

Stable Operation of Carbon Nanotube Transistor

Carbon nanotube transistors, so far reported, had major problems such as a large time fluctuation of drain current and a large hysteresis characteristic. A cause of these fluctuations was found to be a photo-resist adhered to the surface of carbon nanotubes, as well as oxygen and water. New fabrication process for a carbon nanotube transistor was established in which the residue of the photo-resist as well as the water and oxygen never adhere to the carbon nanotubes. The new carbon nanotube transistor shows almost no fluctuation of the current and no hysteresis characteristic.

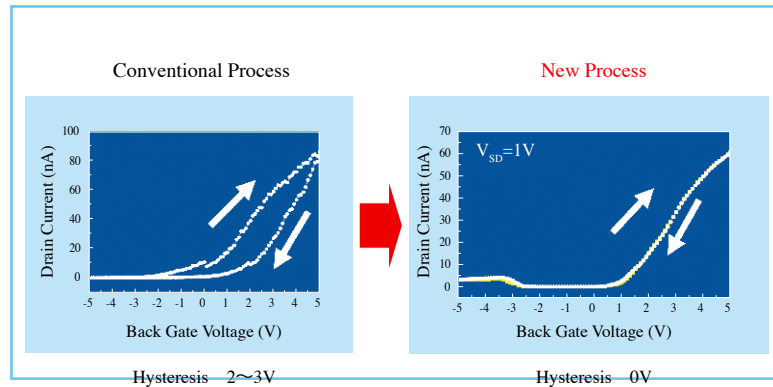


Figure : Carbon nanotube FET fabricated by the conventional process shows the large hysteresis characteristics of a few Volts. On the other hand, the carbon nanotube FET fabricated by our new process shows almost no hysteresis characteristic.

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Highly Conductive Single-Wall Carbon Nanotubes

Enrichment of metallic single-wall carbon nanotubes (SWCNTs) up to 80 % has been achieved by preferable oxidation of semiconducting SWCNTs simply by keeping HiPco® SWCNTs in hydrogen peroxide at 90 °C for 47 min. The higher chemical reactivity of semiconducting SWCNTs was probably caused by a metallization of semiconductors due to a charge transfer to the hydrogen peroxide. This reaction could be applied to more precise selection that is crucial to transparent electrodes and the other electronic devices in near future.

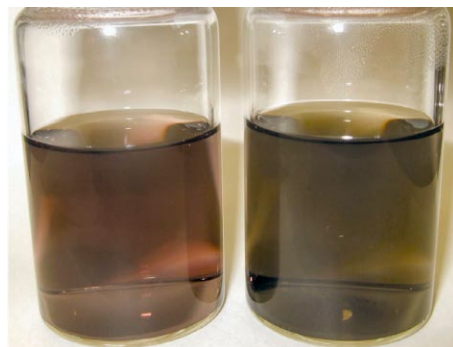


Figure 1: Optical photographs of SWCNT suspension before (right) and after (left) the heat treatment in hydrogen peroxide. "Red" seen in the left bottle is the color of metallic SWCNTs.

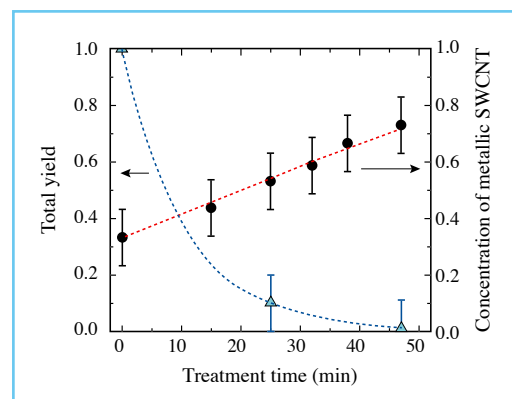


Figure 2: Treatment time dependence of the total yield and the concentration of metallic SWCNTs.

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