

Field emission characteristics of the sprayed carbon nanotubes on the conducting films/Nb/Si

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Since carbon nanotubes (CNTs) have been discovered, they showed unique electrical, mechanical, and geometric properties for nanoelectronic devices such as field emitters, interconnects, and field effect transistors.

We have investigated field emission properties of the sprayed CNTs on the conducting films/Nb/Si substrate. To improve the adhesion between the conducting films and Si wafer, the Nb(thickness : ~30 nm) has been deposited on Si wafer by using magnetron sputtering system. Then, the conducting films (thickness : ~500 nm) have been deposited on the substrate by using magnetron sputtering system. The solutions with thin-CNTs (ILJIN : CMP-310F) have mixed 1,2-dichloroethane (DCE)⁽¹⁾. The dispersion process consists of the sonication and centrifugation to remove the undissolved CNTs and some amorphous carbon. After this solutions were blown into the substrate by the spray method, the sample was annealed with ambient Ar at ~700°C. As the CNTs on the conducting films were heated, they have been penetrated into the molten conducting films. As a result of the heating process, the CNTs were tightly combined with the conducting films.⁽²⁾ Moreover, the conducting films are provided with characteristics as a electrode, high electrical conductivity, low contact resistance. Then, we measured the field emission current, turn-on voltage, I-V curve and field emission stability. Furthermore, we observed the morphology of the embedded CNTs by scanning electron microscopy (SEM).

[Reference]

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