Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Highly Stable Silver-Platinum Core-Shell Nanowires for H_2O_2 Detection

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KEYWORDS (silver nanowires, core-shell nanowires, stability, H_2O_2 Detection).

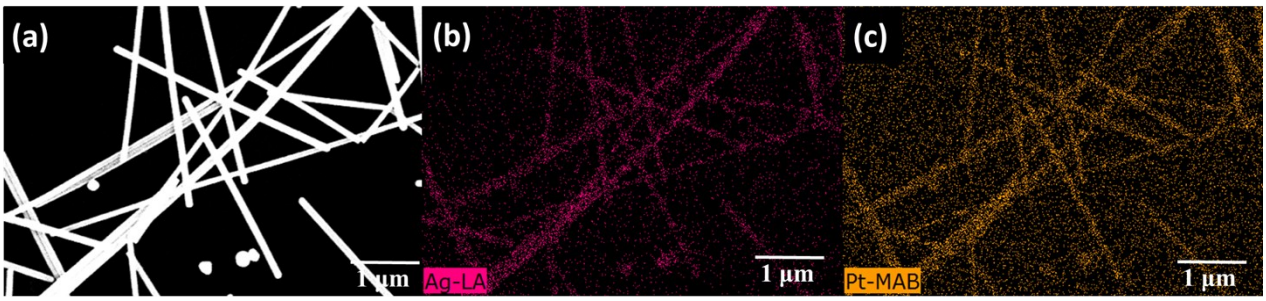

Figure S1. (a) SEM image of Ag-Pt core-shell NWs and corresponding EDS maps for (b) Ag and (c) Pt.

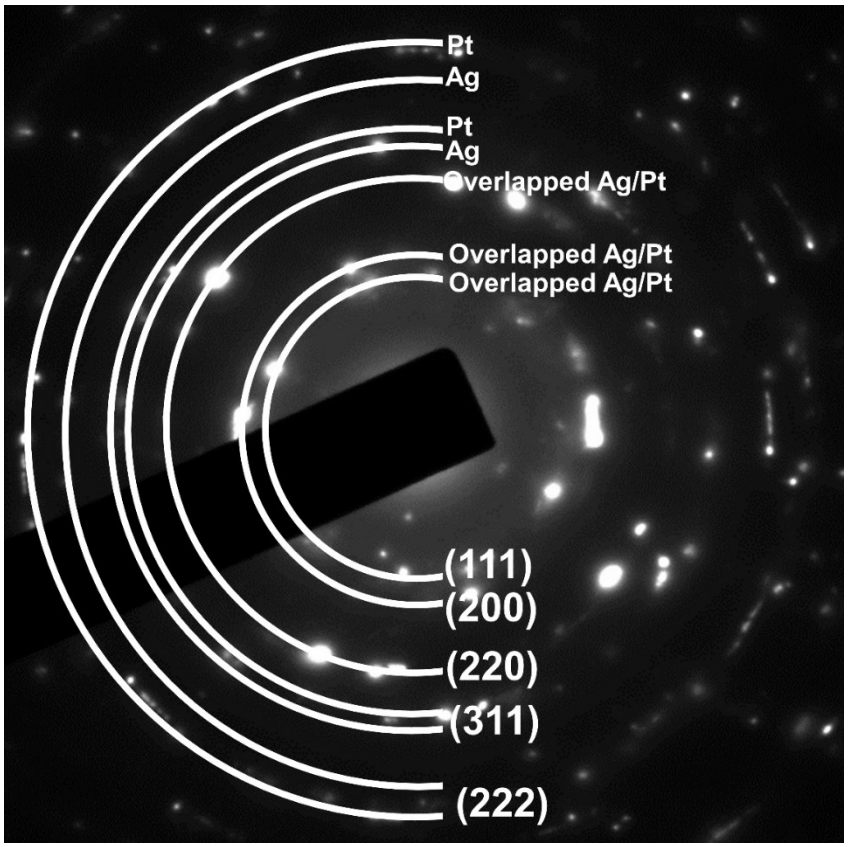

Figure S2. SAED image of Ag-Pt core-shell NWs. The half-rings on SAED are drawn for eye tracking.

