

Metal-free preparation of Multi-walled Carbon Nanotubes Based on New-diamond-Induced Growth Mechanism

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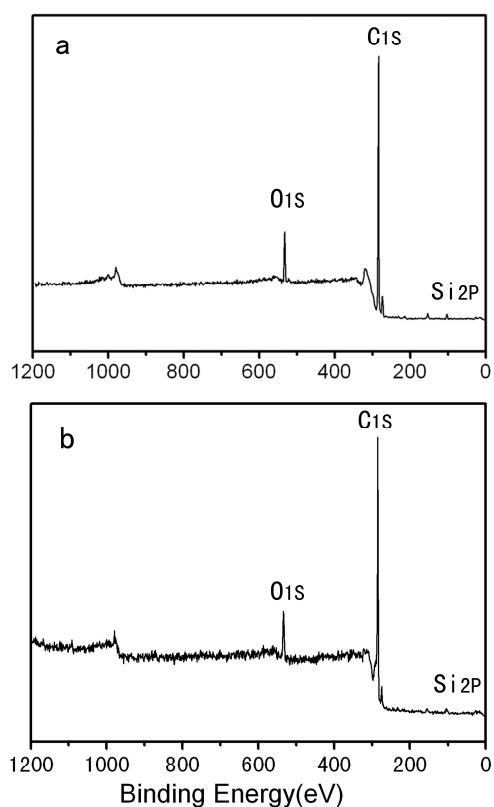


Figure S-1. XPS spectra of the diamond film (a), and MWCNTs grown on diamond film (b).

To make sure that there are no other impurities introduced in the as-prepared MWCNTs, XPS survey scan was employed to examine the elements present in the substrate before and after MWCNTs growth. The XPS spectra in Figure S1

demonstrate that only Si, C and O exist in the product, further indicating that the as-prepared MWCNTs on the diamond surface is metal-free.

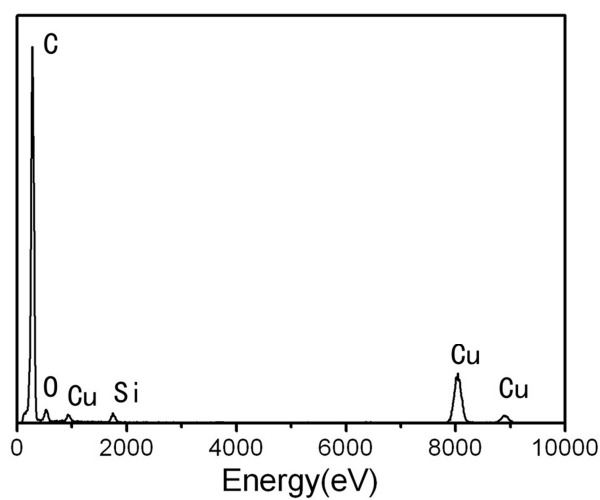


Figure S-2. EDS of the sealed MWCNT tip with carbon particle

The EDS spectra obtained from MWCNT tip with black particle shows only C and the elements originated from the membrane and Si wafer (Cu and Si) were detected, indicating that the black particle is carbon.

