



The Role of Temperature on the Degree of End-Closing and Filling of Single-Walled Carbon Nanotubes

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Steam treatment

As-received SWCNTs, containing a fraction of DWCNTs, were finely ground in an agate mortar with a pestle, loaded into a silica tube end exposed to steam under Ar atmosphere at 900 °C during 4 h. Then, they were refluxed with 6 M HCl (PanReac Appli-Chem) at 110 °C overnight. The resulting sample was rinsed with distilled water until neutral pH, filtered onto a polycarbonate membrane (Whatman Cyclopore, pore size 0.2 µm) and dried in an oven at 100 °C overnight.

Nitrogen adsorption-desorption experiments

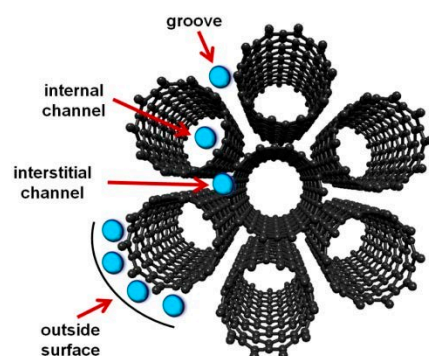


Figure S1. Schematic representation of gas adsorption in a bundle of SWCNTs. The blue dots represent the gas molecules adsorbed on accessible surfaces.

Table S1. Apparent specific surface area (S_{BET}) and cumulative pore volume up to 1.5 nm pore diameter (V_c) of as-received and empty purified/annealed samples. Data obtained from low temperature nitrogen adsorption and NLDFT calculations.

Sample	S_{BET} [m^2g^{-1}]	V_c [cm^3g^{-1}]
As-received	1246	0.146
RT	1263	0.231
400 °C	1285	0.220
700 °C	1196	0.221
900 °C	1157	0.199
1100 °C	791	0.194

Raman spectroscopy

Table S2. I_D/I_G Raman ratio of purified and annealed samples. Each value is averaged based on three measurements. CNTs were excited using 532 nm laser wavelength.

Sample	I_D/I_G	Error
RT	0.13	0.03
400 °C	0.11	0.03
700 °C	0.13	0.01
900 °C	0.14	0.01
1100 °C	0.12	0.02

Electron microscopy

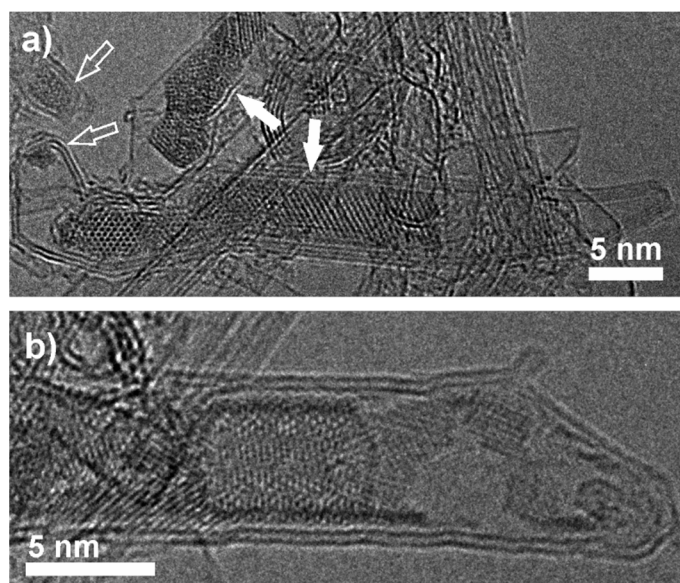


Figure S2. Additional HRTEM images of EuCl_3 @CNTs prepared at 1100 °C. As a guide to the eye, white arrows point to CNTs filled with nanowires of EuCl_3 , empty white arrows to filling with nanoparticles, and black arrows point to closed ends. A single-layered inorganic nanotube of EuCl_3 was found inside the cavities of a large diameter DWCNT (Figure S2b), thus creating a tubular (1D) van der Waals heterostructure,