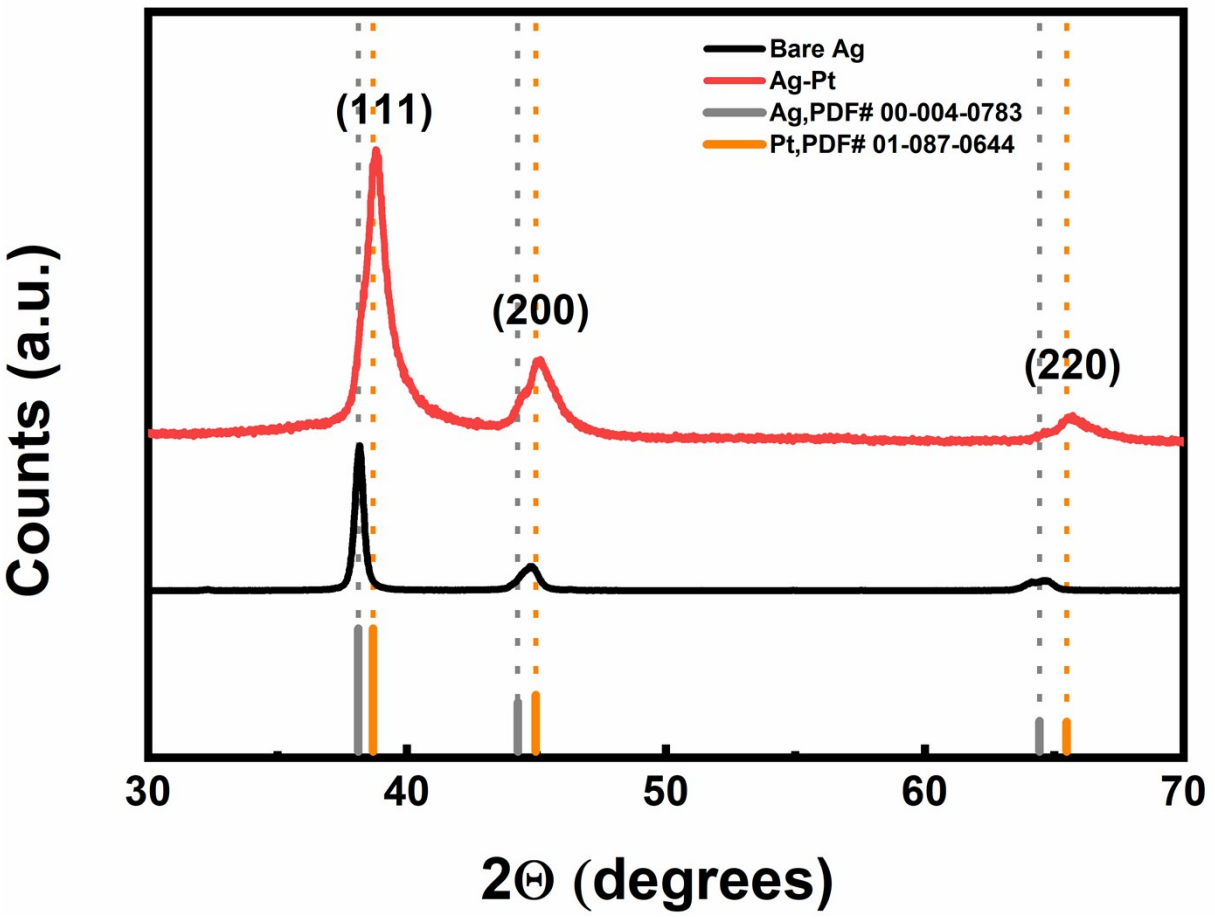

Figure S3. XRD patterns of bare Ag NWs (black) and Ag-Pt core-shell NWs (red).

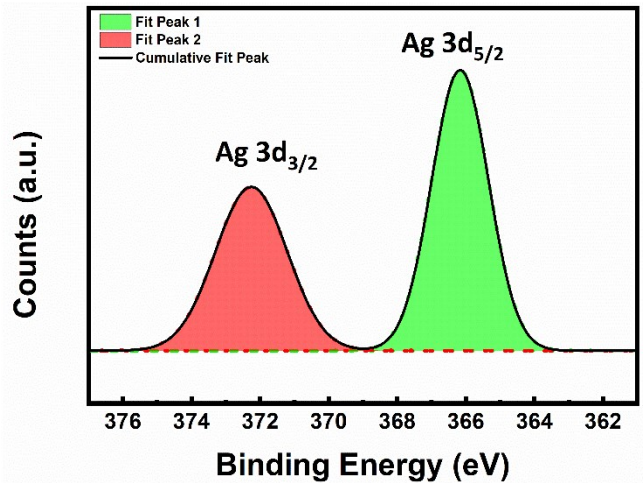

Figure S4. Fitted XPS spectra of Ag $3d_{3/2}$ (372.2 eV) and Ag $3d_{5/2}$ (366.2 eV) from bare Ag NWs.

