

Seminar

Date: 13 May 2009 (Wednesday)

Time: 11:00 am - 12:00 pm

Venue: EF 305, The Hong Kong Polytechnic University

***In Situ* Mechanical Characterization of Metallic Nanowires**

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Abstract:

Metallic nanowires are of great technological importance due to their current and potential applications in miniaturized electronic, optical, thermal and electromechanical systems. It is thus crucial to acquire a thorough understanding of their mechanical properties at comparable length scales. In addition to the technological driving force, one-dimensional metallic materials provide a unique opportunity to investigate fundamental mechanisms in materials science governing the origin and transitions of size dependent mechanical behavior for metals. This talk presents some of our recent efforts to study the size dependent mechanical behavior of metallic nanowires. We have developed a simple micro-device that allows *in situ* quantitative mechanical characterization of metallic nanowires, in scanning electron microscope (SEM) or transmission electron microscope (TEM) chamber equipped with a quantitative nanoindenter. The unique design of this device makes it possible to convert compression from nanoindentation to uni-axial tension at the sample stages. Fabrication of the micro-device is successfully demonstrated using established micro-fabrication processes. Finite element analysis (FEA) is employed to model the device behavior under mechanical loading and compared with experiments. Also in this work, Ni and Au nanowires with different diameters ranging from a few nanometers to hundreds of nanometers were fabricated. The morphology and microstructure of these nano-entities were studied using SEM and TEM. Finally, *some in situ* results on deformation and fracture behavior of Ni and Au nanowires will be discussed.

Biosketch:

Dr. Jun Lou obtained B.E. and M.S. degrees in Materials Science and Engineering from Tsinghua University (Beijing, China) and Ohio State University (Columbus, OH), respectively, and his Ph.D. degree from the Department of Mechanical and Aerospace Engineering and Princeton Materials Institute at Princeton University. He then did his postdoctoral research at Brown University (Providence, RI) before joining Rice University in summer, 2005 as an assistant professor in the Department of Mechanical Engineering and Materials Science. He is a recipient of the Air Force Young Investigator Award and the ORAU Ralph E. Powe Junior Faculty Enhancement Award. His research interests include nanomaterials synthesis, nanomechanical characterizations and nanodevices fabrications for energy and biomedical applications.

* Refreshment will be served after the seminar.