Abstract Submitted
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Horizontally Aligned Carbon Nanotube Growth: Defects and Film Density[1] W.D. TENNYSON, D. SHI, E.S. SANCHEZ, J.C. KEAY, M.B. JOHNSON, D.E. RESASCO, University of Oklahoma — Horizontally-aligned single-walled carbon nanotubes (SWNTs) were grown on ST-cut quartz by chemical vapor deposition (CVD). The 0.2-0.3 nm thick thermally evaporated Fe catalyst was patterned using standard liftoff processes both parallel and perpendicular to the $< 2\bar{1}\bar{1}0 >$ quartz surface (the SWNT alignment axis). Enhanced SWNT film density and improved film uniformity were observed by atomic force microscopy (AFM) and scanning electron microscopy (SEM) when water was included with the carbon feed source (ethanol). For SWNT films without water, the SWNT linear density within 1 μm of the catalyst edge was 8 SWNT/μm and down to 2 SWNT/μm at 10 μm from the edge. However, films grown with water exhibited similar linear densities both near and far from the catalyst edge, 6 SWNT/μm. AFM observations suggest that tube-tube interactions during growth contribute to a reduced the linear SWNT density. Aligned SWNTs were observed to terminate when they intersected a non-aligned SWNT. Water-assisted growth reduced the concentration of unaligned SWNTs near the catalyst edge, resulting in a higher fraction of nanotubes extending from the catalyst.

[1]CaNTeC & SWeNT

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