Supporting Information

Core-shell and alloy integrating PdAu bimetallic nanoplates on reduced graphene oxide for efficient and stable hydrogen evolution catalysts

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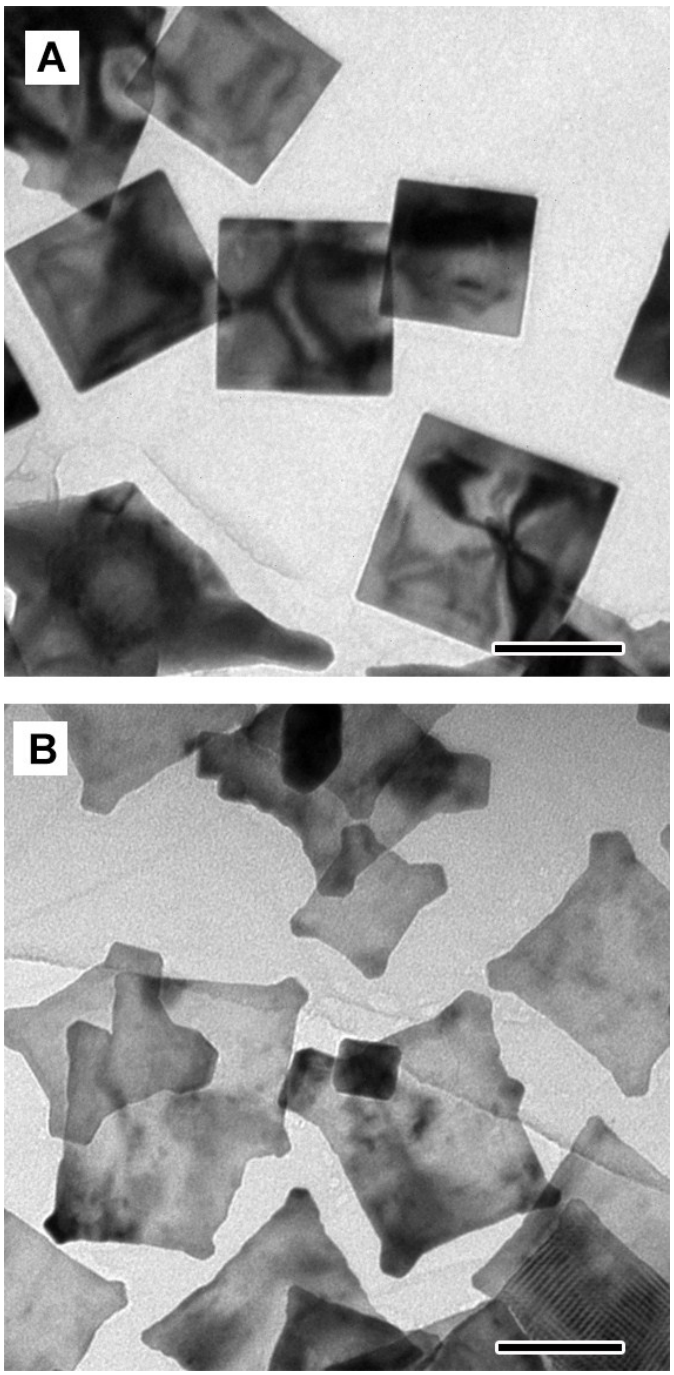

Fig. S1 TEM images of (A) PdAu@rGO-1 prepared using the standard procedure at a high injection rate of the Au precursor (e.g., 45 mL/min) (B) PdAu@rGO-2 prepared using the standard procedure at a slow injection rate of the Au precursor (e.g., 0.5 mL/min). The scale bars are 100 nm.

