



# IBS Center for Multidimensional Carbon Materials



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### Misinterpreted Structures of Carbon Nanotubes

Tuesday, MAY 10 | Bldg. 101  
2 PM | Seminar room on the 1<sup>st</sup> floor

Carbon nanotubes (CNTs) have raised considerable interest worldwide because of their nano-size and unique shape since their first report in 1991. The materials were expected to open new applications in diverse sectors of industry such as electronics, composites, energy storage and conversions, biotechnology as well as electrochemistry. There have been numerous studies on the applications after their successful mass production for last two decades. Currently, however, their applications are at a stand-still. In this talk, I explain that there was big misunderstanding in analyzing the structures of multi-wall CNTs (MWNTs) as well as single-wall CNTs (SWNTs). I reveal evidence of the structure of commercial MWNTs to be the AA' stacking of helical graphene sheets rather than disorderedly stacked concentric tubes with different diameters, using the complementary analyses of X-ray and electron diffraction measurement, and high-resolution transmission electron microscopy and atomic force microscopy observation. I also show evidence of the structure of SWNTs to be a graphene helix, resulted from spiral growth of a zigzag graphene ribbon. I discuss that our helical models for MWNTs and SWNTs can explain experimental data reported in the literature, indicating that the structural model proposed here is common structures of MWNTs and SWNTs. Thus, I attribute the unexpected delay of their application to the misunderstood structures of MWNTs and SWNTs which have been analyzed as concentric graphene tubes. I also show a way of producing graphene nanopowders (GNPs) (~ 5 nm in size) by ball milling of MWNTs, and of enlarging the GNPs via seeded growth.

**You are cordially invited to attend!**

Tuesday Colloquium