

The Pre-Treatment and Post-Treatment Techniques for the Thermal chemical Vapor Deposited Carbon Nanotubes

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ABSTRACT

In order to study their effects on the surface morphology and enhance the field emission characteristics of the synthesized carbon nanotubes (CNTs), catalyst metal pre-treatments using nitrogen-based, plasma post-treatment, and acid post-treatment method were applied to functionalize the surface and to modify the structures of multi-walled carbon nanotubes grown on silicon substrates. In this study, scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images were 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 structural changes caused by plasma treatments. Our experimental results clearly demonstrate that catalyst pre-treatment, plasma post-treatment, and acid post-treatment method can effectively enhance the field emission current of CNTs. The enhancement in field emission characteristics is due to the modification of surface morphology, the increase in surface density of CNTs, and the lowering of work function after pre-treatment and post-treatment.

Keywords : carbon nanotube (CNTs)、 field emission (FE)

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