

[22-T15]

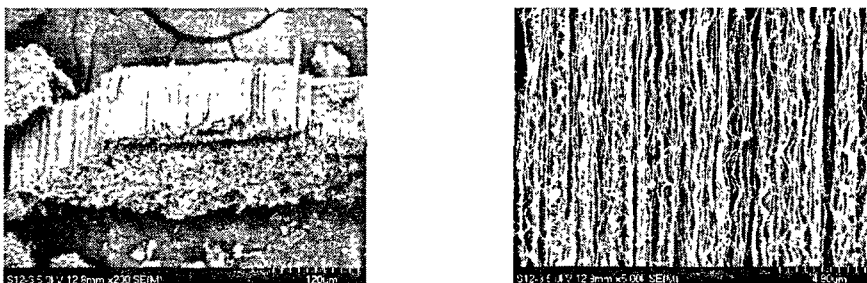
Preparation of Carbon Nanotubes by Chemical Vapor Deposition Using Acetylene-Organometallic Mixture

Jong Hun Han, Seung Chul Lyu,* Cheol Jin Lee*

Nanotechnology Center, Iljin Nanotech Co., Ltd.

*School of Electrical Engineering, Kunsan National University

Multi-walled carbon nanotubes (CNTs) can be grown by the chemical vapor deposition that decompose various hydrocarbon gases over the catalyst particles of Fe, Co and Ni. The floating catalyst method has the advantage over the substrate method, which allows a cost-effective way to prepare the CNTs with a uniform distribution of diameter on a large scale⁽¹⁾. This method involves the three dimensional dispersion of the metal particles in a gas-phase by the pyrolysis of carbonyl or metallocene compounds. In this study, we reported the whole growth of multi-walled CNTs on the most of heated zone in a single step by the pyrolysis of mixtures of acetylene with $\text{Fe}(\text{CO})_5$. C_2H_2 gas of purity 99.5 % was used as a hydrocarbon source, $\text{Fe}(\text{CO})_5$ as a catalyst precursor and Ar gas of purity 99.9 % as a carrier gas. We analyzed the microstructure of CNTs depending on the process parameters using the scanning electron microscopy, transmission electron microscopy and Raman spectrometry. Fig. 1 shows the SEM images of multi-walled CNTs. As shown in Fig.1, the CNTs were well-aligned with high packing density. The average length and diameter of the nanotubes was about $100 \mu\text{m}$ and 50nm , respectively.



[Fig. 1] SEM images of multi-walled carbon nanotubes by the floating catalyst method.

[References]

1. P. Nikolaev, M. Bronikowski, R. K. Bradley, R. Rohmund, D. T. Colbert, K. A. Smith, R.E. Smalley, "Gas-phase catalytic growth of single-walled carbon nanotubes from carbon monoxide," Chem. Phys. Lett. 313, 91. (1999).