

Water molecule adsorption/desorption on VA-SWNT films in water vapor

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Adsorption and desorption process of molecules to and from an adsorbent governs the performance of various industrial products. Therefore, understanding and controlling the adsorption and desorption process is crucial for improving the industrial products. In this study, we used SWNT to probe the behavior of water molecules on graphite surfaces, because of the following: (1) SWNT surfaces are smooth on the atomic scale, and (2) we can control their diameter on the nanometer scale. Water molecular adsorption/desorption on VA-SWNT (Vertically Aligned SWNT) films^[1] in water vapor atmosphere was studied with Raman spectroscopy^[2,3]. VA-SWNT film was prepared by alcohol CCVD method^[4] on the silicon substrate and thickness of the film is 20 ~ 30 μm . Water vapor was introduced into a Raman cell and the pressure of the vapor was varied from 0 ~ 440 Pa. Raman spectra of VA-SWNT films measured in water vapor atmosphere are different from that measured in the atmospheric atmosphere. As the water vapor increased, intensity of a peak around 180 cm^{-1} decreased. This intensity reduction came from the change of electronic states of SWNT that caused by water molecular adsorption.

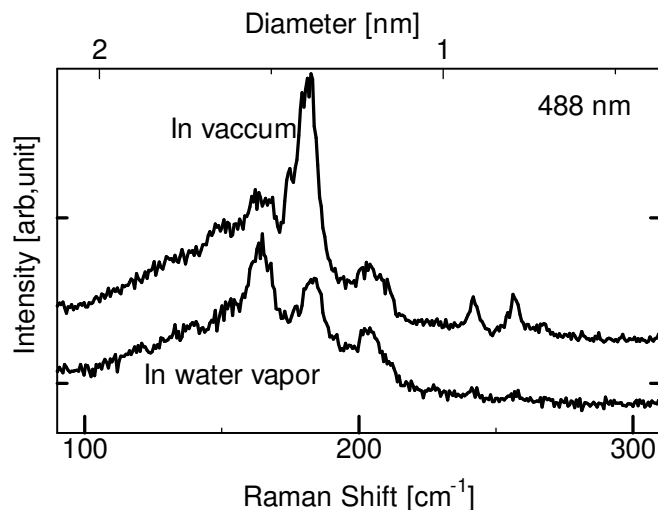


Fig. 1: Raman spectra of VA-SWNT recorded in vacuum/ water vapor.

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