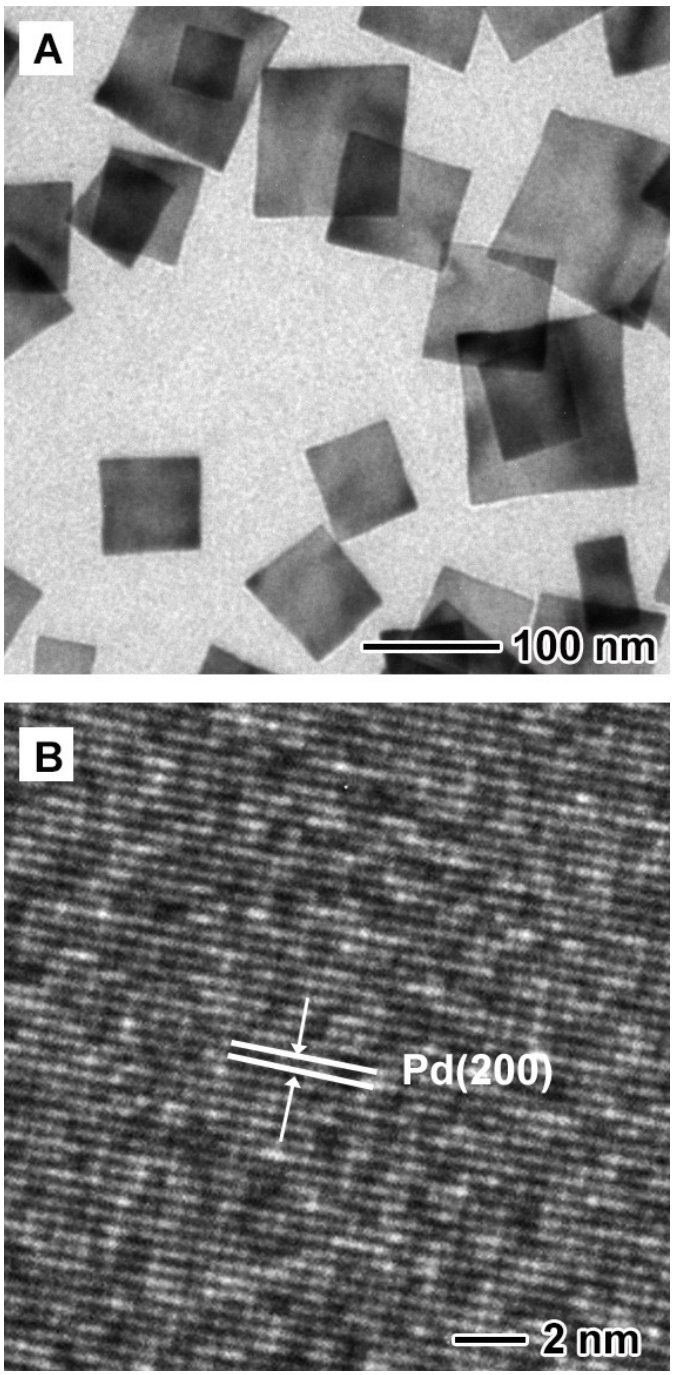

Fig. S2 (A) TEM and (B) HRTEM images of PdSP@rGO prepared using the standard procedure before $HAuCl_4$ being added.

