ACCVD Growth of Vertically Aligned Single-Walled Carbon Nanotubes on a Quartz Substrate

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Vertically aligned single-walled carbon nanotubes (SWNTs) up to 5 microns thick as shown in Fig 1 were produced by an alcohol CVD process [1]. In contrast to the first report of CVD growth of vertically aligned SWNTs [2], hydrogen gas was supplied only during the heating-up stage with the improved background vacuum condition. A time-progressive investigation of the growth process was studied by observing SEM images of SWNT films grown for different CVD times. Measurements of the film thickness by both SEM and optical absorbance show a non-linear growth rate, as well as an eventual decrease in the film thickness after extended reaction times. This is attributed to the presence of oxygen in the reaction chamber, which decreases catalyst activity as well as oxidizes the nanotube film. By using the relation between light absorbance and the thickness determined by SEM, the in situ monitoring of the vertically aligned SWNT film thickness has made possible for the further investigation of the growth mechanism.

Polarization dependence of resonant Raman scatterings from vertically aligned SWNT films as shown in Fig. 2 and polarized optical absorption properties of SWNTs are studied by using these samples.

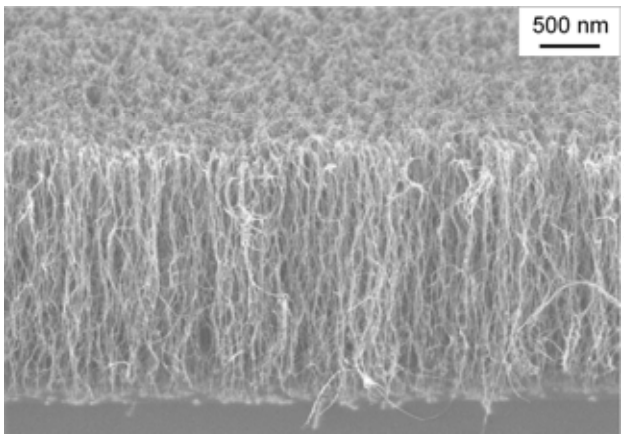

Fig. 1 SEM Image of vertically aligned SWNTs.

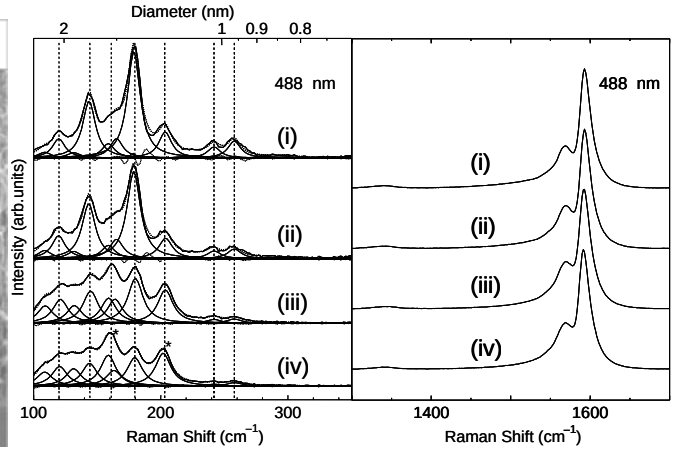

Fig. 2 Polarized Raman studies of vertically aligned SWNTs.

References

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