

21COE Programme: Mechanical Systems Innovation Open Seminar

21COE Programme: The Mechanical System Innovation Open Seminar 2007 will be held as follows. Professor Hans Kuzmany is well known for excellent spectroscopy works in nano-scale materials, such as Raman spectroscopy on carbon nanotubes. He is also known as the founder and chairman for more than 20 years of International Winterschool on Electronic Properties of Novel Materials always held in Kirchberg. His talk will be about the growth process of a single-walled carbon nanotubes inside a single-walled carbon nanotube based on excellent Raman measurements. Do not miss this chance to hear his talk in Tokyo. Participants from any departments or outside of University of Tokyo are welcome.

Invited Speaker: Professor Hans Kuzmany
(Department of Physics, University of Vienna, Austria)

Title: The Growth of DWCNTs from the Precursor Route

Date & Time: October 22, 2007 (Monday) 14:00~15:30

Place: The University of Tokyo, Engineering Building II, 11th Floor,
EEIC Conference Room 4 (112C1)

Abstract :

Double-walled carbon nanotubes (DWCNTs) are a special tube species intermediate between single-walled carbon nanotubes and multi-walled carbon nanotubes. They attract recently particular attention, since they exhibit several properties which are of scientific and technological relevance. DWCNTs can be grown either directly in a CVD process or from precursor routes. In the latter case either peapods as a starting material or a catalytic process inside the tubes can be used.

We report on detailed Raman, x-ray scattering, HRTEM, and photoemission studies performed for the precursor routes. For the peapod as a starting material an analysis with ^{13}C labelled fullerenes the growth process is found to be local which means immediately on the cage. Stone-Wales transformations play a crucial role. They lead to an intermediate phase between the fullerenes and the final inner-shell tube. For the catalytic process ferrocene is used as a starting material. Eventually iron carbide is the active catalyst. Tube growth can proceed for temperatures as low as 600 K. There is evidence for charge transfer between the catalyst and the outer-shell tubes. The final DWCNT product is different for the two precursor routes even for equal starting material. Some characteristic differences to the CVD grown tubes will be elucidated.

Work supported by the Austrian Science Foundation Project 17345 and I80-N20 (IMPRESS), by the HRTEM facilities at AIST in Japan, and by the Alexander von Humboldt foundation in Germany.

Contact: The University of Tokyo, Department of Mechanical Engineering,
Professor Shigeo Maruyama
(E-mail: maruyama@photon.t.u-tokyo.ac.jp, Tel: 03-5841-6421)