

# Liquid-based Site-selective Deposition of Catalyst for SWNT Growth: Mechanism and Applications

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We recently proposed a versatile wet chemistry method to localize the growth of SWNTs to desired regions via surface modification. 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.[1] Here, we present some further attempts to apply this technique to amorphous and crystal quartz, and some investigation on the mechanism of such growth selectivity. By AFM imaging of the SAM formation process, we clearly reveal the effect of wettability on the density of SWNTs grown on the surface. Meanwhile, the compatibility and scalability of this method will be presented. Large area patterns can be obtained by applying this technique into commercial e-beam lithography. Since monolayer (~2 nm high) reduces the electron scattering, the resolution is further improved. In the end, we fabricated a SWNT-based field effect transistor (FET) array. These transistors can be also transferred onto a flexible and stretchable PVA film. Potential applications will be discussed.

- [1] R. Xiang, T. Wu, E. Einarsson, Y. Suzuki, Y. Murakami, J. Shiomi, S. Maruyama, *J. Am. Chem. Soc.* **131** (2009) 10344.