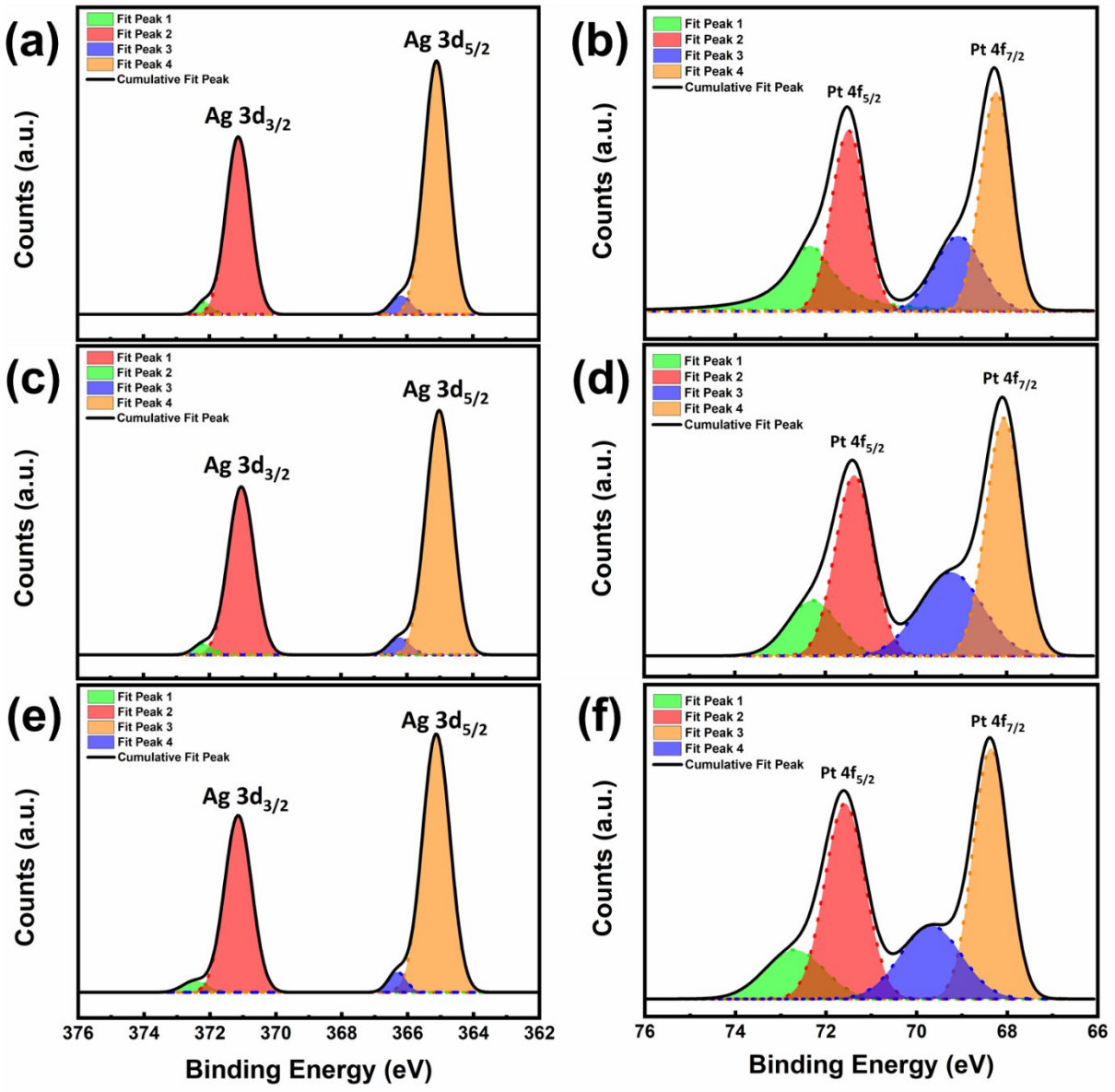

Figure S5. Fitted XPS spectra for Ag 3d and Pt 4f from Ag-Pt core-shell NWs after corresponding stability tests. (a) Ag and (b) Pt for 85% RH, (c) Ag and (d) Pt for 150 °C, (e) Ag and (f) Pt for H_2O_2.