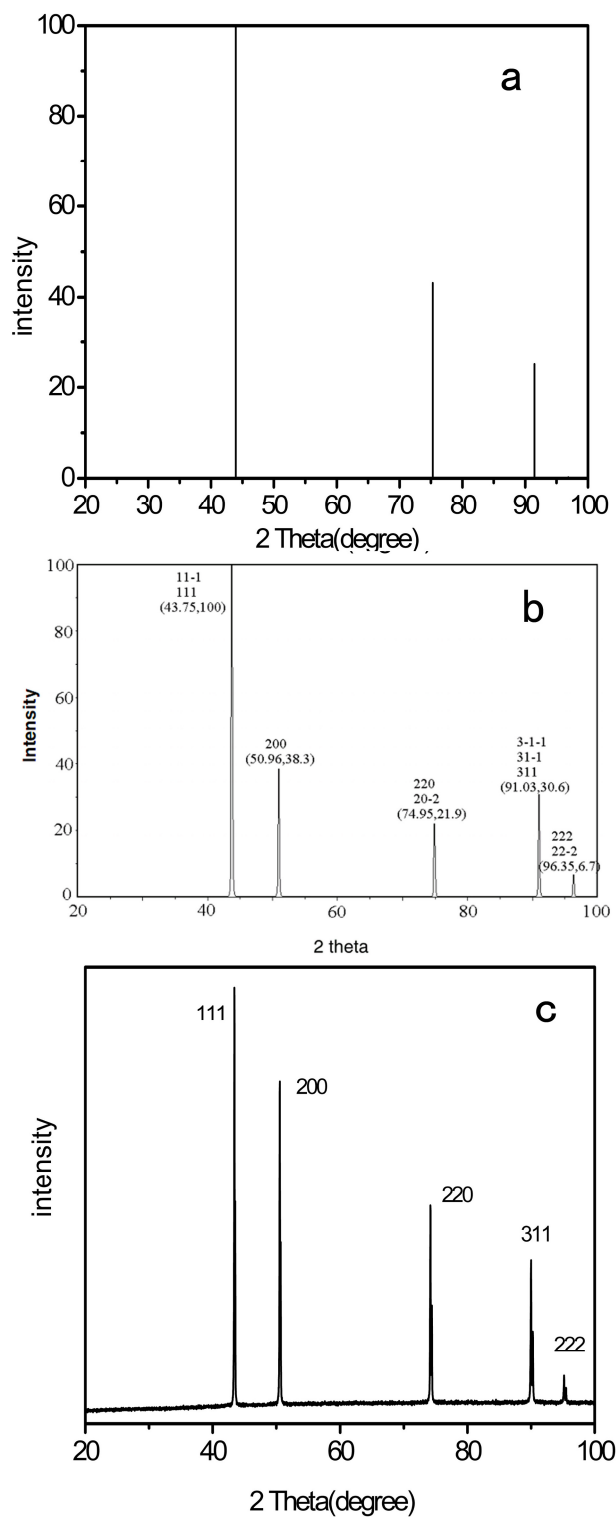


Figure S-3. XRD spectra of (a) normal diamond (b) n-diamond reported, (c) n-diamond film used as substrate

Figure S3 (a) shows the standard card of normal diamond according to JCPDS Card No. 06-0675, there are no (200) peak. Figure S3 (b) shows the typical n-diamond XRD spectrum reported by Wen et al. Figure S3 (c) is the XRD result of the

n-diamond film used as substrate.

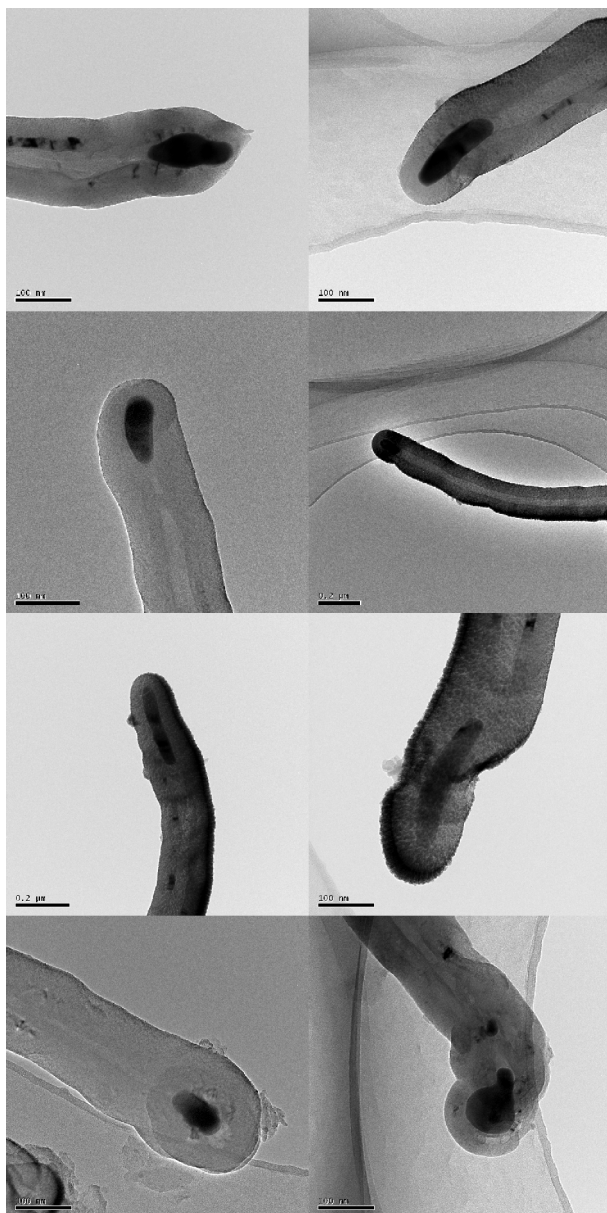


Figure S-4. TEM of different tips of carbon nanotubes

Figure S4 shows various tips of the carbon nanotubes with n-diamond.

