Electronic Supplementary Material (ESI) for Energy & Environmental Science.
This journal is © The Royal Society of Chemistry 2014

Optically transparent hydrogen evolution catalysts made from networks of copper-platinum core-shell nanowires

Zuofeng Chen,[‡a,b] Shengrong Ye,[‡a] Adria R. Wilson,[a] Yoon-Cheol Ha,[a,c] and Benjamin J. Wiley*[a]

[a]*Department of Chemistry, Duke University, 124 Science Drive, Durham, North Carolina 27708, United States;* [b]*Department of Chemistry, Tongji University, Shanghai 200092, China;* [c]*Creative and Fundamental Research Division, Korea Electrotechnology Research Institute, Changwon 642-120, Korea.*

Supplementary Information

* Corresponding author. Tel.: (+1) 919-668-3066. E-mail address: benjamin.wiley@duke.edu

‡ These authors contributed equally.

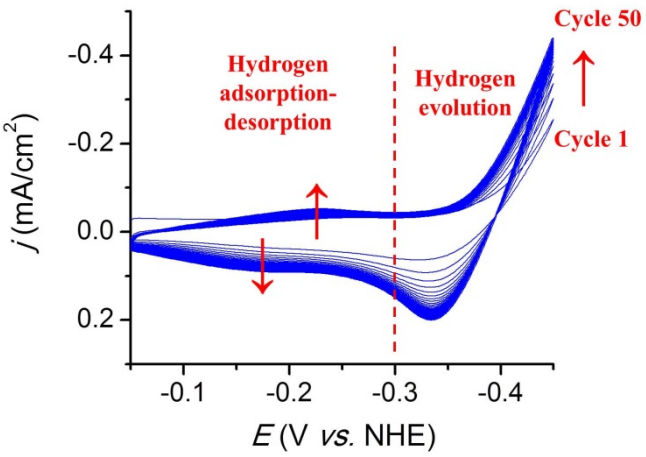

Figure S1. Successive cyclic voltammograms (50 cycles) for the Cu NWs in 0.2 M deaerated phosphate buffer (pH 7.0) contained 0.1 mM K_2PtCl_6. Scan rate, 100 mV/s.

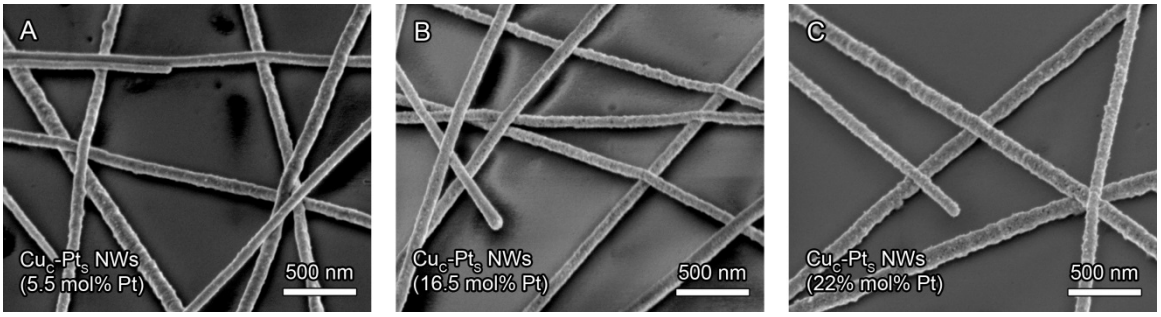

Figure S2. SEM images of Cu_c-Pt_s NWs after electroplating Pt for 5 (A), 20 (B), and 30 (C) min.

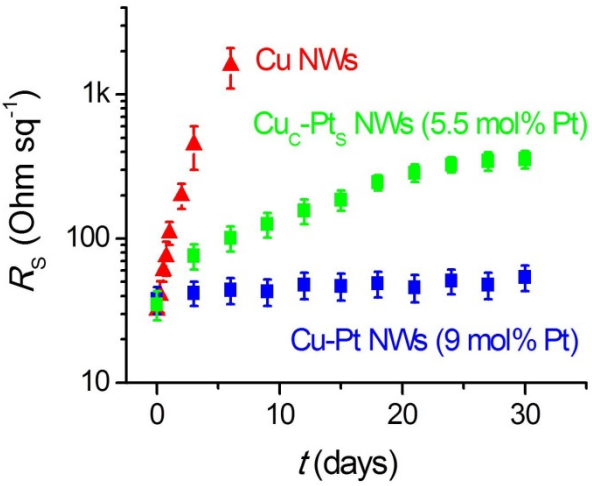

Figure S3. Plots of sheet resistance (R_S) *vs.* time for films of Cu NWs, Cu_c-Pt_s (5.5 mol% Pt) NWs, and Cu_c-Pt_s (9 mol% Pt) NWs stored in an oven at 85 °C.

