

Characterization of Single-walled Carbon Nanotubes Synthesized by Water-assisted Catalytic Chemical Vapor Deposition

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The influence of the water vapor on the growth of single-walled carbon nanotubes (SWCNTs) was investigated. SWCNTs were synthesized by catalytic chemical vapor deposition of acetylene over Fe-Mo/MgO catalyst with injection of water vapor. The morphologies and structures of the water-assisted SWCNTs were investigated according to the growth conditions such as water vapor concentrations, flow rate of the gas, furnace temperature, and growth time. Water-assisted SWCNTs exhibited large bundle morphological features with well-alignment of each CNT, while SWCNTs synthesized in the absence of water vapor showed entangled CNT with the random orientation. We also found that the diameter of the SWCNT bundle could be controlled by the growth condition. In our optimal growth condition, the product yield and the purity were 300 wt. % and 75%, which were 7.5 and 2.5 times higher than those of SWCNTs synthesized without water vapor, respectively. More detail discussion will be offered at the poster presentation.

Keywords: Carbon nanotube, Single-walled carbon nanotube, Synthesis, Chemical vapor deposition