Supplementary Material for Energy & Environmental Science

Supporting Information

for

Light-Harvesting Multi-Walled Carbon Nanotubes and CdS Hybrids: Application to Photocatalytic Hydrogen Production from Water

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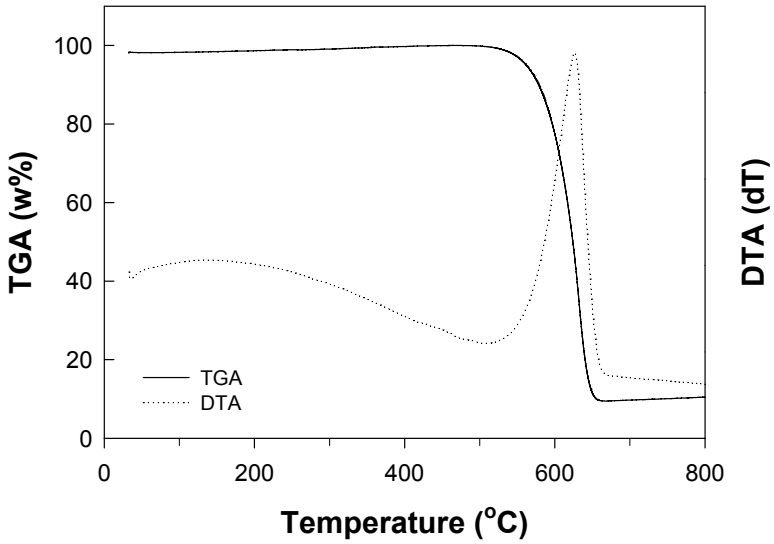

Figure S1. Thermogravimetric analysis (TGA) of employed carbon nanotubes (c-CNT).

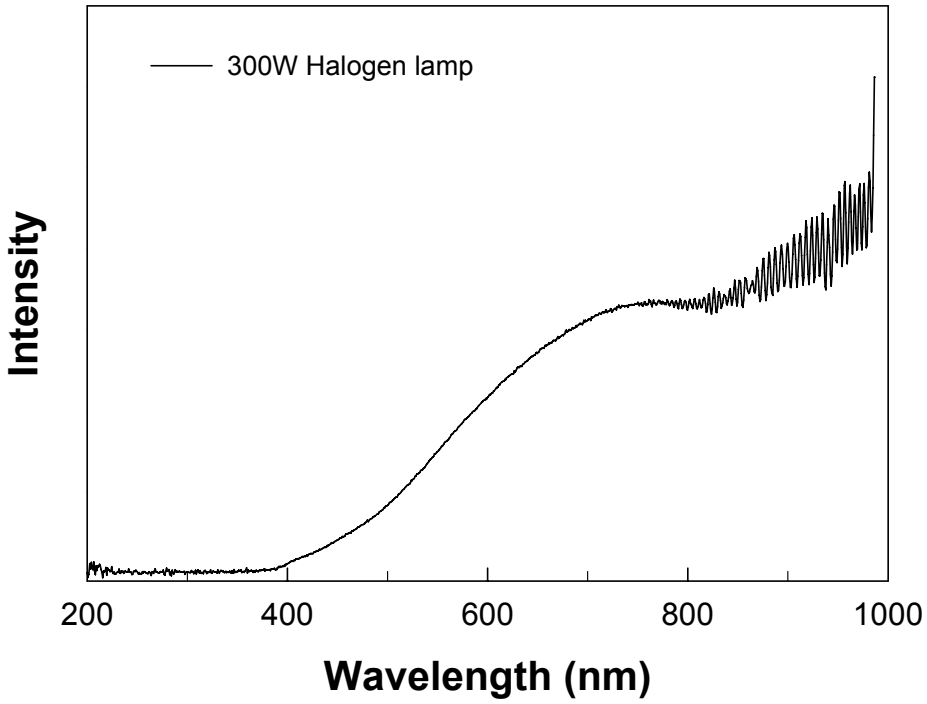

Figure S2. Spectral output of a 300-W halogen lamp employed in this study.

