


Fig. 1. A typical growth curve of acetylene assisted ACCVD, showing growth can be significantly accelerated when acetylene is introduced.