Supporting Information:

TerpyridineCu^{II}-mediated Reversible Self-assembly of Single-Wall Carbon Nanotubes: Towards Ordered Nanoscale Architectures

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General Information:

TEM characterization: An FEI TECNAI 12 transmission electron microscope (TEM) with an accelerating voltage of 120 kV was used to study the size, distribution, and structure of the carbon nanotubes and the resultant composite. Samples for analysis were prepared by adding a droplet of either dilute solution or suspension to the surface of carbon coated, 400-mesh Cu or Ni grids (available from SPI Supplies), followed by drying at 25 °C for 48 h.

AFM characterization: Droplets of dilute solutions or suspensions of the commercial Oxi-SWNTs, $[(\text{Oxi-SWNT})(\text{tpyCu}^{II})_m]_n$ composite, and disassembled SWNTs were placed on the surface of freshly cleaved mica. After drying at 25 °C for 6 hours, the samples were characterized by atomic force microscopy (AFM) using a Digital Instruments Nanoscope IIIa scanning probe microscope equipped with a Multi 75, Force Modulation Etched Silicon Probe (model MPP-21100) and operating in tapping mode.

CV and UV characterization: Cyclic voltammetry was performed on a BAS C3-Voltammetry Cell Stand with an Epsilon potentiostat at 20 °C. A three-electrode configuration was used with a glassy carbon working electrode, a platinum auxiliary electrode and an Ag/AgCl reference electrode with a scan rate of 100mV/s. The analyte concentration was 1 mg sample per 10 mL of water. A pH=7 buffer solution (Alfa Aesar) was used as the supporting electrolyte and solvent. Depositing a drop of the analyte solution onto the electrode surface and drying with an infrared lamp made a film of the sample. The solvent was purged with argon for 10 minutes prior to the experiment and kept under a blanket of argon during the experiment. UV-Vis spectra were recorded on an Ocean Optics, Inc. Chem2000 UV-Vis spectrophotometer.

Experimental Procedures:

Synthesis of the $[(\text{Oxi-SWNT})(\text{tpyCu}^{II})_m]_n$ composite:
The oxidized single-wall carbon nanotubes were purchased from Sigma-Aldrich Co. and used without further purification. A terpyridine-Cu^{II} (3 mg) aqueous solution[1] was added to a basic, oxidized single-wall carbon nanotube (10 mg) aqueous solution at 25 °C with agitation to afford a black precipitate. Filtration through a nylon filter, followed by washing with $NaPF_6$ in water, and CH_3CN gave (11.7 mg) the black solid nanotube composite.

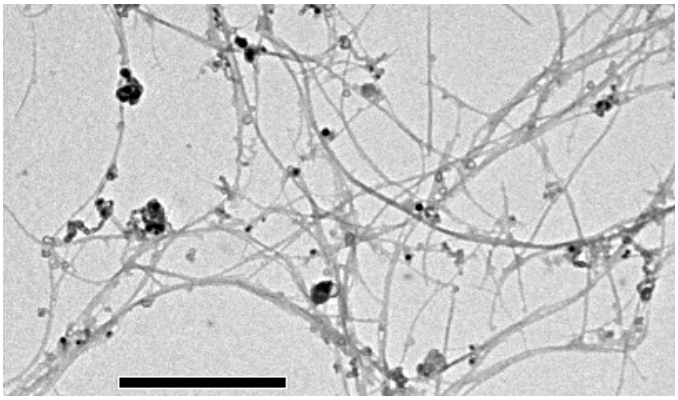
Disassembly of the composite:
2 mg of the $[(\text{Oxi-SWNT})(\text{tpyCu}^{II})_m]_n$ composite was suspended in 8 ml of water at 25 °C, then 1 mg of KCN was added with stirring for 4 hours to yield a dark blue-green solution.

References:

(1) The terpyridine-Cu^{II} adduct was synthesized according to a published procedure, ESI-MS (m/z) 314.7 amu (terpyridine-Cu^{II} + F^-)$^+$. Wang P.; Moorefield C. N.; Panzer M.; Newkome G. R. *Chem. Commun.* **2005**, 465-467.

TEM image:

Figure S1. [(Oxi-SWNT)(tpyCu^{II})$_m$]$_n$ composite formation.



