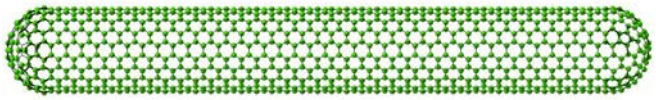
21COE Programme: Mechanical Systems Innovation Open Seminar

21COE Programme: The Mechanical System Innovation Open Seminar 2007 will be held as follows. Professor Tobias Hertel is a leading researcher in carbon nanotube science and engineering. In particular, his excellent works in photoluminescence and ultra-fast spectroscopy are well recognized in the field. Do not miss this chance to hear her talk in Tokyo. Participants from any departments or outside of The University of Tokyo are welcome.



Professor Tobias Hertel

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Colorful Carbon: Photophysics of Carbon Nanotubes

Date & Time: **February 18, 2008 (Mon.) 14:00-15:30**
Place: 7-3-1 Hongo, Bunkyo-ku, Tokyo
The University of Tokyo, Engineering Building II, Seminar Room 2-31B
Map: http://www.u-tokyo.ac.jp/campusmap/cam01_04_03_e.html

The extraordinary thermal-, chemical- and photostability of carbon nanotubes (CNTs) along with their high molar photo-absorption coefficients, tunable nearinfrared luminescence and narrow spectral features appear to furnish them with unique potential for a variety of applications in nano-, materials- and life sciences. Most of these characteristics can be attributed to the strength of the graphitic CNT backbone, its unique electronic structure and a quasi onedimensional geometry. Photoluminescence quantum yields of semiconducting carbon nanotubes however, have long been believed to be discouragingly low. Here I will discuss recent experimental and theoretical advances which have shed light onto the microscopic mechanisms responsible for fast non-radiative decay. Until recently the highest reported PL quantum yields were on the order of 10^{-4} to 10^{-3}. Today PL quantum yields of semiconducting CNTs exceed 3% and continue to increase with advances in sample processing. We have used a combination of CW and time-resolved optical probes including time-correlated single photon counting, pump-probe-, photoluminescence excitation-, and femtosecond time-resolved photoelectron-spectroscopy to study the dynamics of optical excitations from the femtosecond to the nanosecond timescale. The results underline the status of CNTs as unique optical material and their potential for use in a manifold of optical applications from optoelectronics to use as fluorescent markers in life-sciences.

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