

Supplementary Materials

Enhanced Hydrogen Production from Ethanol Photoreforming by Site-Specific Deposition of Au on Cu₂O/TiO₂ p-n Junction

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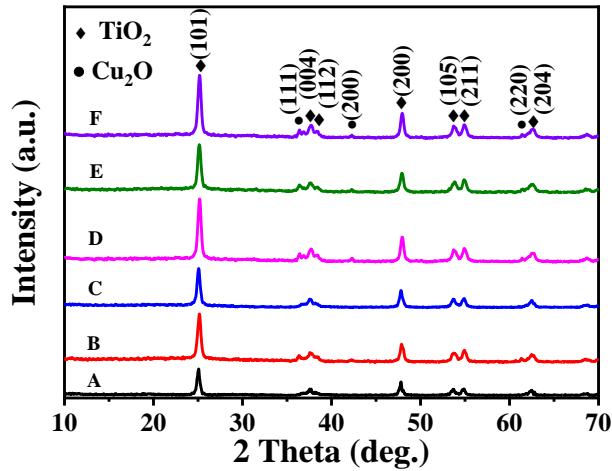


Figure S1. XRD patterns of (A) TiO₂, (B) Cu₂O/TiO₂, (C) Au@TiO₂, (D) Au@Cu₂O/TiO₂, (E) Au@TiO₂/Cu₂O@Au, (F) Au@TiO₂/Cu₂O.

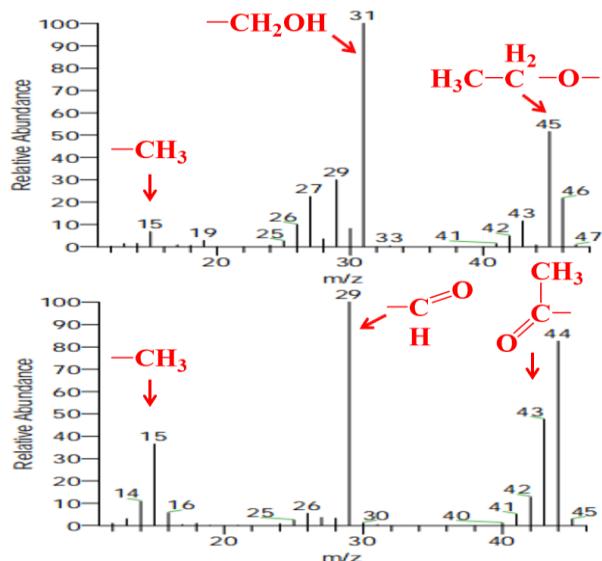


Figure S2. GC-MS spectra of the products formed on Au@TiO₂/Cu₂O.

