

## In situ transmission electron microscopy reveals defects vs properties of nanomaterials

D. Golberg<sup>1</sup>

<sup>1</sup>National Institute for Materials Science (NIMS), Japan

Diverse in situ experiments aimed at understanding of defects/property relationship in nanomaterials will be summarized and presented [1]. The objects of interests are nanotubes and graphene-like structures in C [2-7] and Boron Nitride [8-13] layered systems, and Si [14], and Ag<sub>2</sub>S [15] nanowires. Electrical and mechanical tests are performed inside a high resolution transmission electron microscope (at a spatial resolution of 0.17 nm) using dedicated STM-TEM and AFM-TEM holders, and under a full control of atomic structure and nanomaterial chemistry alternations. The effects of various defects on bending and tensile nanomaterial strength, electrical conductance, phase and morphology change processes will be reviewed and the future perspectives of the in situ TEM methods with respect to the material and instrumentation design will finally be emphasized. DG is grateful to numerous colleagues and co-authors of the in-situ TEM project funded by the World Premier International (WPI) Center for Materials Nanoarchitectonics (MANA) tenable at NIMS, Tsukuba, as evidenced by a selected list of related publications over the recent years.