要旨ひながた **The form of Abstract**

Supported Ni catalysts of nominal submonolayers grew single-walled carbon nanotubes.

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Fe, Co, and Ni is known catalytically effective to grow carbon nanotubes (CNTs). However, when Ni is supported on substrates, it comes to yield just multi-walled CNTs (MWNTs) but not single-walled CNTs (SWNTs). This characteristic may be understood when we consider the possible surface diffusion of metals at the elevated temperatures of chemical vapor deposition (CVD). Over oxide surfaces such as SiO_2, which are often used as supports for these metals, oxidative interaction dominates the metal/support interaction, which affects island structures and surface diffusion of metals [1]. Because Ni has the smallest heat of oxidation among these metals, it can easily diffuse over oxide surfaces at the CVD temperatures, and possibly results into particles too large to grow SWNTs.

If the amount of Ni is limited to 1 nm^3 per the area of surface diffusion, it should spontaneously form 1-nm-sized particles. By using our combinatorial method [2], we prepared a thickness profile of Ni on a SiO_2/Si or SiO_2 wafer and carried out alcohol catalytic CVD (ACCVD, [3]) at 800 °C. Micro-Raman spectra as well as filed-emission scanning electron microscope (FE-SEM) images showed the formation of SWNTs and nominal submonolayers was optimal to grow SWNTs.

[1] M. Hu, S. Noda, and H. Komiyama, Surf. Sci. **513**, 530 (2002).

[2] S. Noda, Y. Tsuji, Y. Murakami, and S. Maruyama, Appl. Phys. Lett. **86**, 173106 (2005).

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

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