

Vertically Aligned Single-Walled Carbon Nanotubes on Quartz Substrates Catalytically Grown from Alcohol

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Films of vertically aligned single-walled carbon nanotubes (SWNTs) with a few micron thickness were grown by catalytic chemical vapor deposition (CVD) on quartz substrates. Low-temperature CVD from ethanol was performed by using densely mono-dispersed Co-Mo catalyst of around 1.0 - 2.0 nm prepared on quartz substrates by a dip-coating method. Continuous reduction of catalysts with argon /hydrogen (3% hydrogen) gas during CVD was essential for generating dense enough SWNTs with vertical alignment. Vertical alignment was clearly demonstrated by anisotropic optical absorption and transmission characteristics in addition to observations by FE-SEM, TEM and resonance Raman scattering.

Presentation type: Oral

Sorting category: 7.9.5 Carbon Nanotubes and Related Nanomaterials (DMP)

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CategoryType: E