

**Fabrication of nanowires with polymer shells using treated carbon nanotube bundles as macro-initiators**

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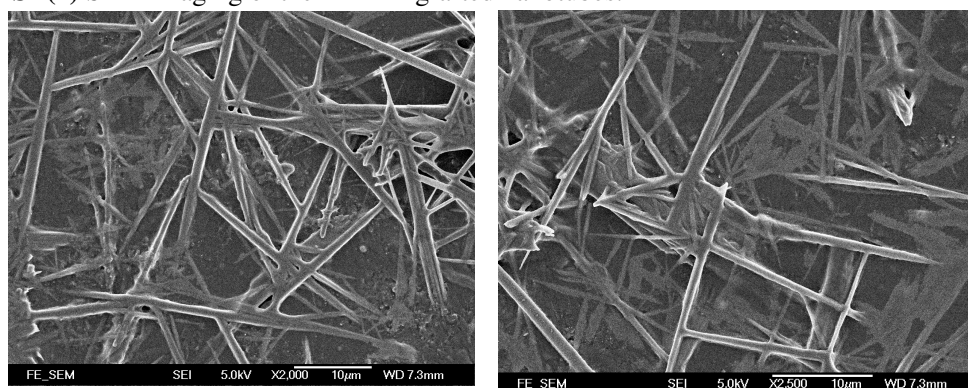
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**ESI (1) Materials and Instruments**

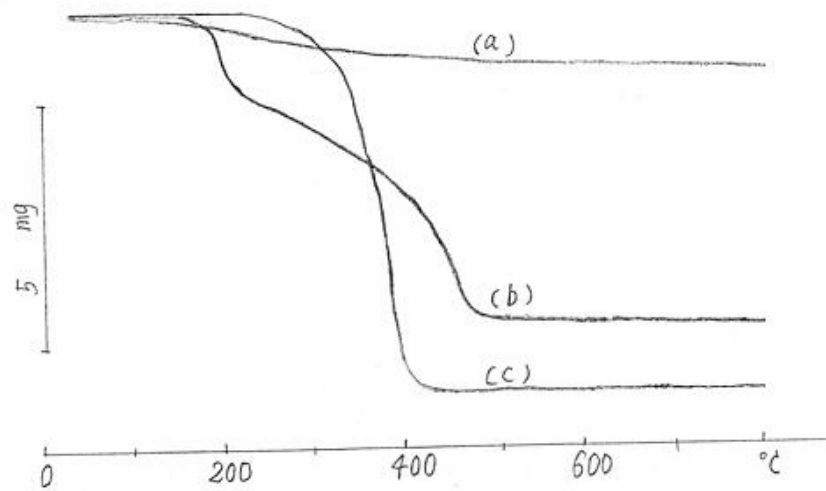
Chemicals and reagents were purchased from Sigma-Aldrich used without further purification. Raw multi-walled carbon nanotubes product (Diameter: 10-30nm, length: 0.5-40  $\mu\text{m}$ , special surface area: 40-300  $\text{m}^2/\text{g}$ ) prepared by catalytic chemical vapor deposition (CCVD) method from Shenzhen Nanotech Port Co., Ltd was used without further purification. Ultrasonic cleaner (BRANSON 2150, USA). Transmission electron microscopy (JEOL JEM-2010 microscope). Scanning electron microscopy (SEM, JOEL JSM-6335F).

**ESI (2) SEM imaging of the PMMA-grafted nanotubes:**

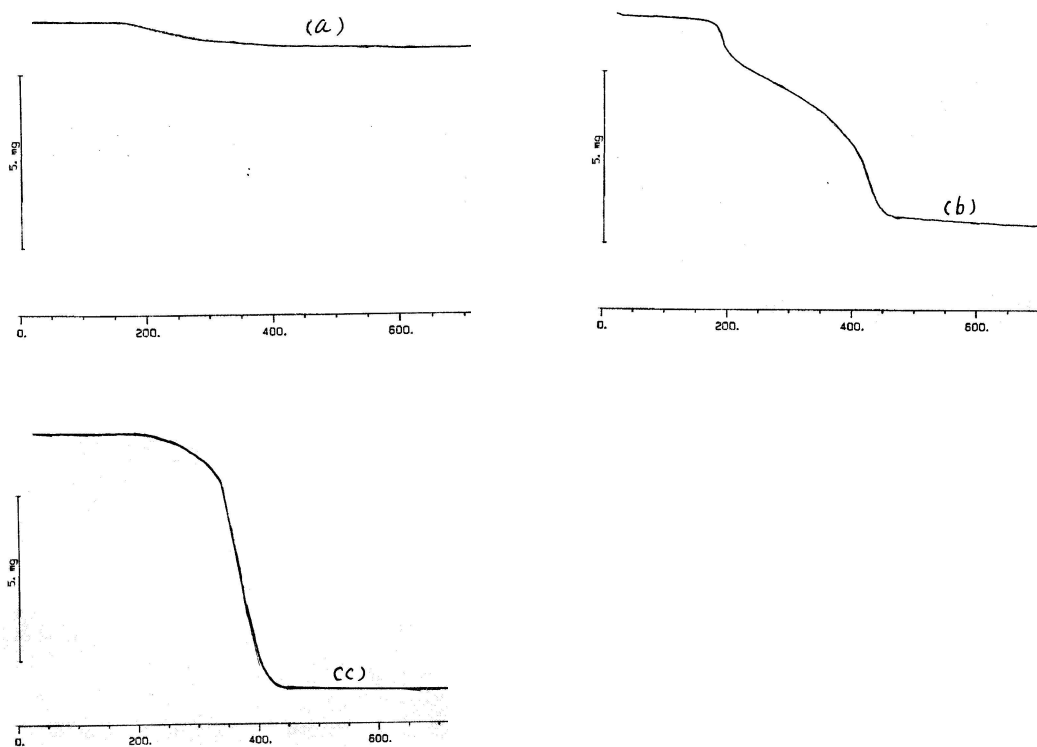


**ESI (3) Thermogravimetric analysis:**

7.5 mg of dried (a) pristine multi-walled carbon nanotubes, (b) PMMA-grafted nanotubes after washing with THF and ethanol and (c) pure PMMA prepared by emulsion polymerization containing divinyl benzene as crosslinking agent after washing with ethanol were tested respectively. Thermogravimetric analysis (TGA, METTLER TC11 TA Processor, TG-50, 20  $^{\circ}\text{C}/\text{min}$ ,  $\text{N}_2$ ). All the figures were computer generated using a *hp 7475A* plotter attached to the TC11 TA Processor. Then all the curves were re-constructed in a common reference frame by hand for analysis (Fig.1). The photo scanning copy of the original TGA was shown in Fig. 2. The difference in the weight loss between the PMMA-grafted nanotubes (b) and the pristine nanotubes (a) shows that PMMA were grafted onto the carbon nanotubes' surface forming the PMMA coating shells.



**Fig. 1** Thermal gravimetric analysis for a) pristine multi-walled carbon nanotubes, b) PMMA-grafted multi-walled carbon nanotubes, and c) pure PMMA prepared by emulsion polymerization.



**Fig. 2** Photo scanning copy of the original TGA curves of a) pristine multi-walled carbon nanotubes, b) PMMA-grafted multi-walled carbon nanotubes, and c) pure PMMA prepared by emulsion polymerization