The Field Emission Characteristics of Carbon Nanotubes Produced with Zinc Oxide Catalyst

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ABSTRACT

In this study, carbon nanotubes (CNT) were synthesized on ZnO nanorods using thermal chemical vapor deposition. ZnO nanorods were coated on silicon substrates by hydrothermal process. The CNT growth temperature was maintained at 900oC at an ambient pressure. Methane and argon gases are used for the CNT synthesis. In this work, scanning electron microscopy (SEM) image was used to observe the surface morphology and side-wall structure, energy dispersive spectrometer (EDS) was used for the identification and analysis of the chemical composition on the surface of CNTs, and Raman spectroscopy was employed to investigate the CNTs structural. Our research results reveal that the carbon nanotubes grown on ZNO nanorods showed a multiwalled structure with defective graphite sheets at the wall. The SEM images and showed that CNTs were quite uniform and disordered. Raman spectra show that there is larger crystallinity or little amorphous carbon than those grown on ZnO nanorods. EDS results reveal that the CNTs grown on ZnO nanorods do not need any purification process to optimize the field emission characteristics of the CNTs. The Fowler-Nordheim plot showed a good linear fit, indicating that the emission current of carbon nanotubes follows Fowler-Nordheim behavior.

Keywords : carbon nanotube ; thermal chemical vapor deposition ; field emission

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