

Synthesis and characterization of carbon nanotubes and their field emission properties

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Since their discovery in 1991, carbon nanotubes (CNTs) have attracted considerable attention due to many unique physical and chemical properties. Many potential applications such as field emitters, nanoscale transistors, supercapacitors, and sensors, have been demonstrated. To realize various applications of CNTs, large quantities of high-quality CNTs are inevitably necessary. Various techniques, including arc discharge, laser ablation, and chemical vapor deposition (CVD), have been developed for the synthesis of CNTs at high quality, high yield, and low cost. Recently, many research groups have studied on the synthesis of SWNTs, DWNTs, thin MWCNTs and MWNTs by a catalytic CVD method because the CVD method is of benefit to achieve high purity and high yield of CNTs, and easily scale up the synthesis of CNTs at low cost. We have studied the synthesis and characterization of CNTs using a catalytic CVD method according to carbon sources, catalysts, support materials, and growth temperature. Here, we discuss a large-scale synthesis and structure of high-quality SWNTs, DWNTs, thin MWCNTs and MWNTs using catalyst CVD method. We also investigate field emission properties from CNTs produced by catalytic CVD method.