Electronic Supplementary Information

1. Crystal size of the residual catalyst in the pristine carbon nanotube film

The average crystal size is about 8 nm.

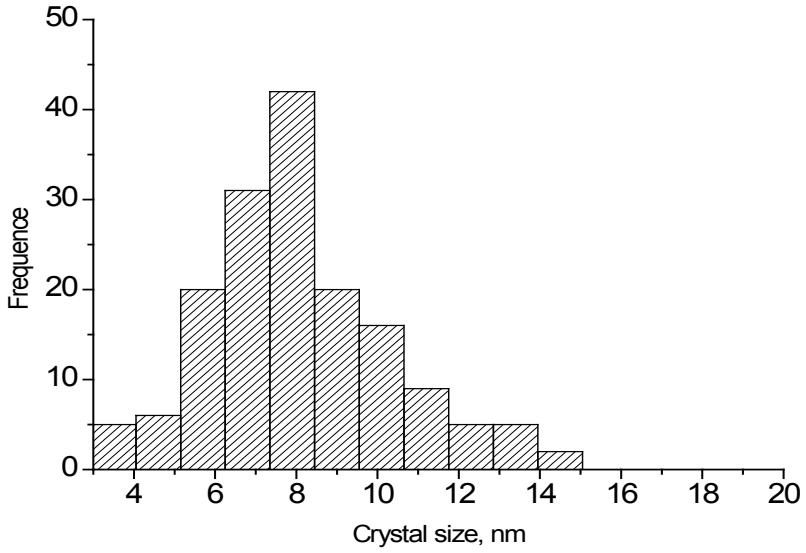

Fig. S1. Crystal size of the residual catalyst.

2. Purification with NH_4Cl at 700 °C in N_2 atmosphere

In order to realize the effect of the oxidation step in purification of DWNTs, we also designed a process in which the raw materials were directly treated by NH_4Cl at 700 °C in N_2 atmosphere. Fig. S2 shows the TEM images of the sample. Although most metal contents were removed (the residual is as low as 8.6%, see Fig. S3), there were a lot of nanocrystalline graphite cages left. From the TG curve, it is estimated that ~13.33% amorphous carbon left. The DTG curve of the samples also has two peaks in the temperature range of 500 to700 °C. Obviously, without oxidation process the graphitic cage is hard to be removed.

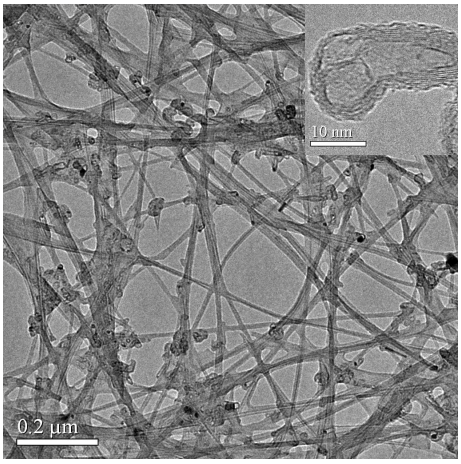

Fig. S2. TEM image of the CNTs purified with NH_4Cl. The inserted image is the morphology of a graphitic carbon nanocage.

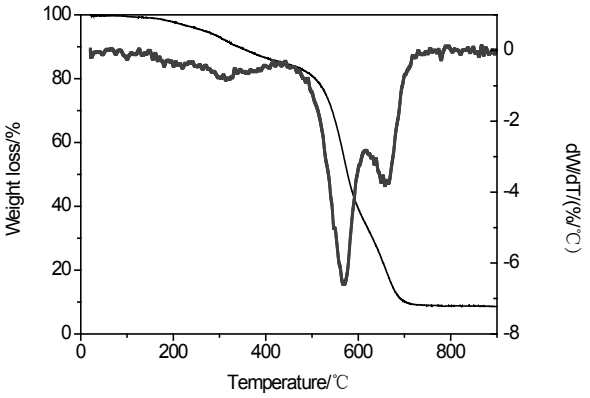

Fig. S3. TGA curves of the CNTs purified with NH_4Cl.