

# Catalytic CVD Generation of High-Purity SWNTs with a Narrow Diameter Distribution

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Single-walled carbon nanotubes (SWNTs) were synthesized by a catalytic CVD technique using  $C_{60}$  as the carbon source. Powder of  $C_{60}$  in a quartz test tube was heated up to the certain high temperature, and vapor phase  $C_{60}$  was supplied over Fe/Co catalyst supported with zeolite in an electric furnace. After cooling down, the sample was analyzed by resonant Raman spectroscopy and transmission electron microscopy (TEM).

Fig. 1 shows a typical example of a TEM image of SWNTs from  $C_{60}$ . The sample was sonicated in methanol after washing in toluene, and a drop was evaporated on the microgrid. As we scanned the TEM, most of the obtained SWNTs formed thin bundles as shown in Fig. 1.

Fig. 2 shows a comparison of Raman spectra of the as-grown sample from  $C_{60}$  and of the SWNTs generated by alcohol catalytic CVD (ACCVD) technique [1]. In spite of using the catalyst prepared in the same way as the case of ACCVD, the diameter distribution of SWNTs from  $C_{60}$  estimated from the peaks of RBM is much narrower than that of SWNTs from alcohol.

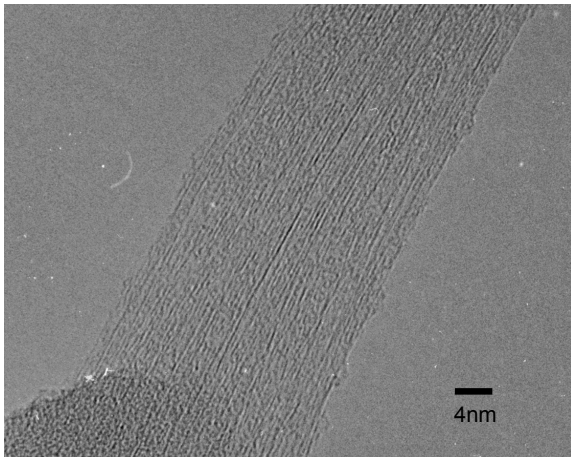


Fig.1 TEM image of SWNTs from  $C_{60}$  over Fe/Co supported with zeolite at 850°C

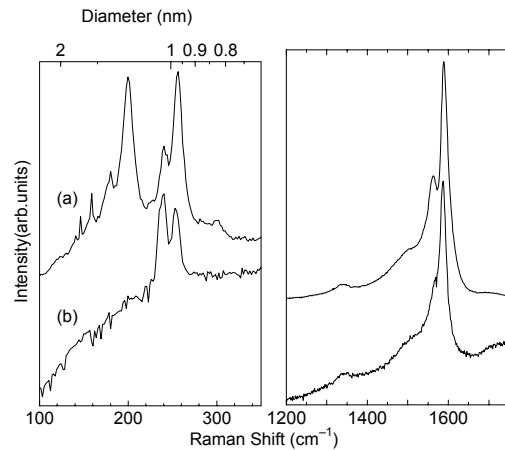


Fig.2 Raman spectra of as-grown SWNTs generated from (a) ethanol at 800°C (b)  $C_{60}$  at 850°C, using Fe/Co catalyst supported with zeolite

[1] S. Maruyama, R. Kojima, Y. Miyauchi, S. Chiashi and M. Kohno, *Chem. Phys. Lett.*, **360** (2002) 229-234.

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