

垂直配向単層カーボンナノチューブの偏光ラマン分光

Polarized Raman spectroscopy of vertically aligned single-walled carbon nanotubes

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Recently, we have prepared up to 30 μm thick vertically aligned single-walled carbon nanotube (VA-SWNT) films with high purity by the alcohol catalytic chemical vapor deposition (CVD) method^[1]. In a previous Raman spectroscopy study, we found an anomalous, anisotropic peak at 180 cm^{-1} for 488 nm excitation^[2]. In the present polarized Raman study, two configurations were used, where the orientation of the polarizer for inspecting the scattered light was parallel to (VV) and perpendicular to (VH) the polarization of the incident light. By changing the incident light orientation with respect to the VA-SWNT growth direction, two different polarization dependences were found for the radial breathing mode (RBM) peaks (Fig. 1). The peaks at 160 and 203 cm^{-1} behave consistently with the “antenna effect”, while peaks at 145, 181, 244, and 256 cm^{-1} exhibit the opposite behavior in the VV configuration. This may due to the cross polarized excitation/emission process, or to the presence of isolated SWNTs within the array.

[1] Y. Murakami, S. Chiashi, Y. Miyauchi, M. Hu, M. Ogura, T. Okubo, S. Maruyama: *Chem. Phys. Lett.* **385** (2004) 298.

[2] Y. Murakami, S. Chiashi, E. Einarsson, S. Maruyama: *Phys. Rev. B* **71** (2005) 085403.

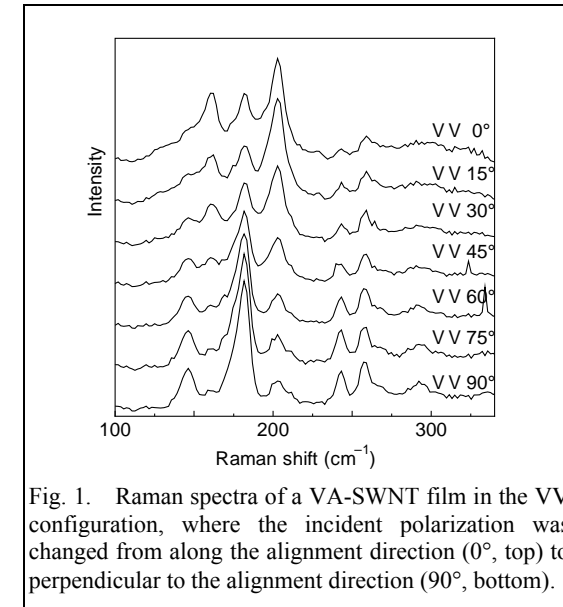


Fig. 1. Raman spectra of a VA-SWNT film in the VV configuration, where the incident polarization was changed from along the alignment direction (0°, top) to perpendicular to the alignment direction (90°, bottom).