DOUBLE WALLED CARBON NANOTUBES

M. Endo*[1,2,4], H. Muramatsu,[2] T. Hayashi,[3] Y. A. Kim[3]

[1]*Institute of Carbon Science and Technology,* [2]*Exotic Nanocarbon Research Center and* [3]*Faculty of Engineering,* [4]*Shinshu University, 4-17-1 Wakasato, Nagano 380-8553 (Japan)*
**endo@endomoribu.shinshu-u.ac.jp*

Double walled carbon nanotubes (DWNTs) are considered as an ideal model for studying the interactions and coupling behavior between different concentric tubules. Moreover, their intrinsic coaxial structures make them mechanically, thermally and structurally more stable than single walled carbon nanotubes (SWNTs). Geometrically, the buffer-like function of the outer tubes in DWNTs allow inner tubes to exhibit exciting transport and optical properties that make them promising in the fabrication of field-effect transistors, stable field emitters and lithium ion batteries. In addition, the utilization of the outer tube chemistry makes DWNTs useful for anchoring semiconducting quantum dots as well as for use as effective multifunctional filler in producing tough, conductive transparent polymer films, while the inner tubes with diameter below 0.9 nm preserve their excitonic transitions.

However, the physics of DWNTs have been less explored in nanotube science, because of their intrinsic complex geometries. More specifically, there is no systematic study on the effect of the intershell interaction as well as the configurations of the two concentric tubules. In order to achieve such a target in DWNTs, here, we report two different approaches of producing high-purity DWNTs (e.g., catalytically grown and peapod-grown DWNTs) and their versatile applications with their respective optical and transport features.