

Synthesis of single-walled carbon nanotube (SWNTs) from size-selected catalytic metal particles.

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ABSTRACT

Recent progress in the high-quality synthesis of single-walled carbon nanotubes (SWNTs) has demonstrated new possibilities of applications. Despite the expectations of wide variety of applications, however it is still difficult to synthesize SWNTs under controlling its diameter and chirality. In the last few years, the technique of catalytic chemical vapor deposition (CCVD) has been developed for the expected large-scale production and for the controlled synthesis directly on semiconductor materials. In this technique, it is known that material, size and morphology of catalytic particles affect the yields or diameter distribution of SWNTs.

In this study, we tried to synthesis SWNTs with controlled diameter, by controlling the size of catalysts particle. The metal (Co, Fe, etc.) particles were prepared by the pulsed laser ablation of target materials in inert gas, and the size classification was performed using a differential mobility analyzer (DMA). After the size classification, the size-selected particles were deposited on the substrate and SWNTs were grown from these catalytic particles by CCVD technique. The presence of SWNTs was confirmed by micro-Raman spectroscopy. The effect of

catalyst particle on the morphologies of SWNTs, will be discussed.