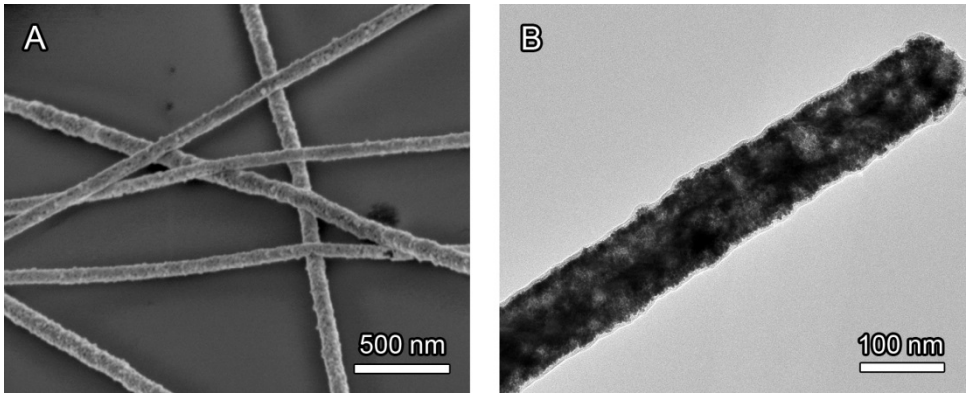

Figure S4. (A) SEM and (B) TEM images of Cu_c-Pt_s (9 mol% Pt) NWs after electrolysis at −0.65 V *vs.* NHE for 6 h.

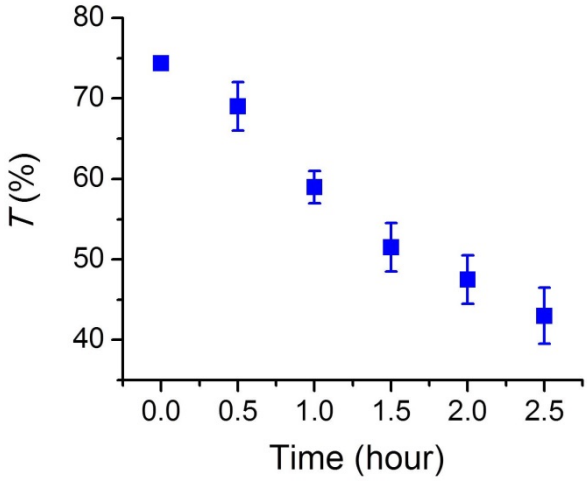

Figure S5. Time-dependent transmittance of ITO with potential holding at −0.80 V *vs.* NHE. The transmittance data are averaged over λ = 300-1800 nm.

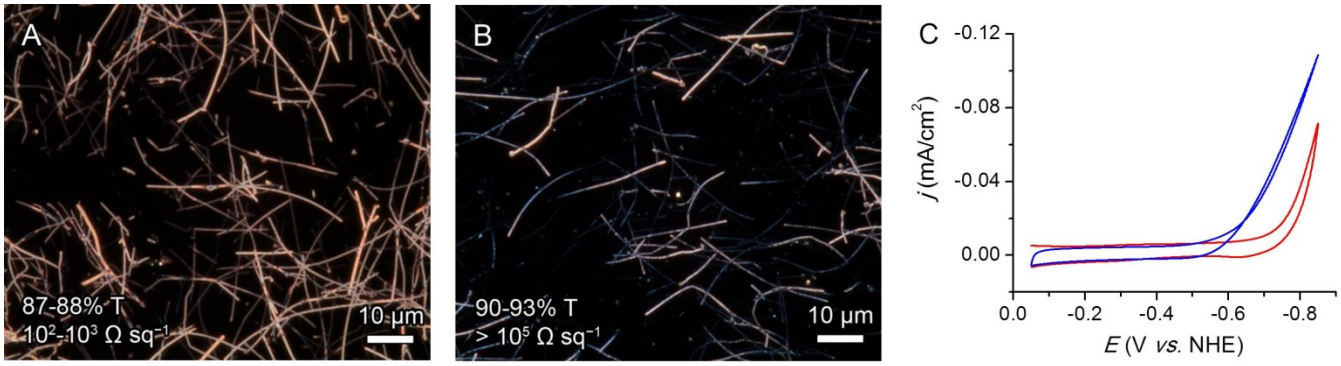

Figure S6. Dark field optical microscopy images of Cu NWs after partial galvanic replacement with Pt by immersion in a 0.2 M deaerated phosphate buffer (pH 7.0) containing 0.1 mM K_2PtCl_6 for (A) 10 min and (B) 60 min. (C) Cyclic voltammogram in 0.2 M deaerated phosphate buffer (pH 7.0) of the Cu NWs after galvanic replacement with Pt for 10 min. Scan rate, 100 mV/s. The red line represents the CV for the Cu NWs prior to galvanic replacement with Pt for comparison.

