

Alcohol CVD Generation of Single-Walled Carbon Nanotubes and Photoluminescence Spectroscopy for Future Chirality Control

Shigeo Maruyama

Laboratoire EM2C, ECOLE CENTRALE PARIS

92295 Chatenay Malabry, FRANCE

Permanent Address: *Department of Mechanical Engineering,*

The University of Tokyo

7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, JAPAN

TEL: +81-3-5841-6421 FAX: +81-3-5800-6983

E-MAIL: maruyama@photon.t.u-tokyo.ac.jp

URL: <http://www.photon.t.u-tokyo.ac.jp/>

By using alcohol catalytic CVD (ACCVD) technique [1], high-purity single-walled carbon nanotubes (SWNTs) are generated at relatively low CVD temperatures. For example, the vertically aligned SWNTs film [2,3] with thickness up to 30 micron meters is grown on quartz substrates by employing the simple dip-coat preparation of catalytic metal particles. This film made of vertically aligned thin bundles of SWNTs could be used for various applications. On the other hand, SWNTs grown by metal particles supported on zeolite were probed to have narrow chirality distribution by near infrared fluorescence spectroscopy [4]. The near armchair nanotubes such as (6,5) and (7,5) are predominantly generated probably because of the stability of nanotube cap structure. The photoluminescence spectroscopy using this narrow chirality ACCVD sample demonstrates the existence of excitonic phonon-side band [5] and cross-polarized absorption with relatively small exciton binding energy [6].

References:

- [1] S. Maruyama, R. Kojima, Y. Miyauchi, S. Chiashi, M. Kohno, Chem. Phys. Lett. 360 (2002) 229.
- [2] Y. Murakami, S. Chiashi, Y. Miyauchi, M. Hu, M. Ogura, T. Okubo, S. Maruyama, Chem. Phys. Lett. 385 (2004) 298.
- [3] Y. Murakami, E. Einarsson, T. Edamura, S. Maruyama, Phys. Rev. Lett., 94 (2005) 087402.
- [4] Y. Miyauchi, S. Chiashi, Y. Murakami, Y. Hayashida, S. Maruyama, Chem. Phys. Lett., 387 (2004) 198.
- [5] Y. Miyauchi, S. Maruyama, Phys. Rev. B, 74 (2006) 35415.
- [6] Y. Miyauchi, M. Oba, S. Maruyama, Phys. Rev. B (2006) in press (cond-mat/0608073).