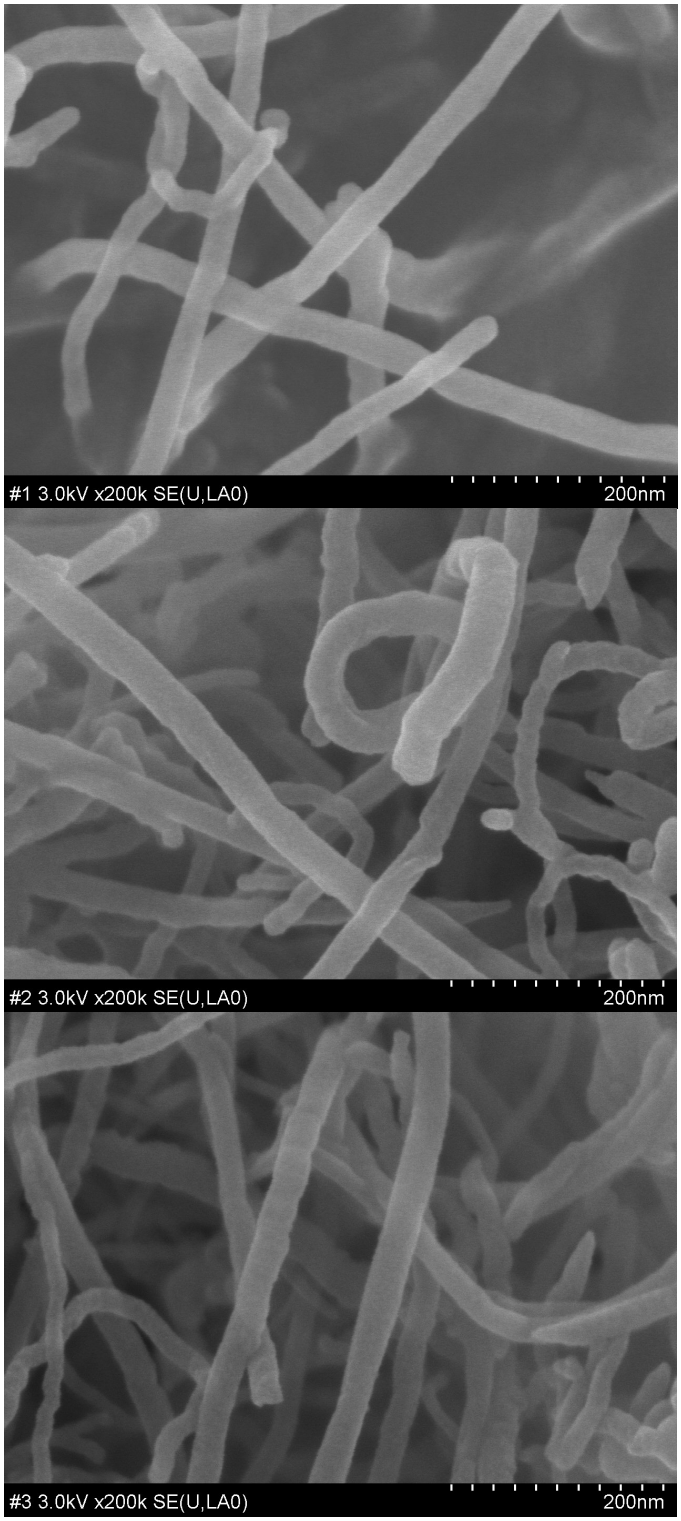

Figure S3. Scanning electron microscopic images of c-CNT (top), a-CNT (middle), and h-CNT (bottom).

