Electronic Supplementary Material (ESI) for Chemical Communications

Facile Synthesis of Gold Nanoparticle (AuNP)-Carbon Nanotube (CNT) Hybrids through an Interfacial Michael Addition Reaction

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Supporting Information

General Materials and Methods

The following reagents were used for the synthesis of the compounds in this article. Potassium thioacetate, triethylene glycol monomethylether, tetraethylene glycol, 4-dimethylaminopyridine (DMAP), sodium borohydride, p-toluenesulfonyl chloride, Gold(III) chloride trihydrate, O-Benzotriazole-N,N,N',N'-tetramethyl-uronium-hexafluoro-phosphate (HBTU), N,N-Diisopropylethylamine (DIPEA), and single wall carbon nanotubes (carbon >90 %, 50-70% carbon as SWCNT, D = 1.2-1.5 nm, L = 2-5 μm) were purchased from Aldrich. All common solvents, dry methanol, hydrochloric acid, sodium hydroxide, triethylamine, and magnesium sulfate were purchased from Caledon. Glacial acetic acid (99.7%) was purchased from BDH. Ethanol and methanol were purchased from Commercial Alcohols. Dialysis membranes (MWCO 6000-8000) were purchased from Spectra/Por.

Transmission electron microscopy (TEM) images were recorded from a TEM Philips CM10. Infrared spectra were recorded using a Bruker Vector33 spectrometer and making a thin film of sample onto a KBr disk.

The XPS analyses were carried out with a Kratos Axis Ultra spectrometer using a monochromatic Al K(alpha) source (15mA, 14kV). XPS can detect all elements except hydrogen and helium, probes the surface of the sample to a depth of 5-7 nanometres, and has detection limits ranging from 0.1 to 0.5 atomic percent depending on the element. The instrument work function was calibrated to give a binding energy (BE) of 83.96 eV for the Au 4f7/2 line for metallic gold and the spectrometer dispersion was adjusted to give a BE of 932.62 eV for the Cu 2p3/2 line of metallic copper. Specimens were mounted on a double side adhesive and the Kratos charge neutralizer system was used on all specimens. Survey scan analyses were carried out with an analysis area of 300 x 700 microns and a pass energy of 160 eV. High resolution analyses were carried out with an analysis area of 300 x 700 microns and a pass energy of 20 eV. Spectra have been charge corrected to the main line of the carbon 1s spectrum set to 284.5 eV for graphitic/nanotube type species. Spectra were analyzed using CasaXPS software (version 2.3.14).

