東京大学グローバルCOEプログラム　機械システム・イノベーション国際拠点

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# Determination of the Chirality of Carbon Nanotubes by Electron Diffraction


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## 要旨


Recent development in both fundamental understanding and techniques in synthesis, fabrication, manipulation, and application-driven design of nanotube- and nanowire-based devices has led to successful production of several model structures to study the transport, electromechanical, and electron emission properties of such nano-devices. An essential challenge in the characterization of carbon nanotube-based devices is to obtain both the atomic structure (chirality) and the property measurement at the same time, since the device performance is very sensitive to the chirality of the nanotube used in building the device. For example, depending on its chirality of the nanotube, the nanotube can be either metallic or semiconducting. Therefore knowledge of the chirality of the nanotube is crucial in understanding and characterization of the nanotube-based device.

In this talk, I will outline the basics of the helical diffraction theory developed to describe the x-ray / electron diffraction from nanotubes and will present a systematic procedure to obtain the exact atomic structure of carbon nanotubes described by their chirality (chiral indices). A few selected examples, including single-shell, double-shell, and multi-shell carbon nanotubes, will be presented to illustrate the theoretical analysis and practical applications of the procedure. For multi-shell carbon nanotubes, the chirality (chiral indices) of each and every shell will be determined.

I will also briefly describe a single carbon nanotube-based nano-electromechanical system (NEMS) with which we characterize and correlate the structure-property relationships of single carbon nanotubes.



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