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SUPPLEMENTARY INFORMATION

Synthesis of Single-Walled Carbon Nanotubes on Graphene Layers

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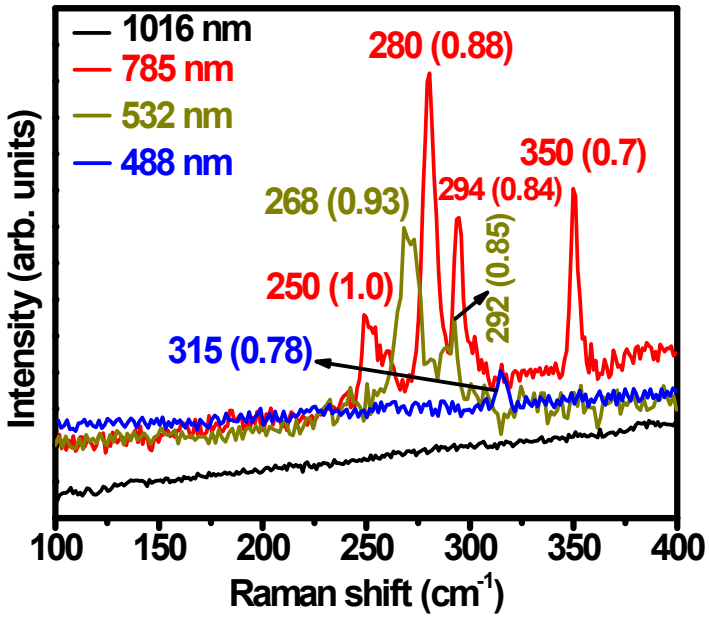

Fig. S1 Raman spectra of as-synthesized SWCNTs on graphene layers using excitation wavelengths of 1016, 785, 532 and 488 nm. SWCNTs were grown by CVD using an alcohol gas source under a pressure of 1×10^{-4} Pa at 700 °C for 1 h. The diameters corresponding to RBM peaks are indicated in parentheses. Diameters were estimated using the formula $d_t = 248/\omega_{RBM}$, where d_t is the SWCNT diameter in nm and ω_{RBM} is the frequency in cm^{-1} of the RBM.

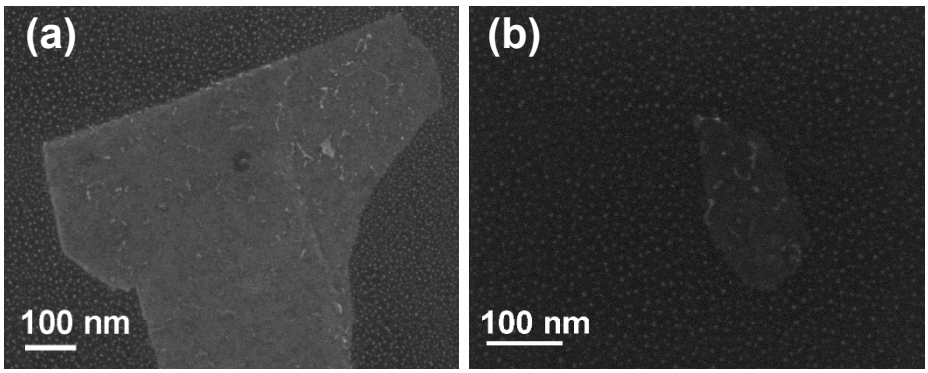

Fig. S2 FESEM images of SWCNTs grown on graphene layers by CVD under different ethanol gas source pressures of (a) 1×10^{-3} Pa and (b) 1×10^{-5} Pa. The thickness of Pt was 0.2 nm in both experiments. Compared with that of SWCNTs grown using an ethanol gas pressure of 1×10^{-4} Pa (Fig. 1d in the main text), the densities of SWCNTs in (a) and (b) are lower.

