Growth of carbon nanotubes on stainless steel substrates by DC-PECVD


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Abstract: We report on the fabrication of carbon nanotubes (CNTs) on Ni-coated stainless steel (SUS) substrates by using dc plasma enhanced chemical vapor deposition. The synthesized CNTs have the diameter of about 30 nm and the length of about 1.2 ?m. To verify the effects of SUS substrates on the growth of CNTs, CNTs had also been grown on Ni-coated Si substrates. CNTs grown on the SUS substrates were more uniform compared with those grown on the Si substrates. Field emission properties of the CNT films were measured in the diode configuration, and the turn-on electric field of 3.87 V/?m and field enhancement factor ? of about 1737 were obtained from the synthesized CNTs at the gap of 500 ?m between the SUS substrate and the anode. These results have not only clarified the effects of the substrate on the growth of CNTs, but also shown the potential of CNTs in field emission applications, especially CNT-based cold-cathode X-ray tubes. ?? 2009 Elsevier B.V. All rights reserved.

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