

# Synthesis of Single-Walled Carbon Nanotubes from Defined Surface of Silicalite-1 Crystals and their Micro-Photoluminescence

## Characterizations

<sup>1)\*</sup>Yoichi Murakami, <sup>1)</sup>Takahiko Moteki, <sup>1)</sup>Tatsuya Okubo, <sup>2)\*</sup>Shigeo Maruyama

<sup>1)</sup>Department of Chemical System Engineering, The University of Tokyo,

Tokyo 113-8656, Japan

<sup>2)</sup>Department of Mechanical Engineering, The University of Tokyo,

Tokyo 113-8656, Japan

Zeolites are microporous, crystalline aluminosilicates constructed from tetrahedral base units. We employed silicalite-1 zeolite crystals for supporting catalysts for the growth of single-walled carbon nanotubes (SWNTs). Cobalt was deposited on the b-surface (010 direction) where open periodic pores of  $0.56 \times 0.53$  nm straight channels exist. The aim of the study is to engineer the chirality distribution of SWNTs by controlling the aggregation and/or morphology of the catalysts expecting their interactions with the crystalline surface.

Figure 1 shows typical FE-SEM images after the growth of SWNTs (CVD condition: 800 °C, 5 min, ethanol vapor = 0.4 kPa) where their intercalations between the top surfaces (b-surface) of the crystals are recognized. Such an intercalation of SWNTs allows us to use micro-photoluminescence spectroscopy to characterize the grown SWNTs individually. The effects of the SWNT growth conditions on the resultant chirality/diameter distributions were investigated and discussed.

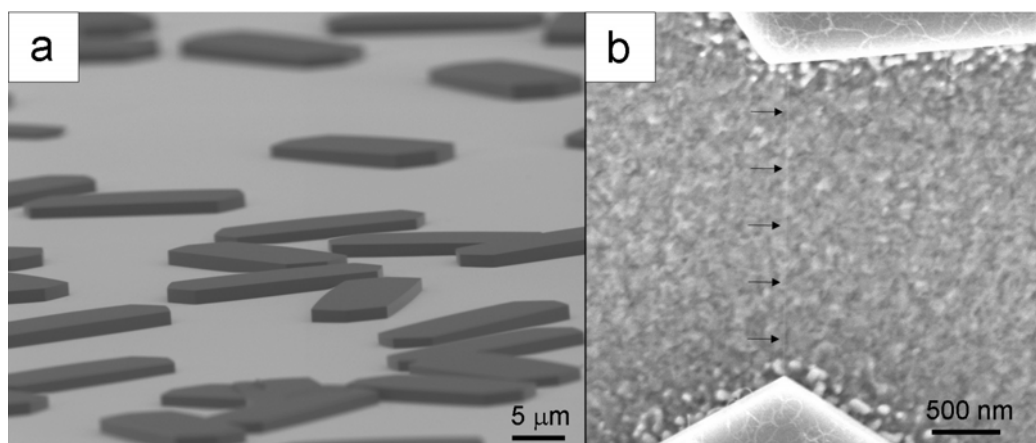


Fig. 1: FE-SEM images of the sample. (a) Silicalite-1 crystals directly grown on a Ti/quartz substrate. (b) Suspended SWNT between top surfaces of two silicalite-1 crystals (indicated by arrows).

\*Email address: ymurak@chemsys.t.u-tokyo.ac.jp; maruyama@photon.t.u-tokyo.ac.jp