

Floated Catalytic CVD Generation of SWNTs from Alcohol

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We have reported the new catalytic CVD generation of SWNTs from alcohol with catalytic metal particles (Fe/Co, Ni/Co, Co...) supported with zeolites [1]. By using alcohol as a carbon source, high-quality SWNTs are produced at relatively low temperature (550-900°C), probably because oxygen atoms contained in alcohol molecules remove carbon atoms with a dangling bond.

Since this mechanism seems to be applicable to other generation techniques, a floated catalyst type generation of SWNTs from alcohol was tried. As the precursor molecule, widely used ferrocene was selected, which is known to efficiently generate Fe clusters at above 400°C.

Ferrocene ethanol solution (Fe content was about 0.06wt%) was injected into a quartz tube as mist, which was heated by the electronic furnace and pumped by the rotary vacuum pump. Keeping the pressure of ethanol at about 200 Torr for a few minutes, black soot was collected at a trap located at downstream of quartz tube.

Raman scattering spectrum in Fig. 1 indicates that the soot contains SWNTs, and that amount of amorphous is small. SEM image in Fig. 2 shows that many tangling bundles of SWNTs exist with small metal particles. This technique is expected to be an alternative to the supported catalyst method, after the optimization of the reaction conditions.

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

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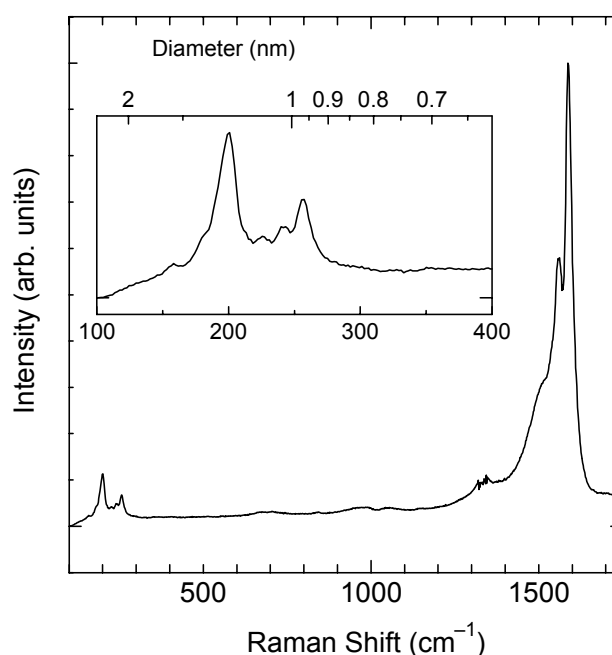


Fig. 1 Raman scattering of SWNTs from ethanol with ferrocene at 900°C.

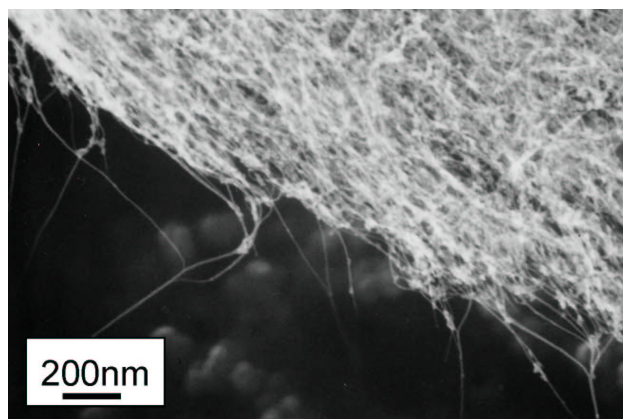


Fig. 2 SEM image of SWNT bundles