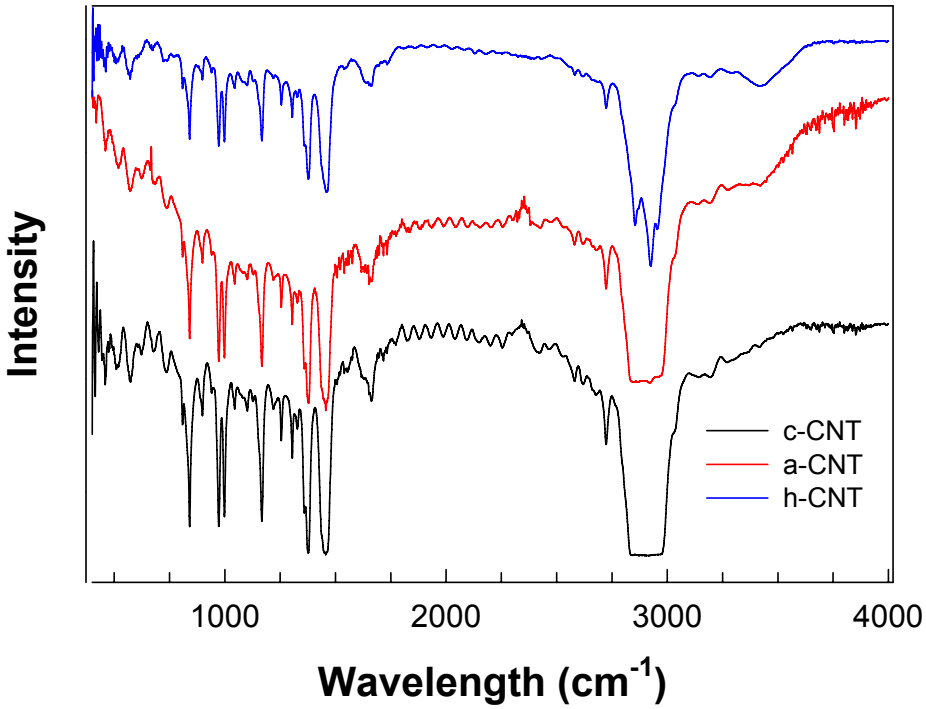

Figure S4. FTIR spectra of c-CNT, a-CNT, and h-CNT.

Overall spectra are quite similar among the three samples. A number of absorption peaks are identically found between 800 and 1500 cm^{-1}, attributable to C-O-C (1140 cm^{-1}, symmetric stretching), C-O (1251 cm^{-1}, asymmetric stretching in ether bridged group), carboxyl-carbonate (1377 cm^{-1})[ref 1], and typical C – C (and/or C – H) vibration modes while a peak at 1650 cm^{-1} arises from C = C stretching (nonconjugated) vibration due to the internal defects.[15] The intensive, broad bands at 2800 ~ 3000 cm^{-1} seem to be originated from C – C stretching vibration modes. One difference of the treated samples from the c-CNT is a broad absorption band (O – H stretching mode) found at ca. 3400 cm^{-1}.

Ref 1. Park et al., Chem. Mater. 1997, 9, 176.

