Supporting Information

Promoting CO_2 electroreduction to CO by a graphdiyne stabilized Au nanoparticles catalyst

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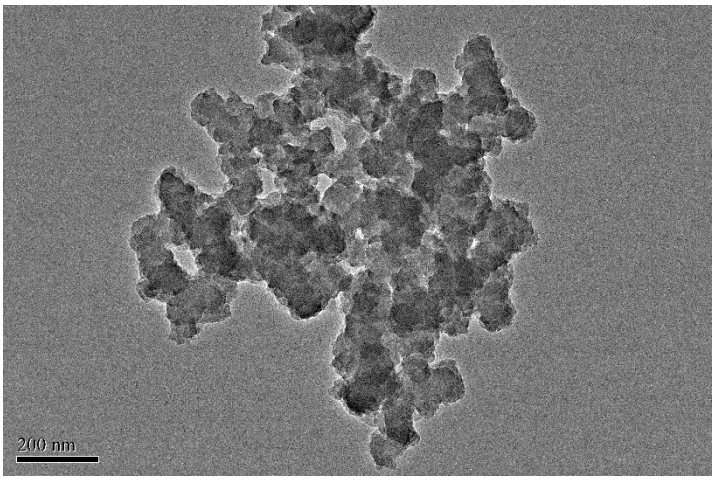

Figure S1. TEM image of GDY.

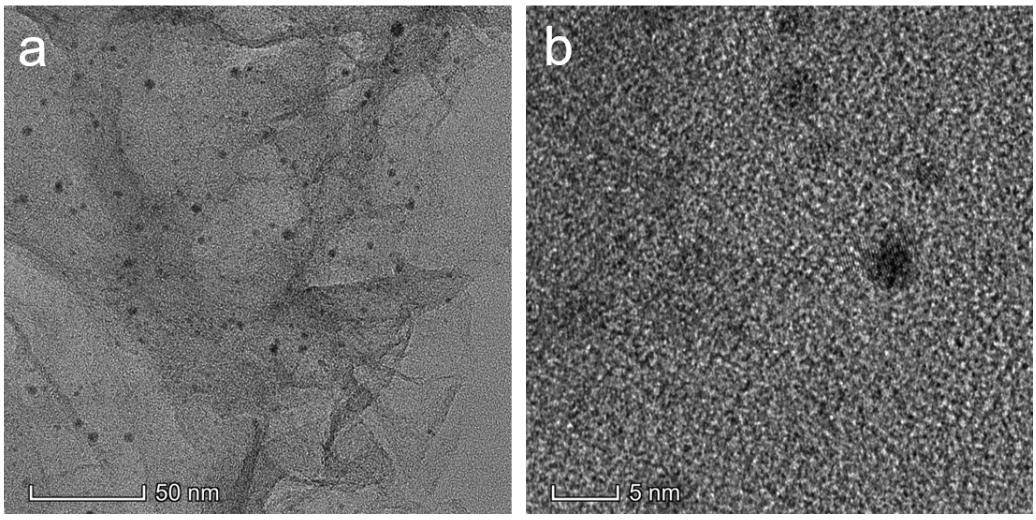

Figure S2. (a)TEM and (b) HRTEM images of Au/GO composite.

