Catalytic CVD Synthesis of Single-Walled Carbon Nanotubes from Alcohol

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High purity single-walled carbon nanotubes (SWNTs) were synthesized from ethanol by catalytic CVD method [1]. The SWNT yield of more than 40 % was achieved over the weight of zeolite support powder with Fe/Co catalyst, which corresponded to more than 800 % yield over the weight of the catalytic metal, within the CVD reaction time of 120 minutes assuring as-grown high quality [2]. Furthermore, a new technique of synthesizing high purity SWNTs on silica or mesoporous silica substrate [3], and finally directly on flat surface of silicon and quartz substrates [4] was developed employing the low-temperature feature of alcohol CCVD method. With a simple dip-coat method, this technique first produced SWNTs directly on a silicon substrate at the temperature of 650 °C. At the optimum CVD temperature (800 °C), a uniform mat of SWNTs was synthesized on the quartz substrates after 1h CVD reaction to the extent that the absorption spectrum of 'as-grown' SWNTs was measured.

References: [1] S. Maruyama et al., Chem. Phys. Lett., 360 (2002), 229. [2] Y. Murakami et al., Chem. Phys. Lett., in press. [3] Y. Murakami, S. Yamakita, T. Okubo and S. Maruyama, Chem. Phys. Lett., in press. [4] Y. Murakami, Y. Miyauchi, S. Chiashi and S. Maruyama, Chem. Phys. Lett., submitted.