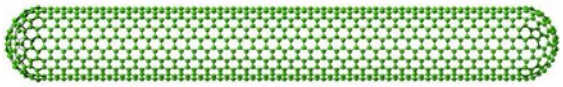
# *21COE Programme: Mechanical Systems Innovation Open Seminar*

21COE Programme: The Mechanical System Innovation Open Seminar 2007 will be held as follows. Professor Yuan Chen is a young and energetic researcher in carbon nanotube synthesis. His recent works of chirality-controlled growth of single-walled carbon nanotubes attract attention in nanotube field. Do not miss this chance to hear his talk in Tokyo. Participants from any departments or outside of The University of Tokyo are welcome.



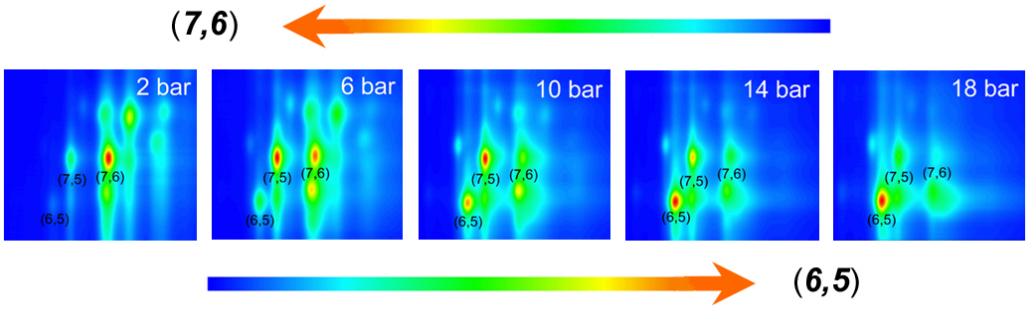
## Professor Yuan Chen

School of Chemical and Biomedical Engineering
Nanyang Technological University, Singapore

## Title: **Pressure-Induced Single-Walled Carbon Nanotube (n, m) Selectivity on Co-Mo Catalysts**

Date & Time: March 12, 2008 (Wed.) 10:30 ~ 12:00
Place: 7-3-1 Hongo, Bunkyo-ku, Tokyo
The University of Tokyo, Engineering Building II, Lecture Room 232 (#2-301)
Map: http://www.u-tokyo.ac.jp/campusmap/cam01_04_03_e.html

My work focuses on (n,m) selective growth and enrichment of single walled carbon nanotubes (SWCNTs). In this study, SWCNTs were synthesized using four different carbon precursors including CO, $C_2H_5OH$, $CH_3OH$, and $C_2H_2$ on Co-Mo catalysts. Semiconducting (n,m) abundance was evaluated by a method based on a single-particle tight-binding theoretical model taking into consideration the relative photoluminescence and absorption quantum efficiency for specific (n,m) tubes. (n,m) abundance determined in photoluminescence analysis was used to reconstruct the near-infrared $Es_{11}$ absorption spectra. Carbon precursor pressure was found to be the key factor to the chirality control in this study. Narrowly (n,m) distributed SWCNTs can only be obtained under high-pressure CO or vacuumed $C_2H_5OH$ and $CH_3$-OH. The majority of these nanotubes are predominately in the same higher chiral-angle region. The carbon precursor chemistry may also play an important role to obtain narrowly (n,m) distributed SWCNTs. We further found the selective growth of bulk SWCNT samples enriched with three different dominant chiralities including (6,5), (7,5), and (7,6) through adjusting the pressure of carbon monoxide on Co-Mo catalysts from 2 to 18 bar. The abundance of each (n,m) tube can be systematically altered by changing the carbon monoxide pressure. (n,m) selectivity on Co-Mo catalysts shifts under different carbon precursors providing the route for (n,m) specific SWCNTs production.




Reference:

J. Am. Chem. Soc. 2007, 129, 9014-9019
J. Phys. Chem. C, Vol. 111, No. 40, 2007 14612-14616

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