AFM images:

Figure S2. Linear [(Oxi-SWNT)(tpyCu^{II})$_m$]$_n$

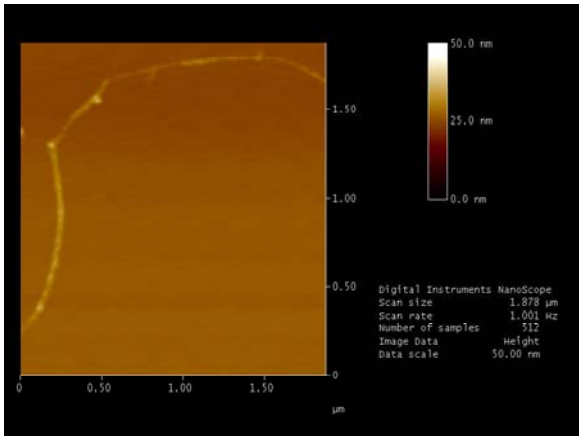
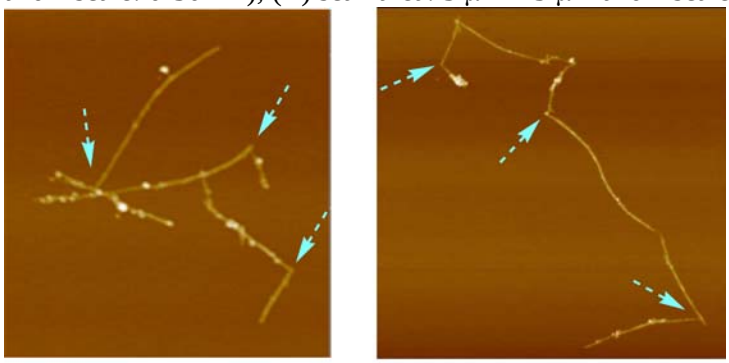


Figure S3. Cross-linked and linear [(Oxi-SWNT)(tpyCu^{II})$_m$]$_n$. A typical AFM image of possible connections of the [(Oxi-SWNT)(tpyCu^{II})$_m$]$_n$ composites, (A) scan area: 2.2 µm x 2.2 µm and z scale: 0-30 nm); (B) scan area: 3 µm x 3 µm and z scale: 0-50 nm).



A B

Figure S4. IR spectra.

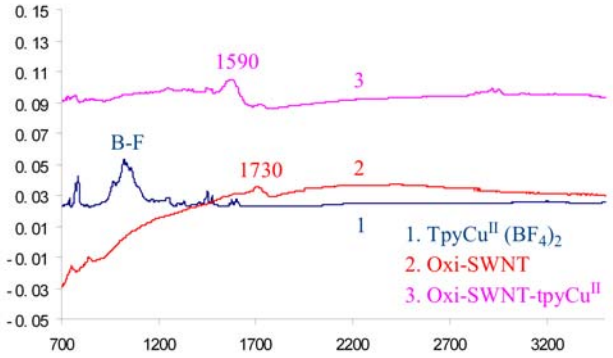


Figure S5. Raman spectra.

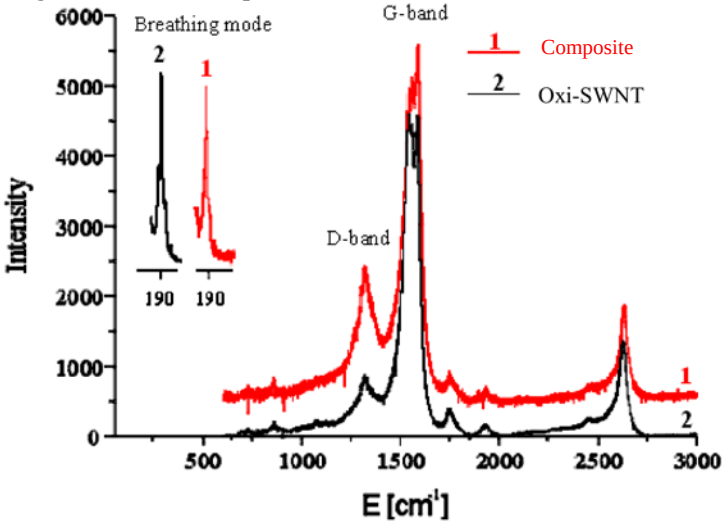


Figure S6. CV measurements.