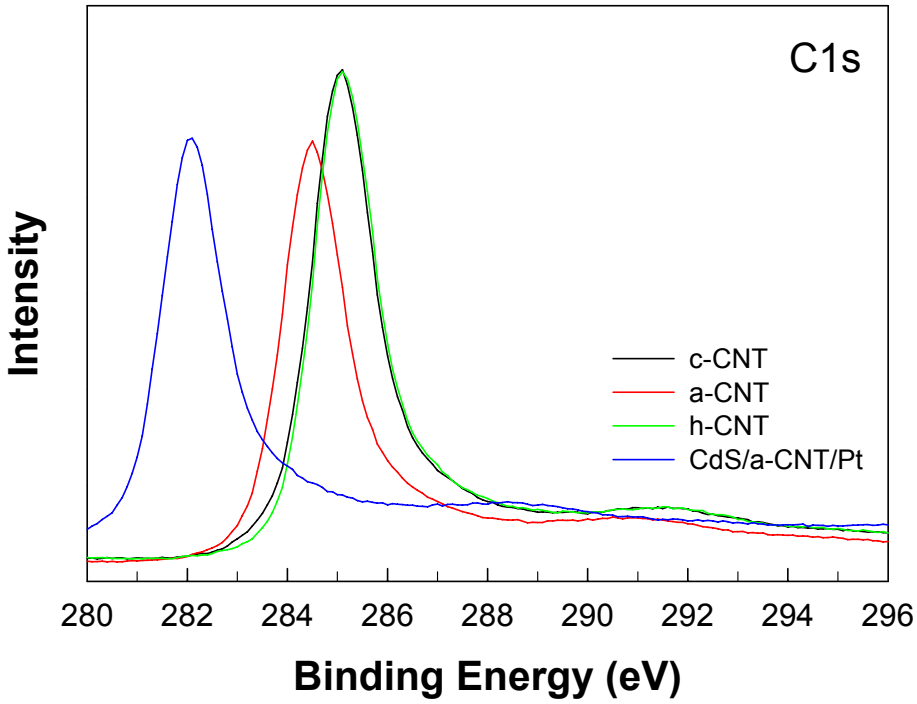

Figure S5. XPS spectra of C1s

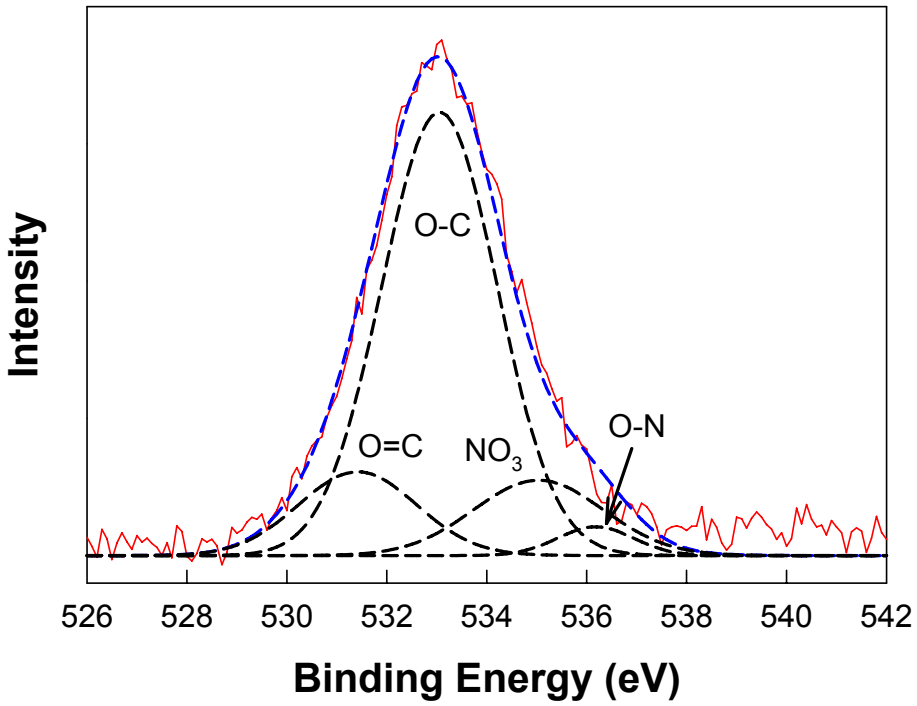

Figure S6. Deconvoluted XPS spectrum of O1s for CdS/a-CNT/Pt.

