Catalyst deposition by spin-coating for synthesis of vertically-aligned single-walled carbon nanotubes

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In our conventional alcohol catalytic CVD method [1,2], vertically aligned single-walled carbon nanotubes (VA-SWNTs) are synthesized from catalyst nanoparticles deposited onto Si or quartz substrates by a dip-coating process [3]. Here we present a spin-coating method as an alternative to dip-coating, where cobalt and molybdenum metals were deposited onto Si substrates by spin-coating a solution containing 0.01 %wt of each metal species dissolved in ethanol. The SWNT arrays were characterized by SEM observation (Fig. 1a) and resonance Raman spectroscopy (Fig. 1b). The results from this method were compared with the standard dip-coating method, and we found the spin-coating method resulted in higher yield of VA-SWNTs. Based on SEM observation, it was clear that the VA-SWNT array thickness is dependent on the thickness of the spin-coated film, and its uniformity could be optimized by tuning the spinning conditions. Furthermore, we found the RBM region of the resonance Raman spectra is very similar to that of VA-SWNTs synthesized from dip-coated catalyst.

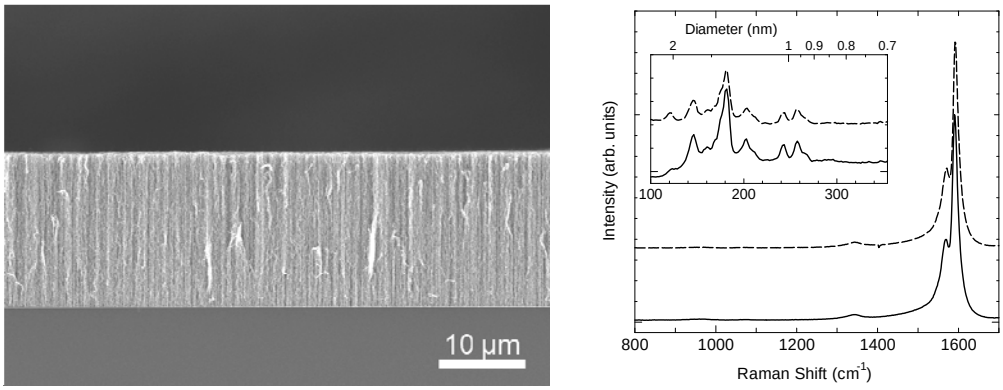

Fig. 1. (a) SEM image of VA-SWNTs synthesized from spin-coated catalyst; (b) resonance Raman spectra (488 nm?) of SWNTs from catalyst prepared by dip-coating (dashed line) and spin-coating (solid line)

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