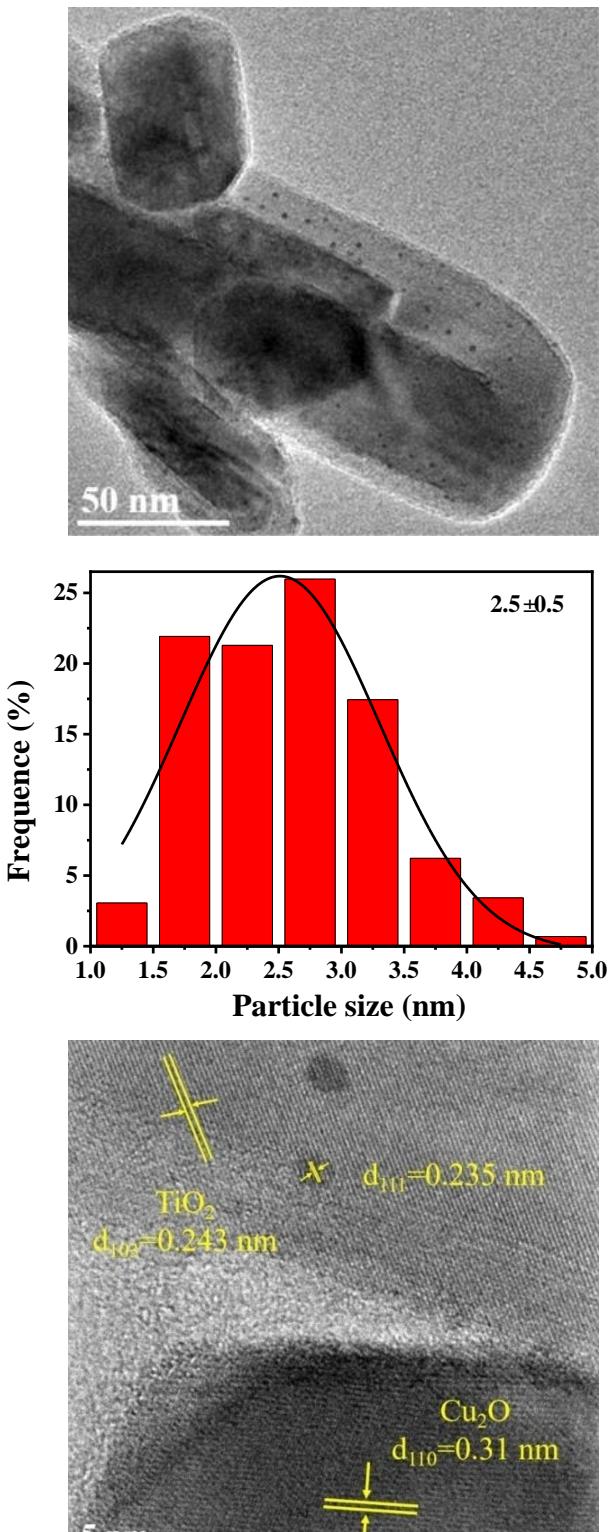


Figure S3. HRTEM photographs and Au particle size distribution of $\text{Au}@\text{TiO}_2/\text{Cu}_2\text{O}$ after ethanol photoreforming.

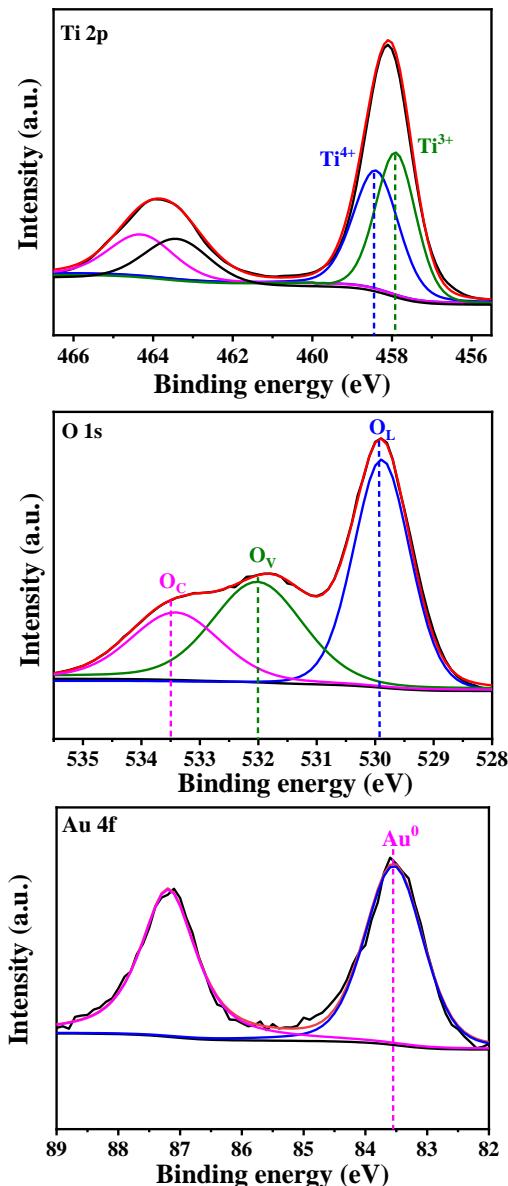


Figure S4. Ti 2p, O 1s and Au 4f XPS spectra of Au@TiO₂/Cu₂O after ethanol photoreforming.

