Dynamic Field Emission Behavior of Individual Carbon Nanotubes Studied by Scanning Electron Microscopy

Do-Hyung Kim

전자현미경을 이용한 개별 탄소나노튜브들의 동적 전계방출 거동 연구

김도형(경북대)

Key Words: Carbon nanotube (탄소소나노튜브), Field emission (전계방출)

Abstract : The dynamic current-voltage (I-V) characteristics of carbon nanotubes (CNTs) during field emission were investigated by in-situ imaging and field emission (FE) measurement inside a field-emission scanning electron microscope (FE-SEM). As the electric field increases, the bent nanotubes (BNT) generally become erect and align to a parallel electric field line. However, the FE of BNTs can initially occur after they are fully straightened it can start at the bended-state (during geometrical straightening) as the applied field increases. In the former case, the FE showed conventional Fowler-Nordheim (FN) behavior with a linear slope. In the latter case, two linear slopes were observed, in which a break in the FN plot corresponds to the applied voltage at which the BNTs becomes fully straightened. The FE of as-straightened CNTs successfully followed conventional FN theory with a single linear slope in FN plots.

나노조작기 및 집속이온빔을 이용한 정밀 나노튜브 탐침의 제작

정기영†(나노포커스) · 박병천*(한국표준과학연구원) · 안상정* · 최진호**(충남대)

Fabrication of Precision Nanotube Tip Using by Nano-Manipultor and Focused Ion Beam

Jung Ki Young, Park Byong Chon, Ahn Sang Jung and Choi Jinho

Key Words: Nano-maipulator(나노조작기), Focued ion beam(집속이온빔), Nanotube tip(나노튜브 탐침), Atomic force microscope(원자현미경)

Abstract : Precision carbon nanotube tip for atomic force microscope was fabricated where carbon nanotube orientation is controlled within the precision of 1 degree. The orientation, diameter and length of carbon nanotube tip are crucial factors for faithful profiling of surface patterns. With a nano-manipulation while viewing scanning electron microscope live image followed by focused ion beam process, precision carbon nanotube tip could be made. Precision carbon nanotube tip acts as a normal nanotube tip without Focused ion beam process. Further it maintains the elasticity. Precision tip can, in principle, enter the trench or hole less than 70 nm, which is impossible with the current state of the art silicon tip for critical dimension atomic force microscope.