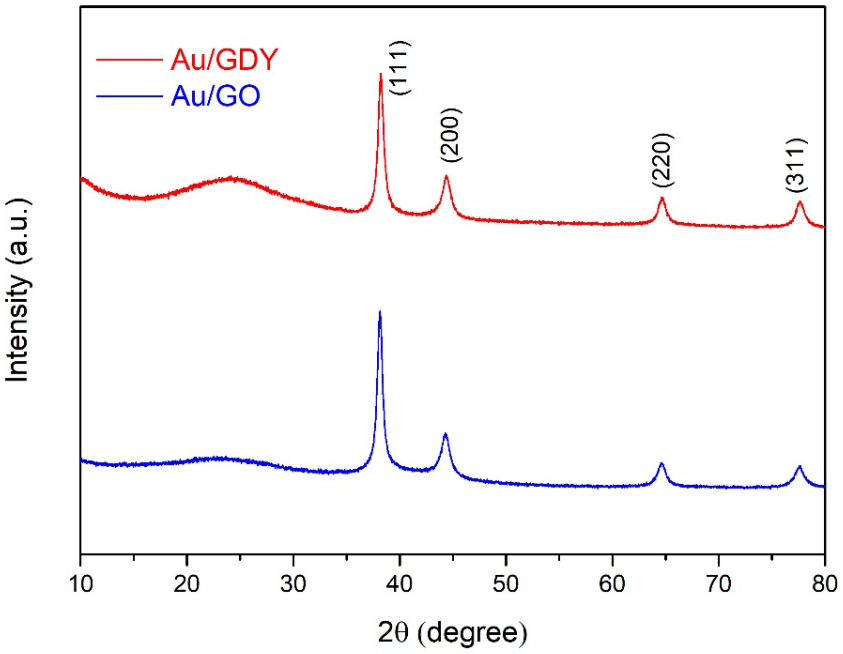

Figure S3. XRD patterns for Au/GDY and Au/GO.

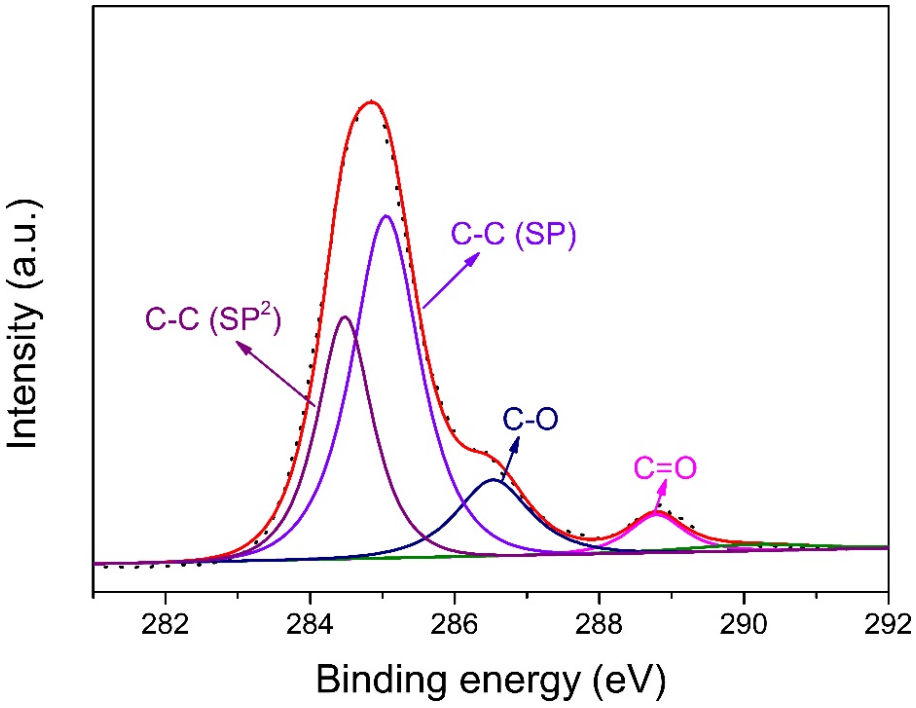

Figure S4. High-resolution XPS spectra of C 1s for GDY.