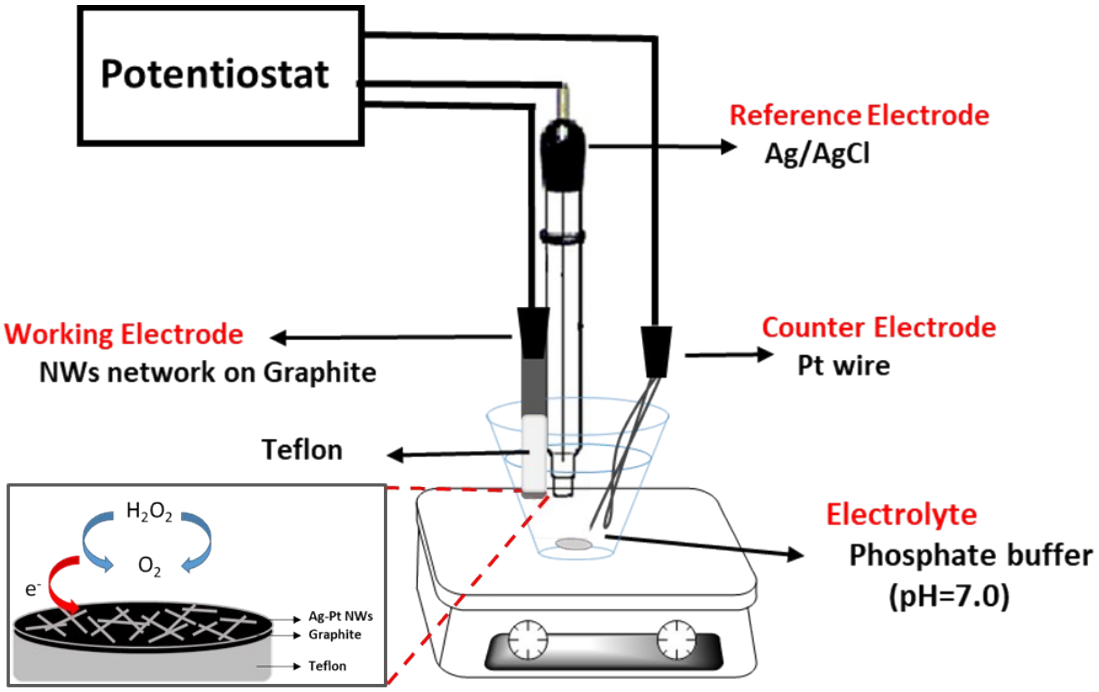

Figure S6. A schematic showing the configuration of the Ag-Pt core-shell NWs on graphite electrodes and three-electrode measurement setup used in this work.

