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Optical spectroscopy of vertically aligned SWNTs synthesized from alcohol

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In this study, we investigate various aspects of optical spectra from vertically aligned single-walled carbon nanotubes (VA-SWNTs). The obtained spectra from optical absorbance, resonance Raman spectroscopy, and photoluminescence excitation (PLE) spectroscopy are compared to SWNTs synthesized by other methods, particularly non-aligned SWNTs synthesized from alcohol. Since the median bundle size in the VA-SWNT sample is only six nanotubes [1], direct PLE measurement is expected. From such measurements, we observe various higher-order Raman modes consistent with isolated SWNTs [2], as well as Raman excitation resonant with the outgoing emission energy. To improve the dispersion yield, a bath-sonication technique [3] was necessary for conventional PLE measurements, which were obtained using Ti:Sapphire laser excitation. By decomposing the parallel and perpendicular components of the PLE spectra for normal and ^{13}C VA-SWNTs, we investigate higher order excitonic states in the PLE map.

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