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Unique Optical and Electrical Properties of Almost-Isolated Vertically Aligned Single-Walled Carbon Nanotubes SHIGEO MARUYAMA, ERIK EINARSSON, MASAYUKI KADOWAKI, ZHENGYI ZHANG, Dept. Mech. Eng., The University of Tokyo — A new insight is gained on the structure of the vertically aligned single-wall carbon nanotubes (VA-SWNTs) generated by ACCVD technique. Our recent finding of the simple removal method using hot-water enabled us to transfer this film to various flat substrates. Transferring this film on TEM grid made it possible to directly observe the morphology of nanotubes from the top. To our surprise, the average number of nanotubes of a bundle is less than about 10. Electronic properties measured by EELS revealed that nanotubes are virtually electronically isolated. Then, the characteristic resonant Raman features are reconsidered. The high resolution Raman measurements show the sharp features for the RBM peak which have been assigned to cross-polarized resonance. The isolated and cross-polarized absorption resonance in Raman will be discussed based on the recent identification of the excitonic cross-polarized absorption through photoluminescence spectroscopy.

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