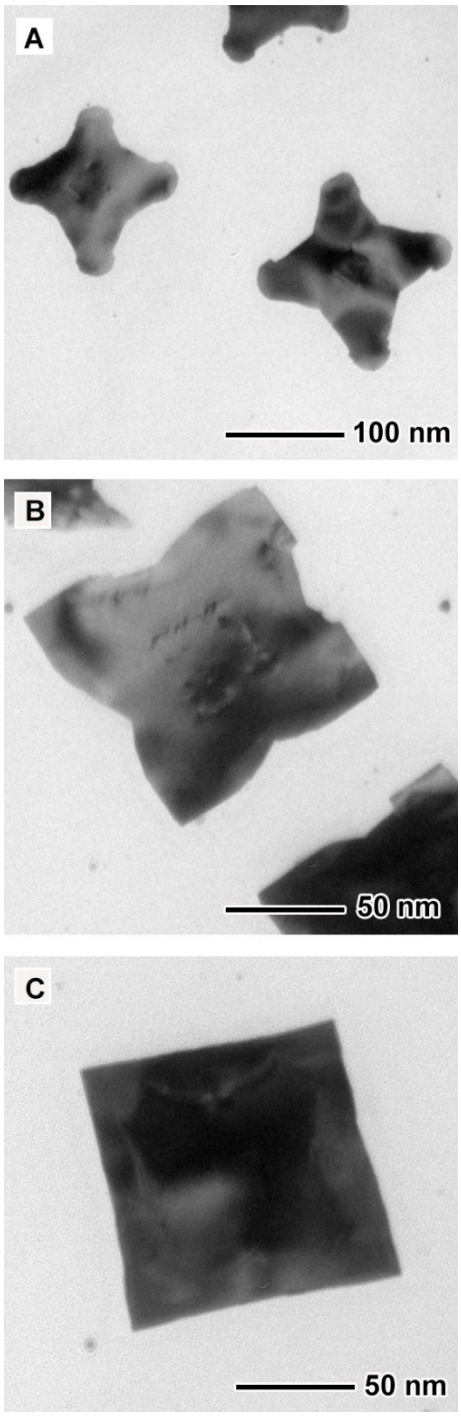

Fig. S3 TEM images of a series of samples for the synthesis of PdAu@rGO-1 at different reaction times after the injection of $HAuCl_4$ solution at a high rate: (A) 1, (B) 5, and (C) 10 min.