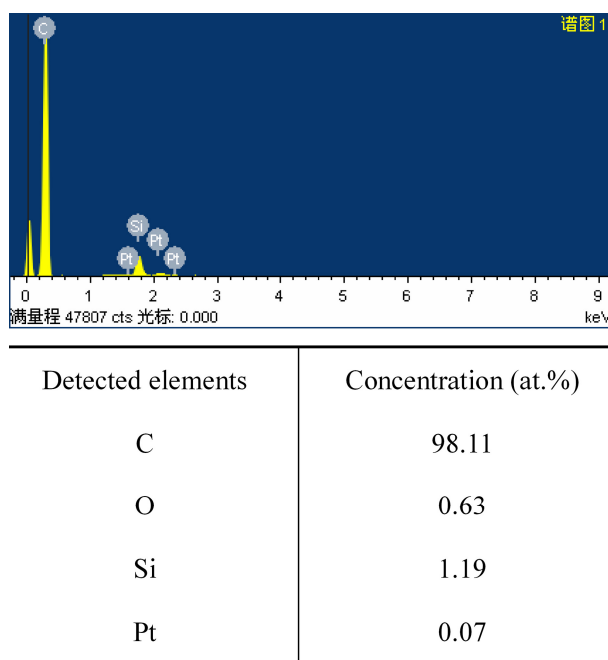


Figure S-5. EDX of the n-diamond film grown with carbon nanotubes

There are only C, O and Si elements detected in the n-diamond film grown with carbon nanotubes, and the Pt element come from sputtered in order to enhance the conductivity for SEM characterization.

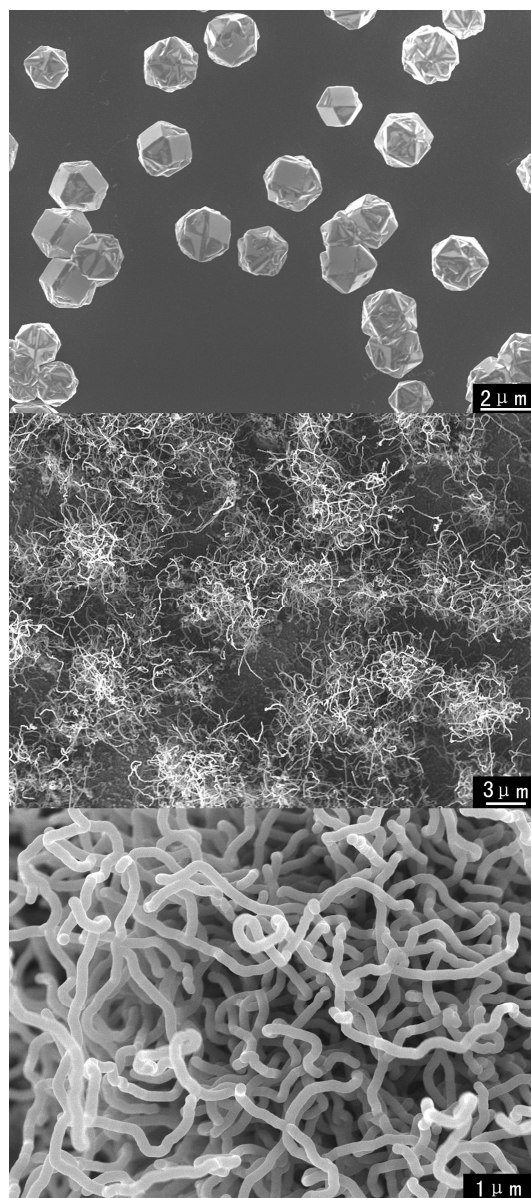


Figure S-6. SEM of the n-diamond film (a), n-diamond film grown with carbon nanotubes (b), and (c) magnified image of (b)

Based on Figure S-6, obviously, carbon nanotubes grow on n-diamond only, since no nanotubes were observed on the Si-wafer.