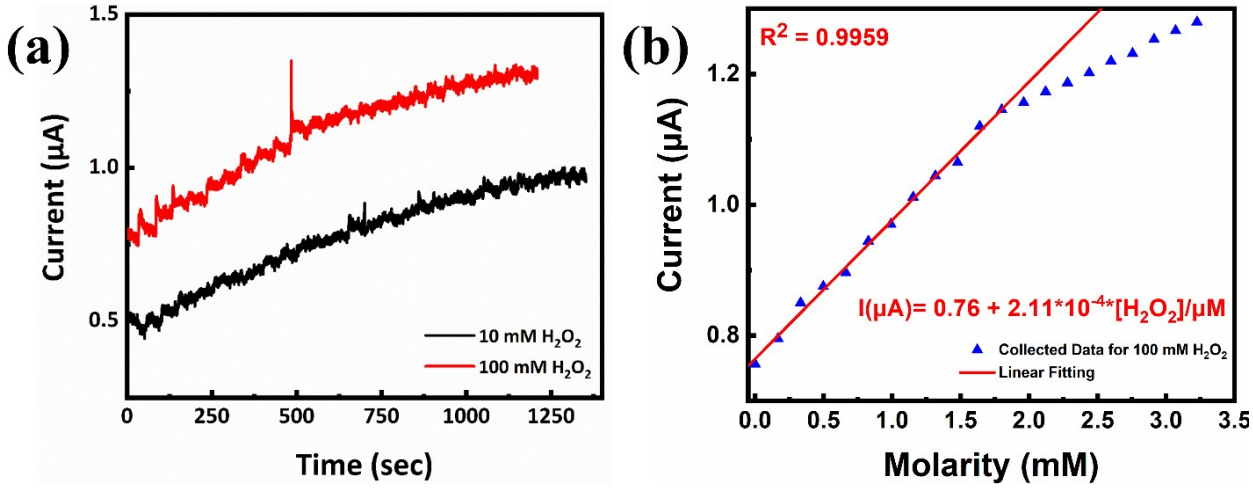

Figure S7. (a) Amperometric response of bare Ag NW electrode with the addition of 10 mM (black) and 100 mM (red) H_2O_2 to phosphate buffer at an applied potential of +0.8 V (vs. Ag/AgCl) (b) corresponding calibration plot for 10 mM H_2O_2 addition with linear regression equation concentration ranging from 756 to 1800 μM.

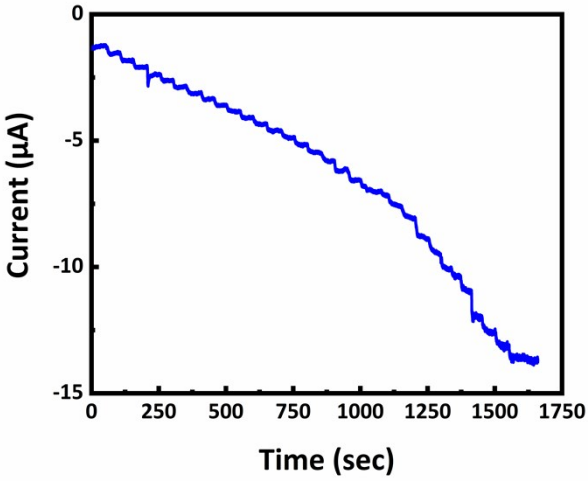

Figure S8. Amperometric response of Ag-Pt core-shell NWs electrode with the addition of 100 mM H_2O_2 to phosphate buffer at an applied potential of 0 V (vs. Ag/AgCl).

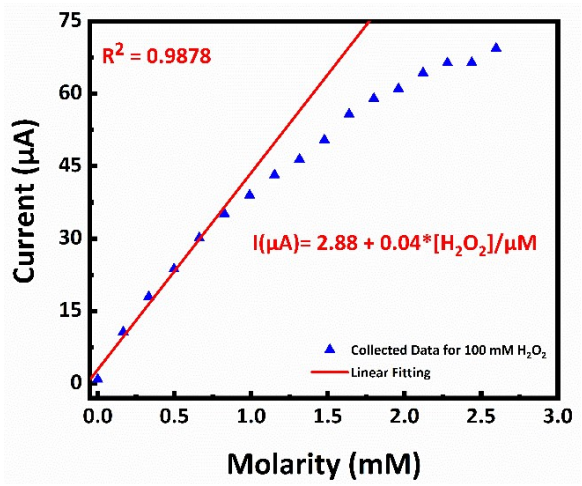

Figure S9. Calibration plot of Ag-Pt core-shell NWs electrode for the addition 100 mM H_2O_2 for concentrations ranging from 182 to 2597 μM.

The electrochemical active surface area (ECSA) of the Ag-Pt core-shell NWs electrode was calculated using Randles-Sevcik equation. Cycling voltammetry measurements with 10-25-50-75-100-200-300 mV/sec were followed using 3-electrode setup where Ag-Pt core-shell NWs on graphite, Pt wire and Ag/AgCl were used as working electrode, counter electrode and reference electrode, respectively. The electrolyte was prepared using 10 mM potassium ferrocyanide ($K_4[Fe(CN)_6]$) in 0.1 M potassium chloride (KCl) and the

potential window of CV was set to 0-0.6 V. The slope of peak current vs square root of scan rate was used in Randles-Sevcik equation which is shown below;

$$i_p = 2.686 \times 10^5 \times n^{3/2} \times A \times D^{1/2} \times C \times \vartheta^{1/2}$$

where, i is peak current (A)

n is number of electrons transferred

A is electrode area (cm^2)

D is Diffusion coefficient (cm^2/s) (6.5×10^{-6} cm^2/s for $K_4[Fe(CN)_6]$)

C is concentration (mol/cm^3)

ϑ is scan rate (V/s)

The ECSA of Ag-Pt core-shell NWs electrode was determined as 0.021 cm^2.