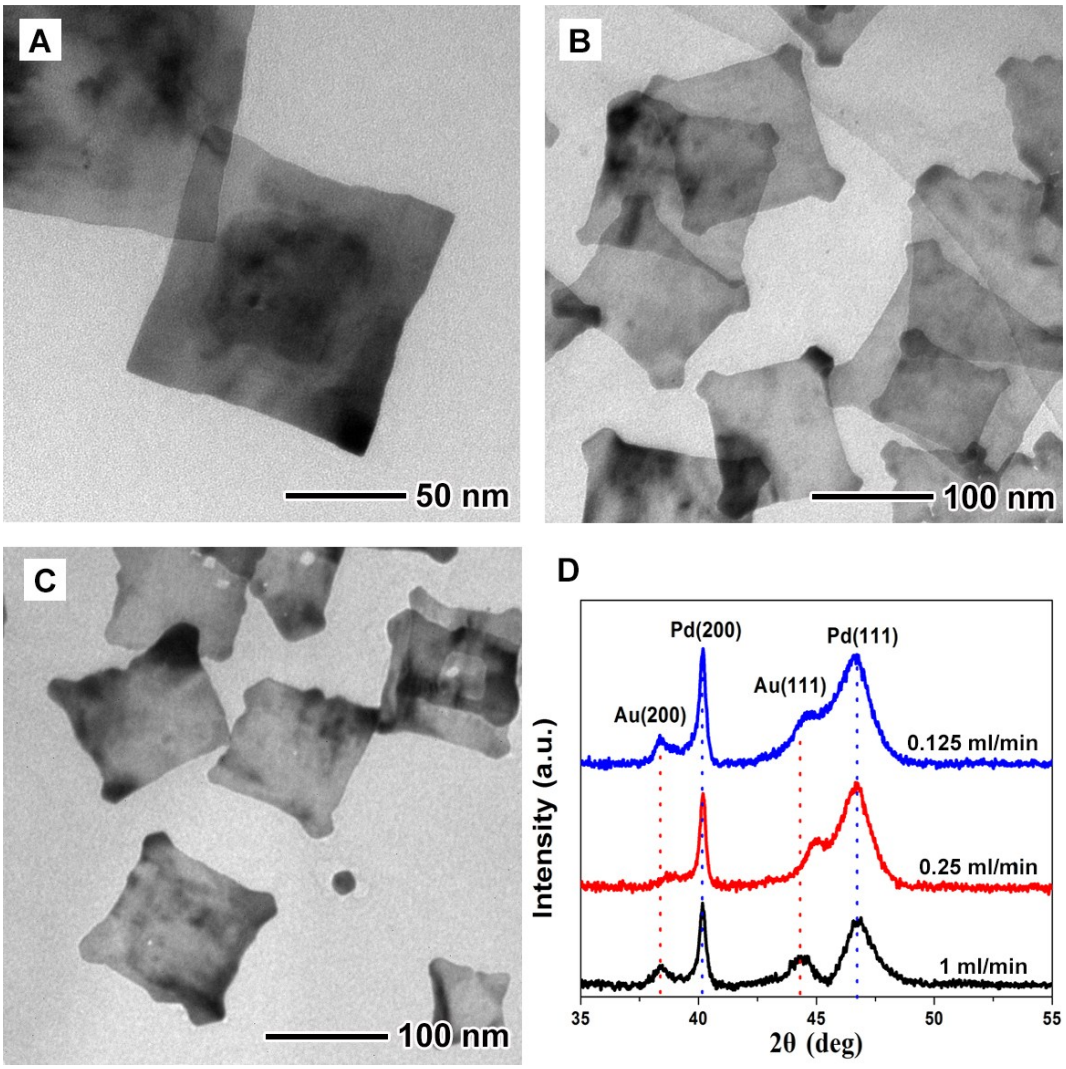

Fig. S4 TEM images of the samples prepared using the standard procedure by varying the injection rate of $HAuCl_4$: (A) 1, (B) 0.25, and (C) 0.125 mL/min. (D) The corresponding XRD patterns of these three samples.

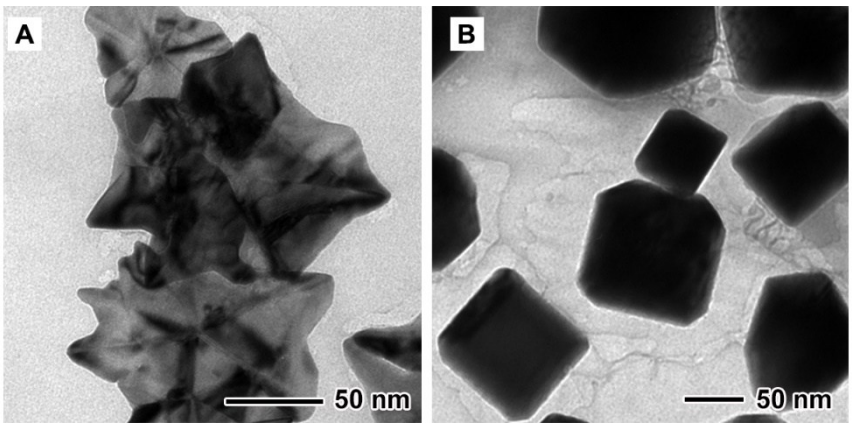

Fig. S5 PdAu bimetallic nanoplate synthesized by standard procedure of PdAu@rGO-1 with different molar ratio (A) 2:1 (B) 1:1.

