

### PL01

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#### Carbon nanotubes

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From the very beginning controlling the structures of carbon nanotubes has been an important issue in many research areas such as optical property measurements, electron transport, and elucidation of growth mechanism as well as industrial applications (for instance separation of semiconducting and metallic). Among many characterization techniques the most straightforward one is high resolution electron microscopy (HRTEM), particularly at the atomic level resolution. The development of the spherical aberration correction devices enables us to visualize individual carbon atoms on a single graphene sheet, providing directly chiral indices (n, m) of any single or double walled carbon nanotube. Other applications of the HRTEM to crystallography is to direct molecular structure determination of single molecules such as higher fullerene molecules and metallofullerenes that will be a good complementary method to synchrotron X-ray diffraction method. More importantly I would like to emphasize on in-situ observation of dynamic morphological-changes in carbon nanotubes under various conditions (heat, current directions, presence of metal catalysts etc). The new technique revealed the electro-migration and diffusion of atomic defects such as atomic carbon vacancy and “interstitial” that takes place on the graphene sheets. The information thus obtained forms an important basis of understanding various unique properties of carbon nanotubes.

Keywords: carbon nanotubes, TEM, molecular structure analysis

### PL02

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#### NMR in solution and X-ray diffraction in crystals for postgenomic biology

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A survey will be presented of structural biology of proteins and nucleic acids with the use of NMR spectroscopy in solution. Special emphasis will be on the interface of the use of X-ray crystallography and solution NMR spectroscopy for studies of proteins, with special emphasis on the coordinated use of the two techniques in structural genomics projects.

Keywords: NMR spectroscopy, protein structure, structural genomics