Field Emission Studies of Singled 1D Nanostructure Field-Emitter

By
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Date: Friday, 19th June 2009
Time: 11.00am to 12.00pm
Venue: Hilbert Space (PAP-02-02)
Host: Nanyang Asst Prof Xiong Qihua

Abstract: Part I

Field emitters are conventionally based on micrometer-sized cathodes, albeit with very sharp tips. Studies have suggested that a further reduction in emission area would change the field emission properties significantly. This work studies the field-emission properties of 1-D nanostructures as individual cold field-emitters. The project involves the setting up of a field emission characterization system, synthesis and characterization of 1D nanostructures, fabrication of single field emitter cathodes, and finally a detailed of field-emission characteristics. The cathodes studied include tungsten nanowires and carbon nanotips synthesized by the field-emission-induced growth method, multiwalled carbon nanotube, and zinc oxide nanowires. Compared to conventional tungsten cold field emitters, the 1D nanostructures studied showed unusual characteristics and phenomena, such as deviation from the Fowler Nordheim equation, good emission current stability, and structural changes during emission. These observations not only help to further elucidate physical mechanisms that affect field emission, but also provide directions for the development of novel electron sources.

Abstract: Part II

Novel characterization technology enhances researcher ability to extract more information from material or device under probing thus contribute to the advancement of science. This talk regards work done by the presenter as a team member in attempt to fabricate Novel SPM probes such as spherical AFM tip and single atom tip for the improvement of SPM scanning and to develop electrical in situ TEM technique for dynamic in situ TEM characterization of nanomaterial and nanodevice in IMRE.