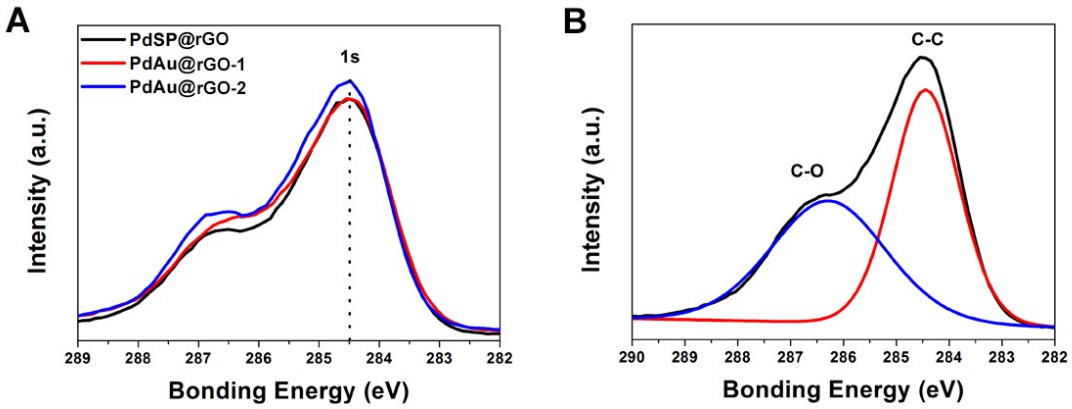

Fig. S6 (A) XPS spectra of the PdSP@rGO, PdAu@rGO-1 and PdAu@rGO-2 for C 1s orbital and (B) split XPS spectrum of C 1s orbital for the PdAu@rGO-1.

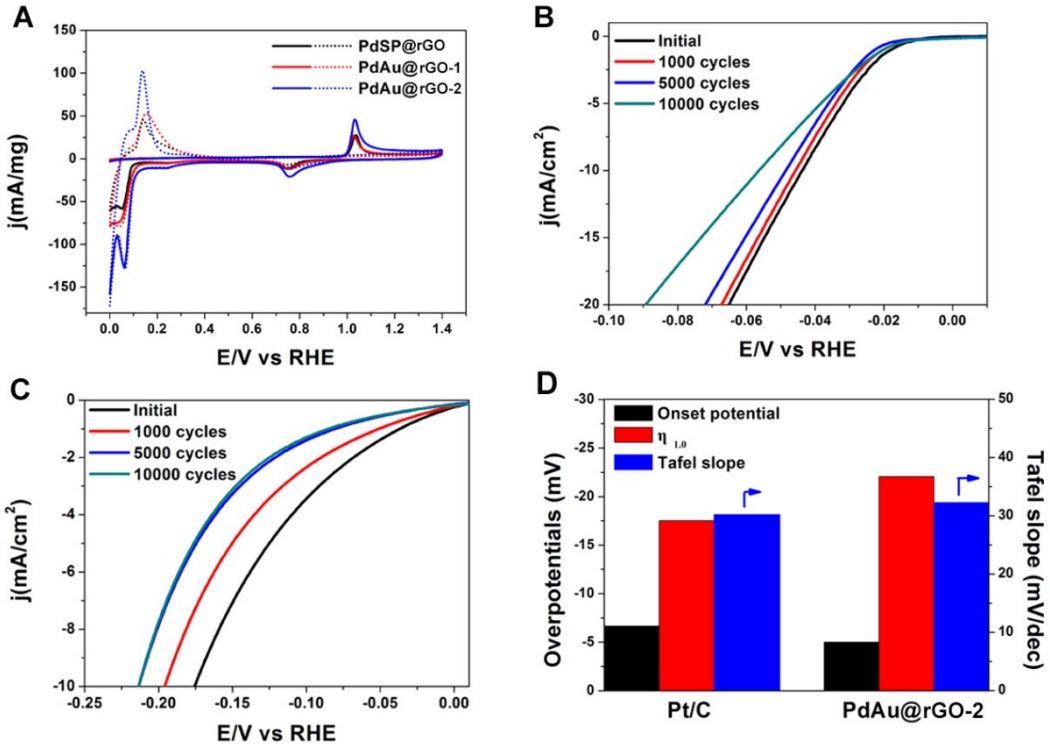

Fig. S7 (A) CO stripping curves for the PdSP@rGO, PdAu@rGO-1 and PdAu@rGO-2. The solid and dot lines represent the first and second cycle, respectively. LSV plots of (B) commercial Pt/C and (C) PdAu@rGO-1 after 1000, 5000, and 10000 CV cycles including the initial one. (D) changes of HER performance of Pt/C and PdAu@rGO-2 after 5000 CV cycles recorded in a 0.5 M H_2SO_4 electrolyte.

