

Patterned CVD Growth of SWNTs for Device Application

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The conventional concept of using SiO₂ patterned Si substrates to selectively grow 3D carbon nanotube structures can be applied to a dip-coating method followed by alcohol CVD growth. High-quality vertically aligned single-walled carbon nanotube (SWNT) patterns can be easily obtained by this protocol [1]. The more elaborate patterned growth is based on the control of wettability of substrates. Surface wettability strongly affects the deposition of catalyst in dip-coating process. By functionalizing the silicon surface using a classic self-assembled monolayer (SAM) and then selectively removing the SAM by ultraviolet (UV) light, the catalyst can be dip-coated onto only the hydrophilic areas of the substrate. Furthermore, by utilizing an electron beam instead of UV, the line width of an SWNT pattern can be easily reduced to 50 nm. The patterned region can be easily located and visualized under a scanning electron microscope [2]. References: [1] R. Xiang, E. Einarsson, H. Okabe, S. Chiashi, J. Shiomi, *Jpn. J. Appl. Phys.*, (2010), in press. [2] R. Xiang, T. Wu, E. Einarsson, Y. Suzuki, Y. Murakami, J. Shiomi, S. Maruyama, *J. Am. Chem. Soc.*, 131 (2009) 10344.