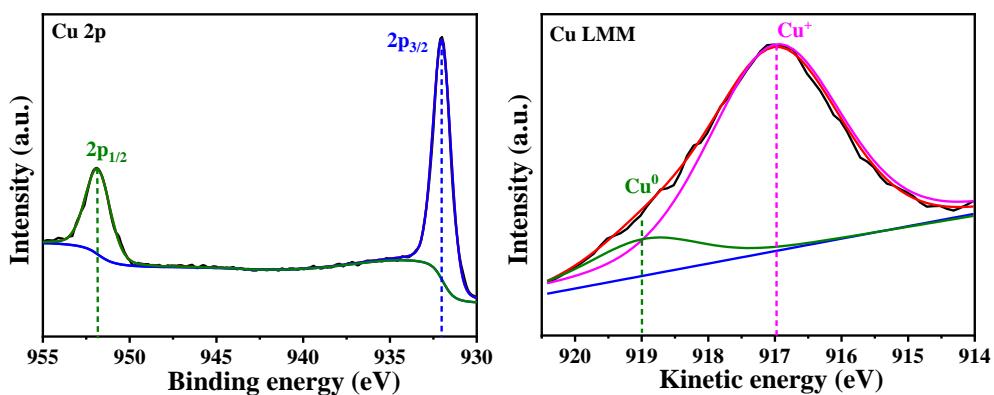
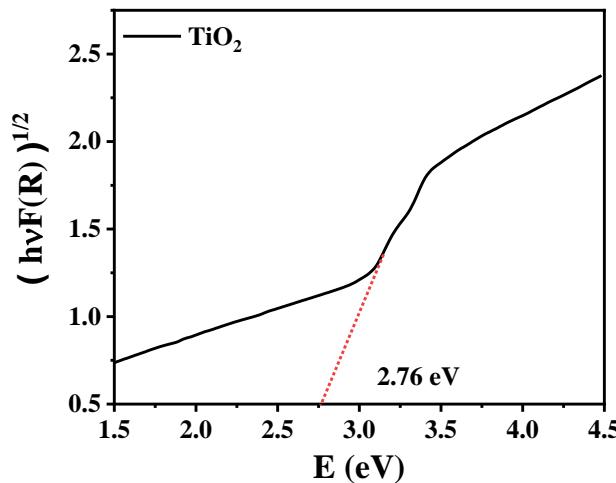


Figure S5. Cu 2p XPS and Cu LMM Auger spectra of Au@TiO₂/Cu₂O after ethanol photoreforming.

**Figure S6.** Bandgap estimation of TiO_2 nanorods.**Table S1.** Ti 2p XPS analyses of $\text{Au@TiO}_2/\text{Cu}_2\text{O}$ before and after ethanol photoreforming.

	B.E. in $2\text{p}_{3/2}$ (eV)		B.E. in $2\text{p}_{1/2}$ (eV)		$\text{Ti}^{3+}/\text{Ti}^{4+}$ ratio ^a
	Ti^{3+}	Ti^{4+}	Ti^{3+}	Ti^{4+}	
Before	457.9	458.3	463.3	464.2	0.96/1
After	457.9	458.3	463.3	464.2	0.97/1

^a The value refers to the ratio of the respective integral peak area. B.E. refers to binding energy.

Table S2. O 1s XPS analyses of $\text{Au@TiO}_2/\text{Cu}_2\text{O}$ before and after ethanol photoreforming.

	B.E. (eV)			Ov/O_L ratio ^a
	O_L	Ov	O_C	
Before	530.0	532.0	533.5	0.71
After	530.0	532.0	533.5	0.70

^a The value refers to the ratio of the respective integral peak area. B.E. refers to binding energy.

Table S3. Au 4f XPS analyses of $\text{Au@TiO}_2/\text{Cu}_2\text{O}$ before and after ethanol photoreforming.

	B.E. (eV)	$\Delta\text{B.E. (eV)}$ ^a
Before	83.4	-
After	83.5	+0.1

^a The value refers to the shift compared to that of $\text{Au@TiO}_2/\text{Cu}_2\text{O}$ before the reaction. B.E. refers to binding energy.

Table S4. Comparisons of Photocatalysts for Ethanol Photoreforming.

photocatalysts	light source	H ₂ (μmol g _{cat} ⁻¹ h ⁻¹)	CH ₃ CHO (μmol g _{cat} ⁻¹ h ⁻¹)	ref.
1.0% Au/TiO ₂	simulated solar light (100 mW cm ⁻²)	6151	6522	1
MWCNT/Pd@TiO ₂	Xe lamp (150 W)	1500		2
dye/Pt/TiO ₂	visible light ($\lambda > 420$ nm)	4359		3
Si/Au/TiO ₂	Xe lamp (300 W)	5143		4
Pt _{0.5} –Au _{0.5} /TiO ₂	Xe lamp (150 W)	1800		5
Au@TiO ₂ /Cu ₂ O	simulated solar light (100 mW cm ⁻²)	8548	8806	this work

References

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