Table. S1 Summarized HER performance of commercial Pt/C, PdSP@rGO, PdAu@rGO-1 and PdAu@rGO-2

samples	Onset potential (mV)	Tafel slopes (mV/dec)	j_0 (mA/cm^2)	$\eta_{1.0}$ (mV)
Pt/C	6.68	30.23	0.75	17.51
PdSP@rGO	36.87	86.97	0.24	72.32
PdAu@rGO-1	14.1	55.77	0.38	35.32
PdAu@rGO-2	13.06	44.35	0.52	31.87

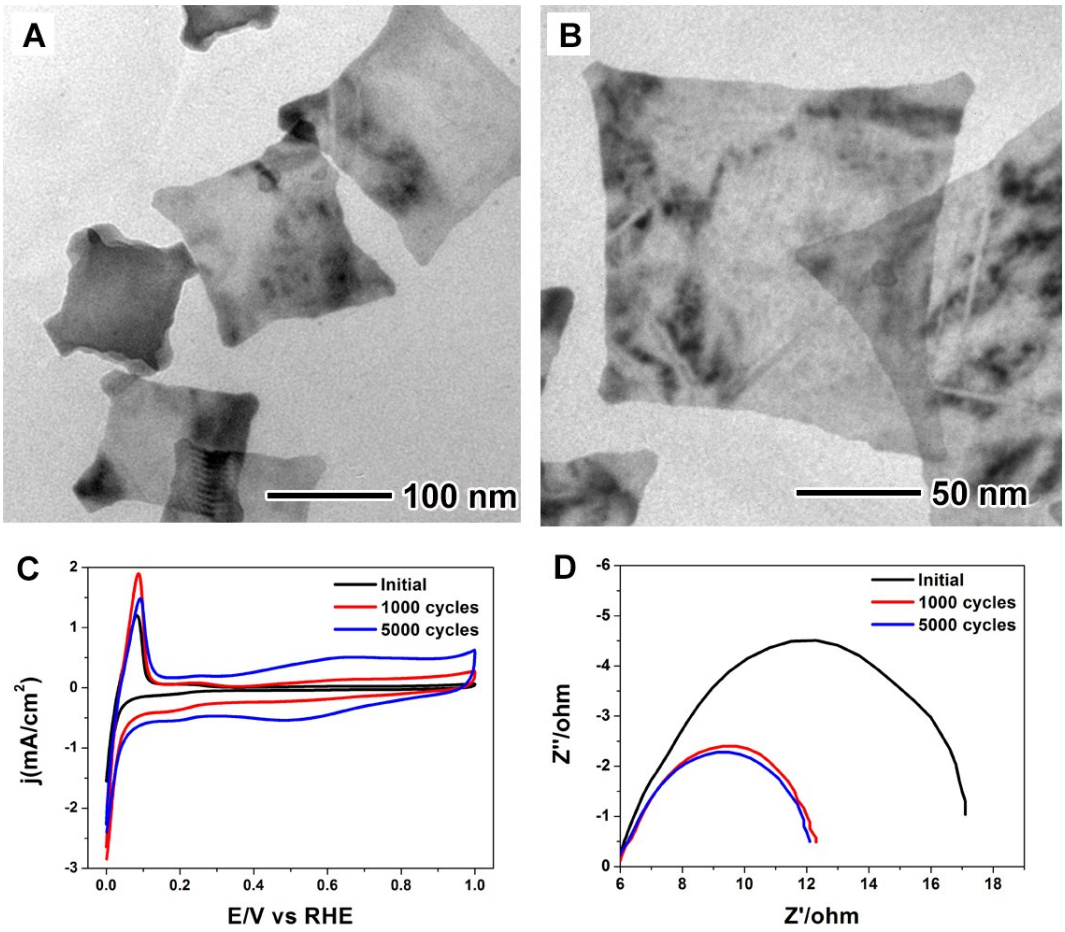

Fig. S8 TEM images of PdAu@rGO-2 after (A) 1000 and (B) 5000 CV cycles and the corresponding (C) CV and (D) EIS plots.