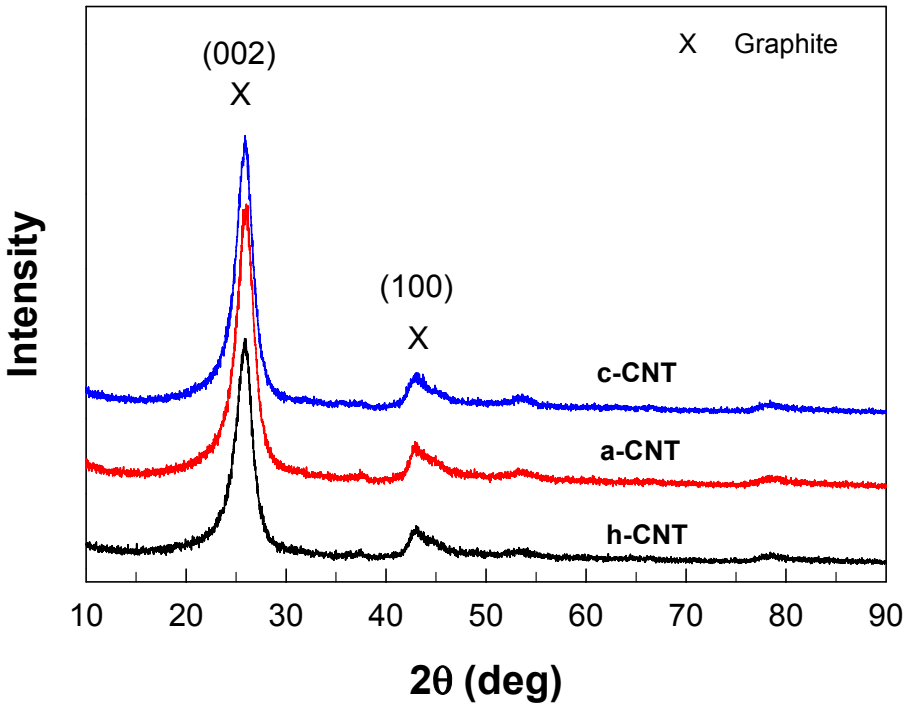

Figure S7. XRD patterns of c-CNT, a-CNT, and h-CNT.

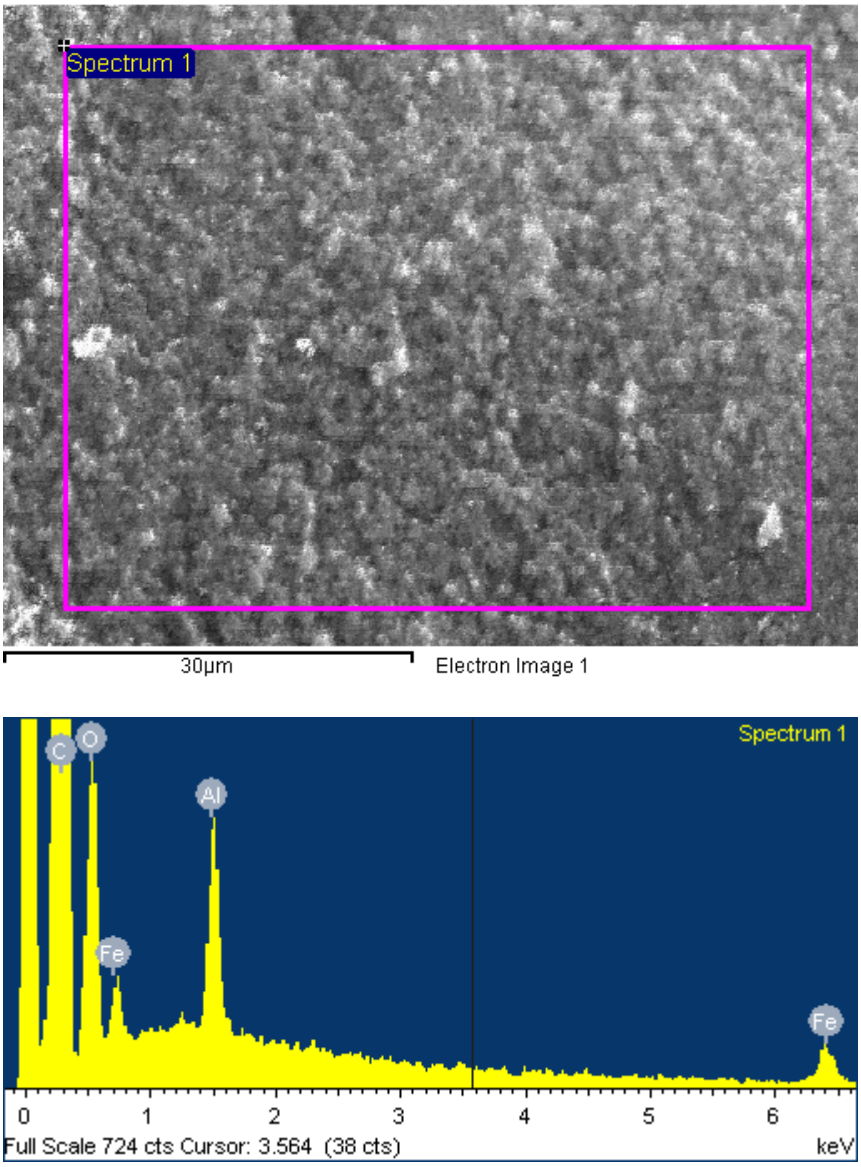

Figure S8. SEM-EDX analysis of CNT annealed at 700 °C for 10 min. Elemental analysis indicates that the CNT is composed of C (87%), O (10%), Al (1%) and Fe (1.58%).