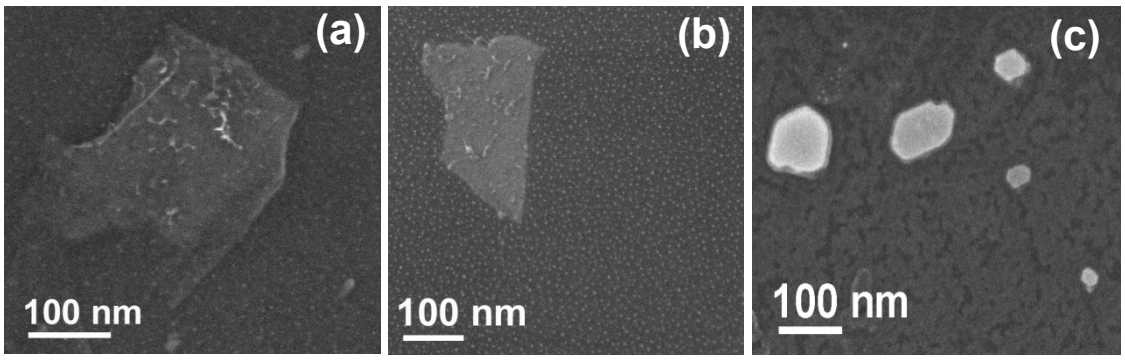

Fig. S3 FESEM images of samples grown using different Pt thicknesses. (a) and (b) SWCNTs (density of about 20/μm^2) grown on graphene layers coated with 0.05 and 0.1 nm of Pt, respectively. (c), SWCNTs did not grow on graphene coated with 0.3 nm of Pt. This is because the Pt particles aggregated to form large hexagonal Pt crystals (white), thus revealing the limit of Pt thickness to grow SWCNTs on graphene.

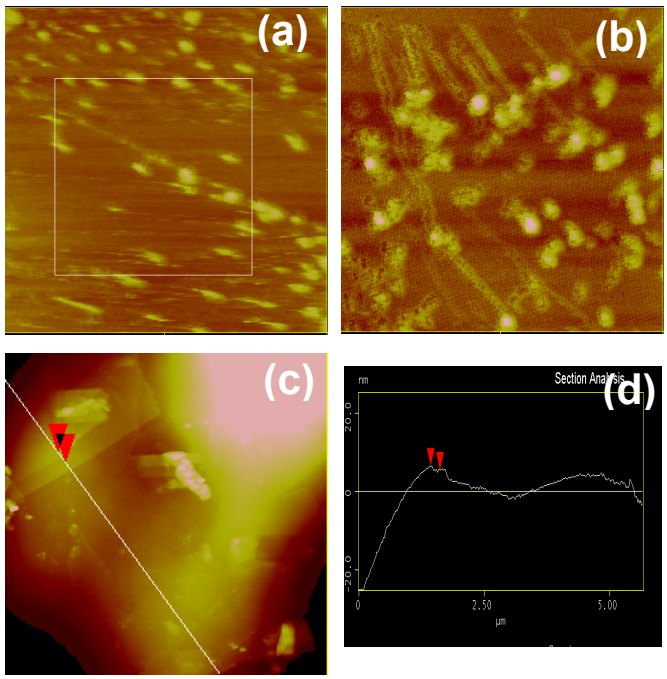

Fig. S4 AFM images of (a) pristine graphite (250×250 nm), (b) chemically treated graphite (250×250 nm), and (c) chemically treated graphene exists on the graphite surface (5×5 μm). RMS roughnesses of the areas shown in (a) and (b) were 0.45 and 0.71 nm, respectively. (d) The height profile for the line in (c) shows that the height difference between the two arrows (edges of graphene layers) is 0.82 nm.

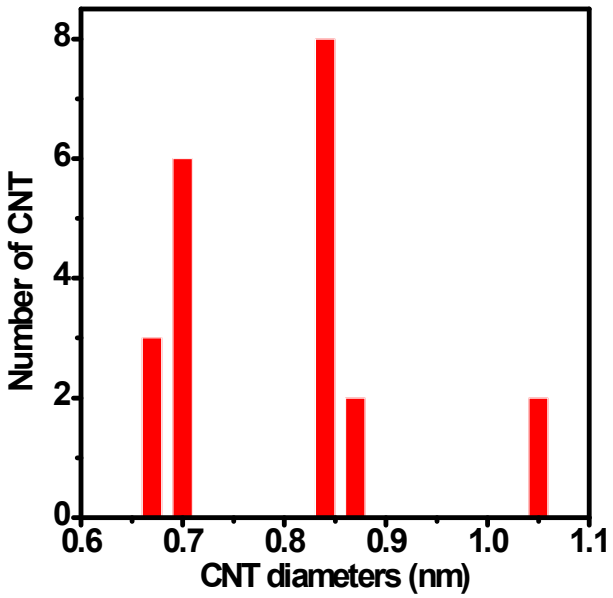

Fig. S5 Histogram showing a diameter distribution of SWCNTs grown on the graphene layers, indicating SWCNTs with a small diameter grown on graphene layers.