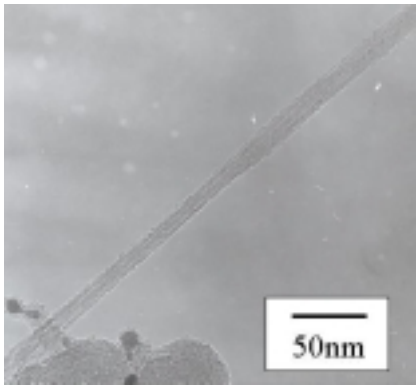
A Trial of Generation of Carbon Nanotubes from C_{60}

○Ryosuke Kojima[a],Shohei Chiashi[a],Yuhei Miyauchi[a],
Masamichi Kohno[b] and Shigeo Maruyama[a]

[a]*Department of Mechanical Engineering, The University of Tokyo,*
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan
[b]*The National Institute of advanced Industrial Science and Technology*
Namiki 1-2-1, Tsukuba, Ibaragi 305-8564, Japan

For more efficient and controlled production of SWNTs, it is necessary to understand the formation mechanism. Even though various techniques to synthesize carbon nanotubes have been already known such as laser-furnace, arc-discharge, catalytic CVD and HiPco process, we sought for an alternative way using C_{60} as the carbon source. Suppose that the initial nucleation process and precursor clusters in laser-furnace and arc-discharge techniques are similar to fullerene generation, then, the synthesis of nanotubes by C_{60} should have less activation barrier because all carbon atoms have sp^2 structure as in the initial C_{60} form.

Powder of C_{60} with and without catalytic materials packed in a stainless steel capsule was heated up to the certain high temperature. Resultant products depending on the initial material, heating temperature, and heating duration were analyzed by SEM, TEM and Raman spectroscopy. Fig. 1 shows examples of TEM image of MWNTs generated with Pt fine particles (about 3 nm diameter) and Co supported by MgO fine particles, respectively. Fig. 2 shows the TEM image of metal-filled MWNT generated from Pt fine particle as the catalytic material.



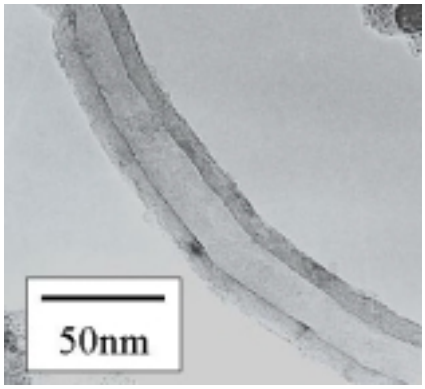


Fig. 1 TEM images of MWNT.

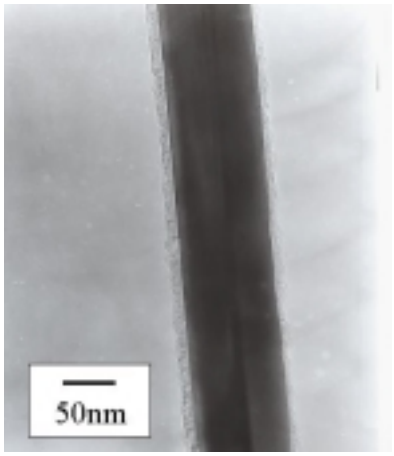


Fig 2 TEM image of metal containing MWNT.

Corresponding Author : Ryosuke Kojima
E-mail :ryosuke@photon.t.u-tokyo.ac.jp Tel/Fax : 81-3-5841-6408