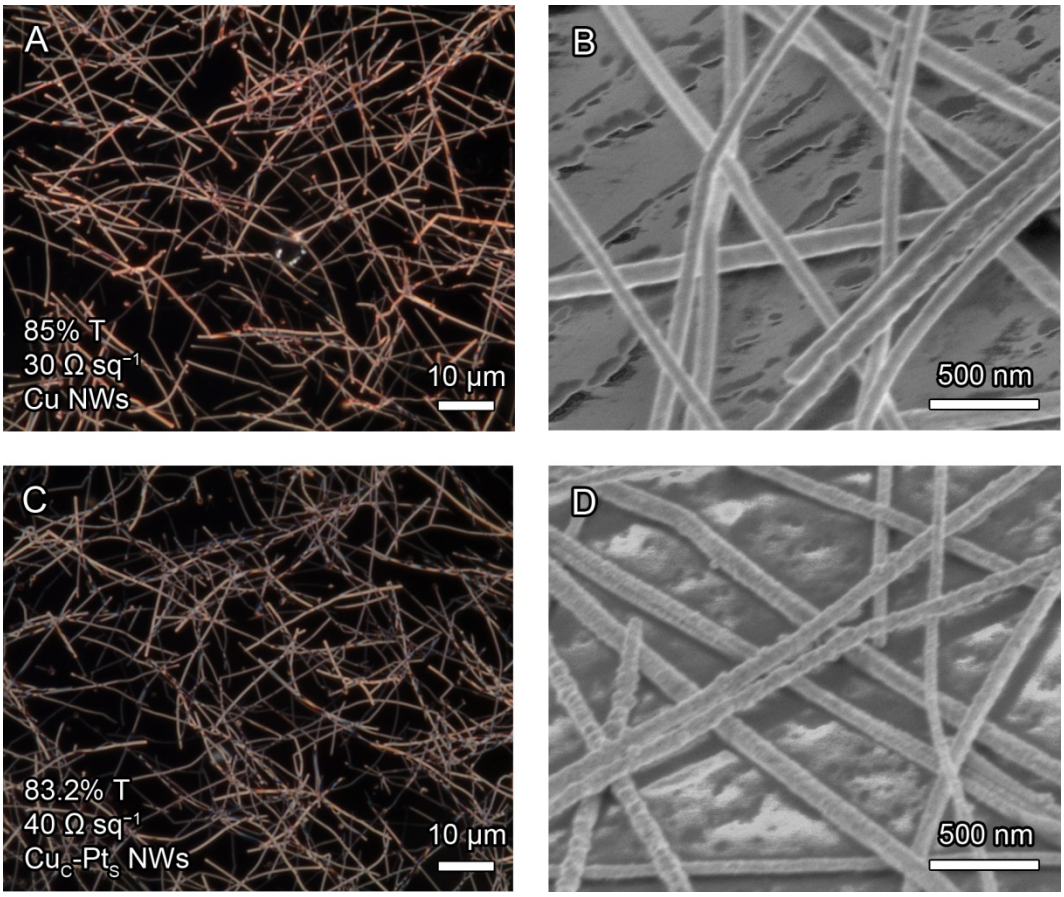

Figure S7. Dark field optical microscopy (A,C) and SEM (B,D) images of the Cu NWs (A,B) and Cu_c-Pt_s (9 mol% Pt) NWs (C,D) on PET. The Cu_c-Pt_s (9 mol% Pt) NWs on PET were prepared as in Figure 1A.

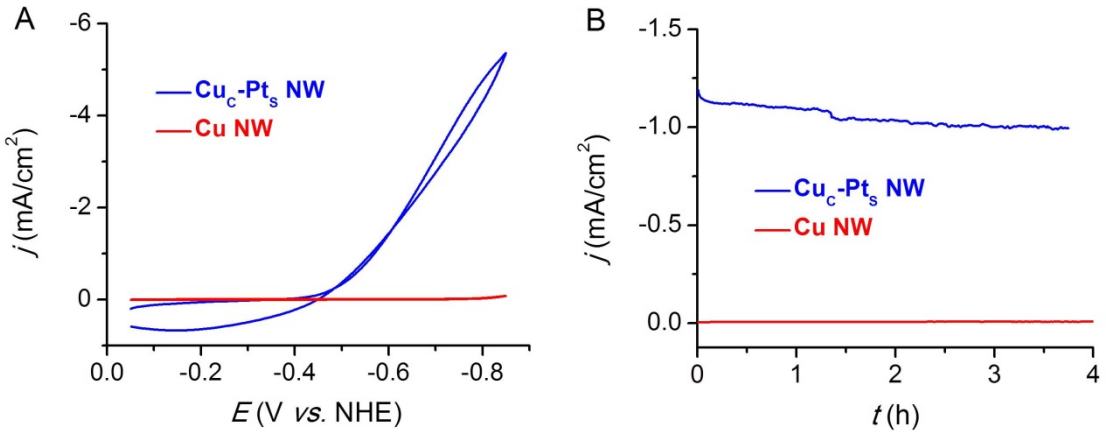

Figure S8. (A) Cyclic voltammograms of Cu and Cu_c-Pt_s (9 mol% Pt) NWs on PET in 0.2 M phosphate buffer (pH 7.0). Scan rate, 100 mV/s. (B) Controlled potential electrolysis of the Cu and Cu_c-Pt_s (9 mol% Pt) NWs on PET at −0.65 V *vs.* NHE.