Electronic Supplementary Information

ZnO-Au-SnO_2 Z-scheme Photoanodes for Remarkable Photoelectrochemical Water Splitting

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Table S1. Fitting results for emission decay profiles of EY in the presence of different samples.

entry	A_1 (%)	τ_1 (ns)	A_2 (%)	τ_2 (ns)	$\langle\tau\rangle$ (ns)	χ^2	k_{ct} (s^{-1})
EY	19.40	16.42	80.60	2.26	11.27	1.006	-
EY/ZnO	16.64	15.01	83.36	1.83	10.01	1.040	0.11×10^8 (EY → ZnO)[a]
EY/SnO2	17.87	15.61	82.13	2.02	10.54	1.021	0.06×10^8 (EY → SnO_2)[a]
EY/Au	19.26	16.29	80.74	2.21	11.19	1.014	0.01×10^8 (EY → Au)[a]
EY/ZnO-Au	10.61	14.66	89.39	1.66	8.31	1.000	0.20×10^8 (ZnO → Au)[b]
EY/ZnO-Au-SnO2-1	1.82	14.44	98.18	1.35	3.52	1.010	1.78×10^8 (ZnO → Au → SnO_2)[c]
EY/ZnO-Au-SnO2-2	0.71	14.42	99.29	1.31	2.26	1.006	3.36×10^8 (ZnO → Au → SnO_2)[c]
EY/ZnO-Au-SnO2-3	2.93	14.49	97.07	1.44	4.48	1.013	1.17×10^8 (ZnO → Au → SnO_2)[c]

[a]The value was calculated by the expression

$k_{\mathrm{ct}}(\mathrm{EY}\rightarrow\mathrm{A}) = \frac{1}{\langle\tau\rangle}(\mathrm{EY/A}) - \frac{1}{\langle\tau\rangle}(\mathrm{EY})$, where A = ZnO, SnO_2 or Au.

[b]The value was calculated by the expression

$k_{\mathrm{ct}}(\mathrm{ZnO}\rightarrow\mathrm{Au}) = \frac{1}{\langle\tau\rangle}(\mathrm{EY/ZnO-Au}) - \frac{1}{\langle\tau\rangle}(\mathrm{EY/ZnO}) - \mathrm{k_{ct}}(\mathrm{EY}\rightarrow\mathrm{Au})$.

[c]The value was calculated by the expression

$$k_{\mathrm{ct}}(\mathrm{ZnO}\rightarrow\mathrm{Au}\rightarrow\mathrm{SnO_2}) = \frac{1}{\langle\tau\rangle}(\mathrm{EY/ZnO-Au-SnO_2}) - \frac{1}{\langle\tau\rangle}(\mathrm{EY}) - k_{ct}(\mathrm{EY}\rightarrow\mathrm{ZnO}) - k_{ct}(\mathrm{EY}\rightarrow\mathrm{SnO_2})$$

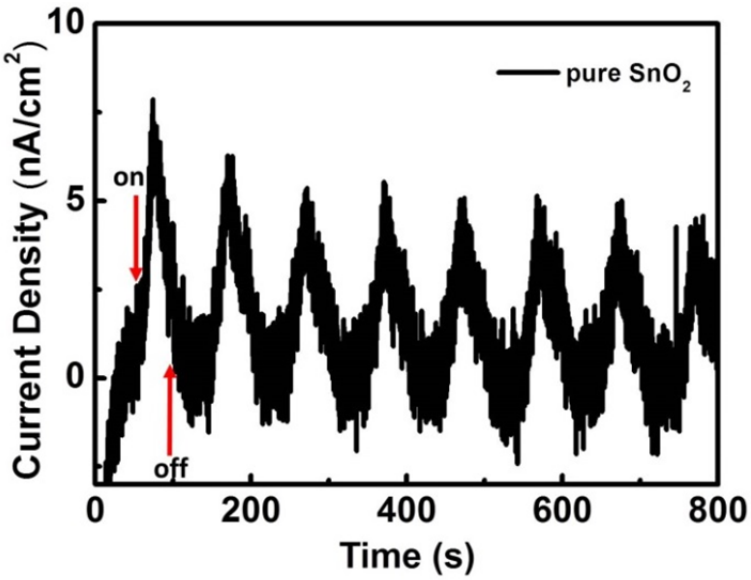

Figure S1. Chronoamperomertic *I*-t curve of pure SnO_2 collected at 0 V vs. Ag/AgCl under chopped light illumination.