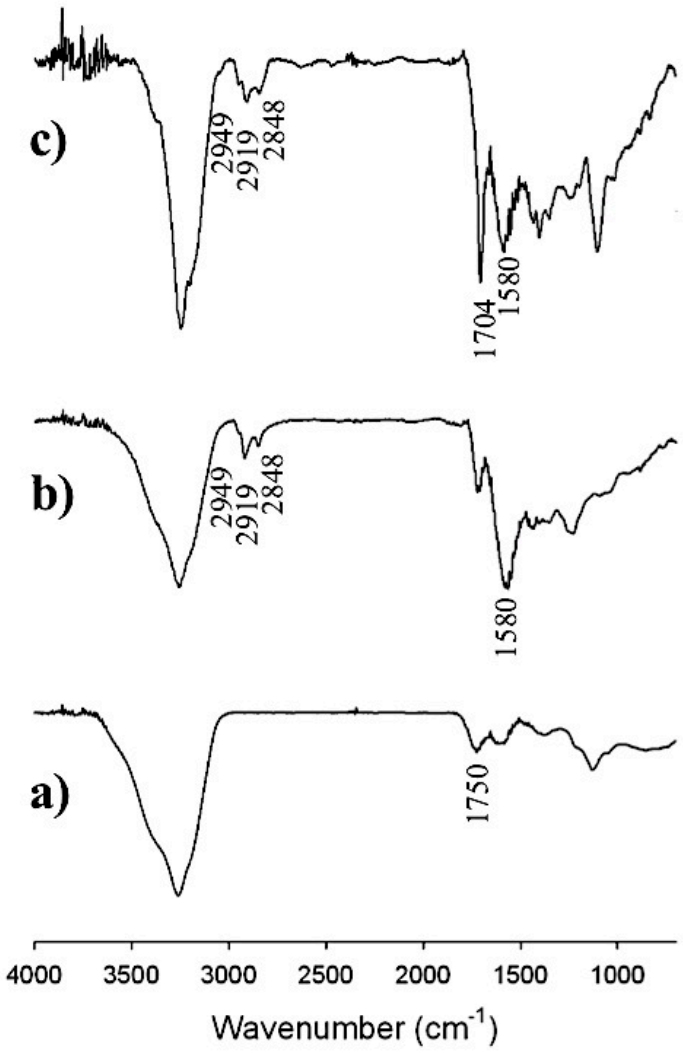

Figure SI1: IR spectra of a) SWCNT starting material; b) SWCNT-SH; c)SWCNT-AuNP hybrid material.

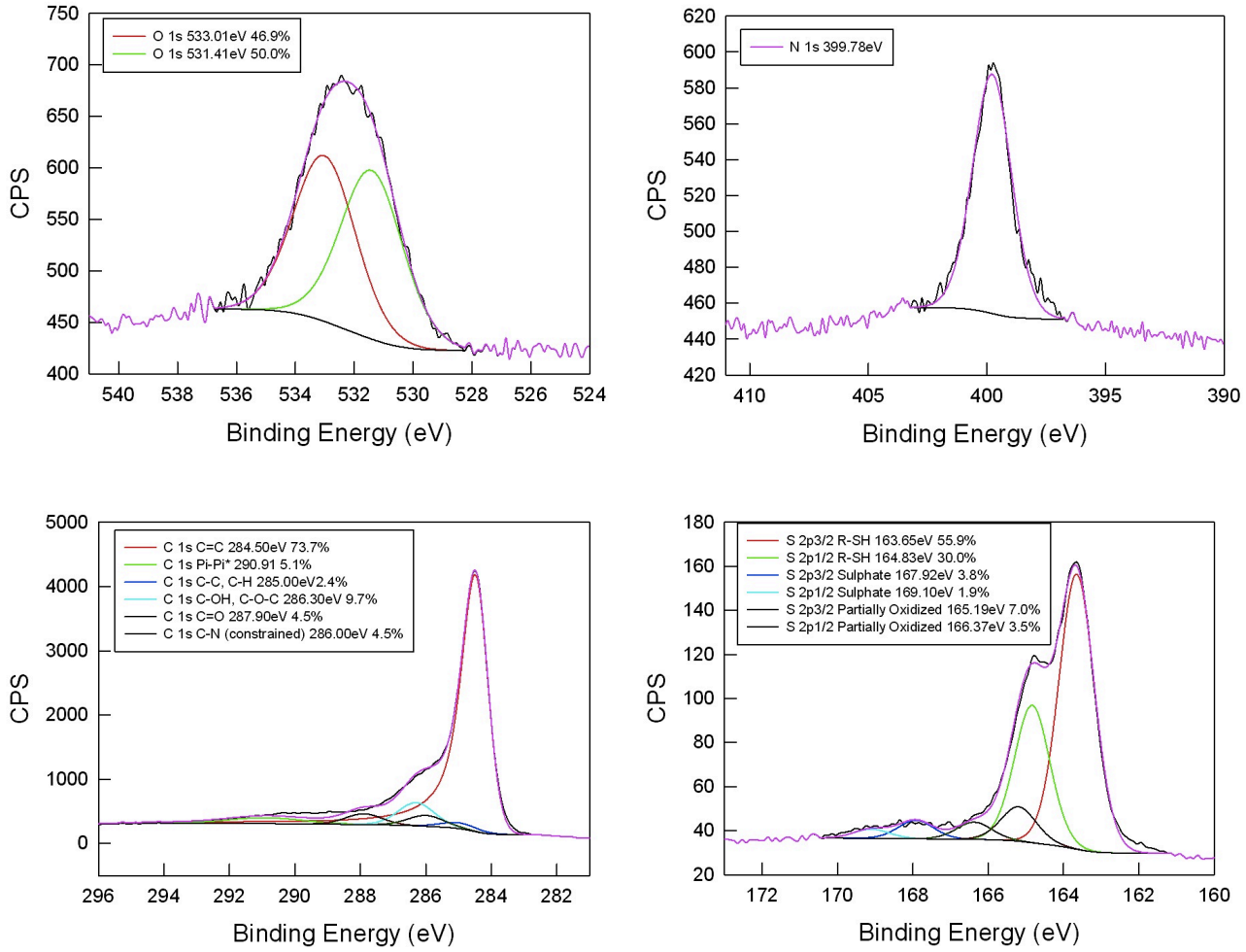

Figure SI2: High resolution XPS spectra for SWCNT-SH.