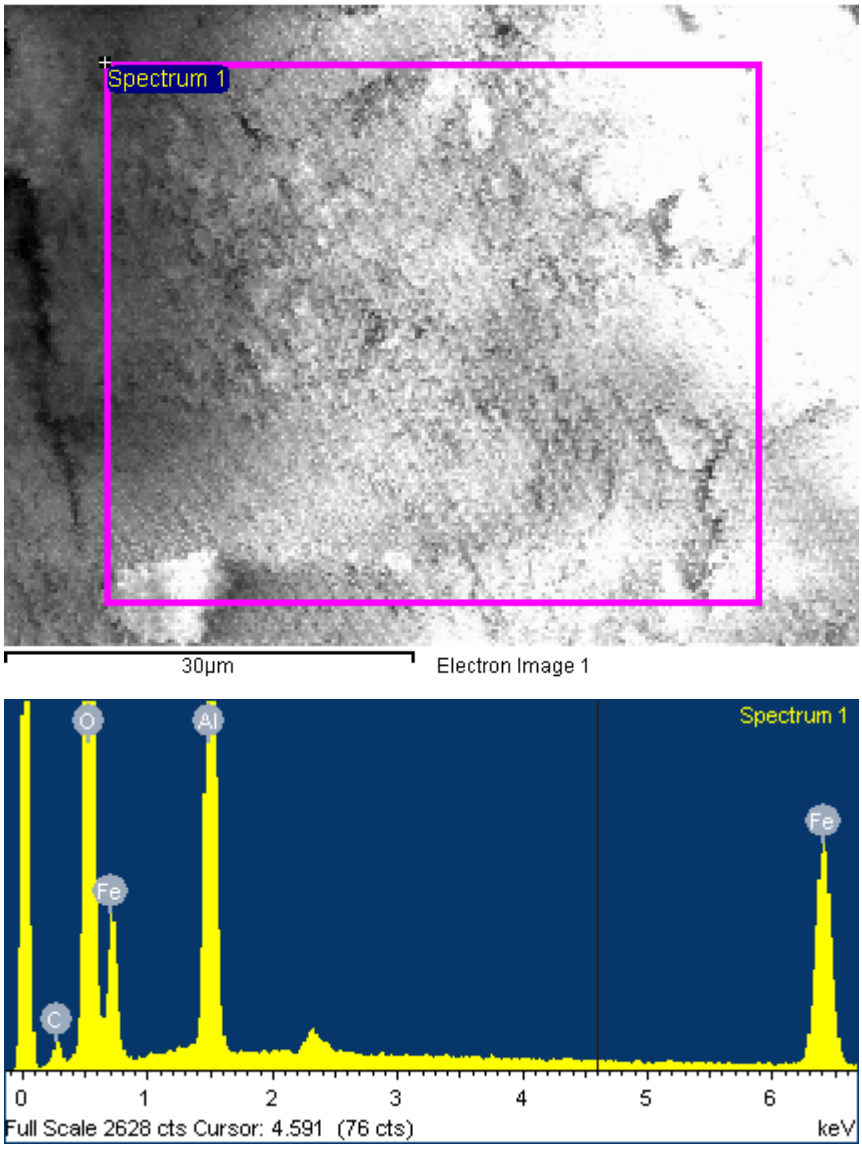

Figure S9. SEM-EDX analysis of CNT annealed at 700 °C for 60 min. Elemental analysis indicates that the CNT is composed of C (3%), O (37%), Al (18%) and Fe (42%).