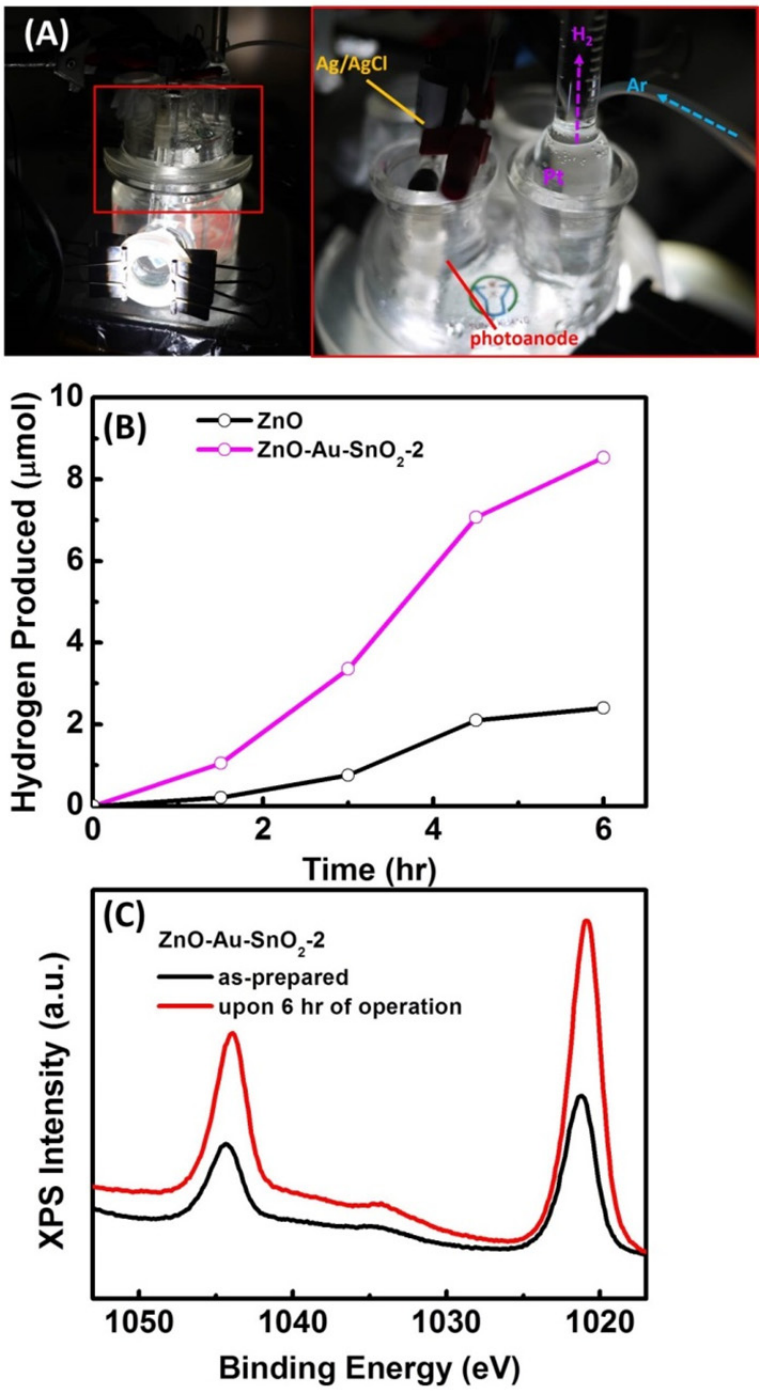

Figure S2. (A) PEC cell configuration for hydrogen evolution measurement. (B) Hydrogen production for pristine ZnO and ZnO-Au-SnO_2-2 recorded in the PEC cell. (C) XPS spectra of ZnO-Au-SnO_2-2 before and after 6 hr of PEC measurement. The Zn 2p signals were consistent with the presence of ZnO with the binding energy of 1021 and 1044 eV for Zn $2p_{1/2}$ and Zn $2p_{3/2}$, respectively.