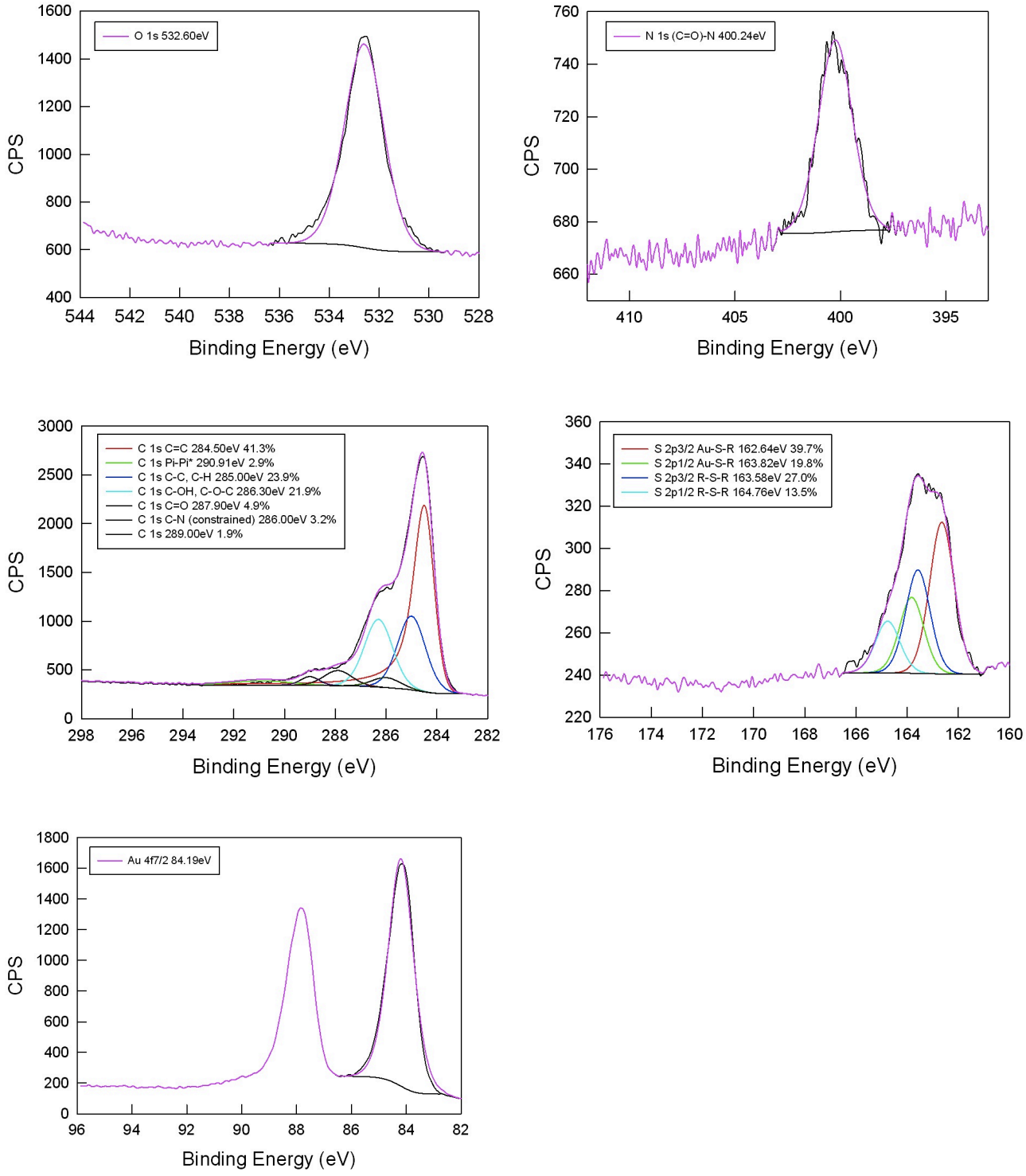

Figure SI3: High resolution XPS spectra for SWCNT-AuNP hybrid material.