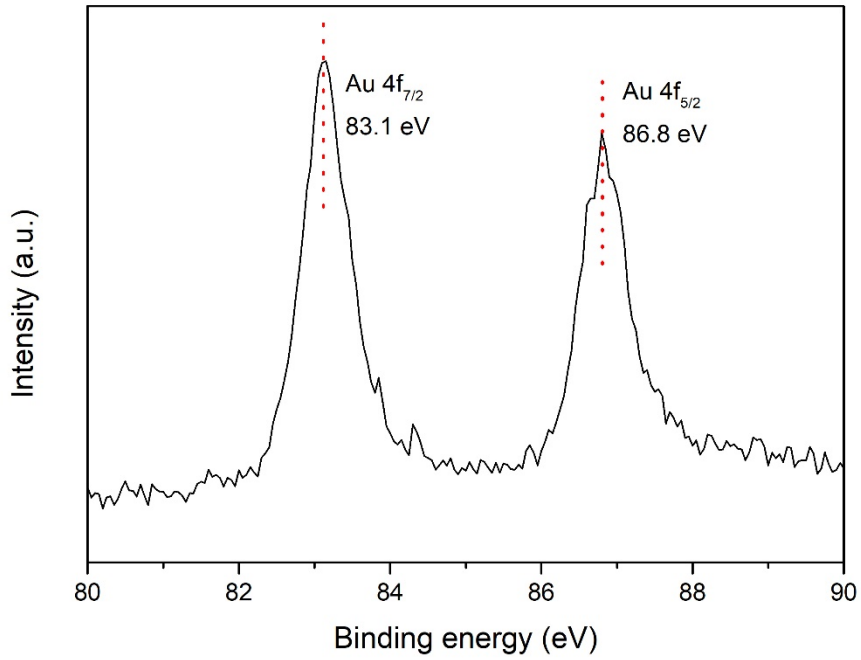

Figure S5. High-resolution XPS spectra of Au 4f for Au/GO

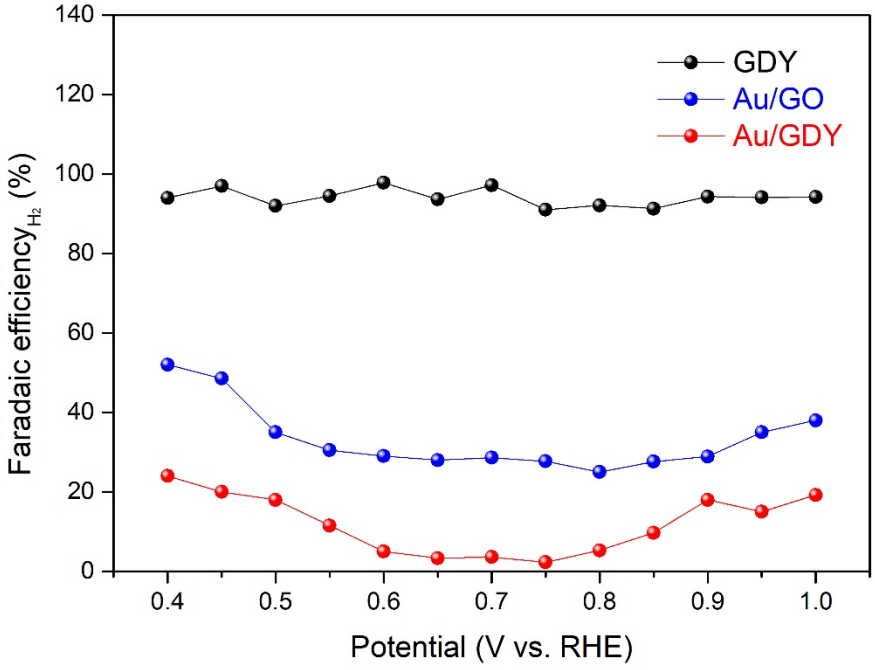

Figure S6. FE_{H_2} of GDY, Au/GO and Au/GDY

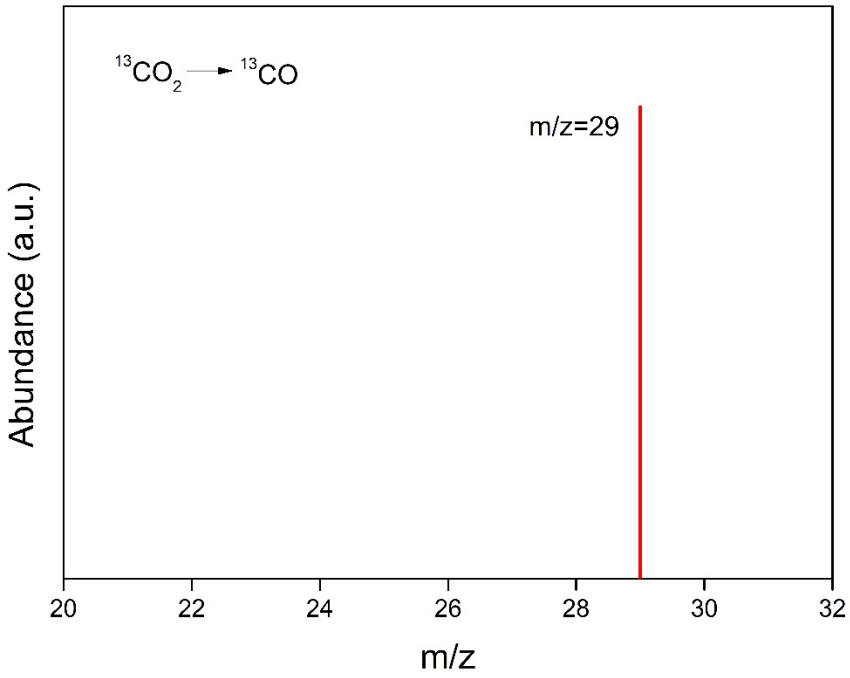

Figure S7. GC-MS result of ^{13}CO produced over Au/GDY from $^{13}CO_2$ isotope experiment

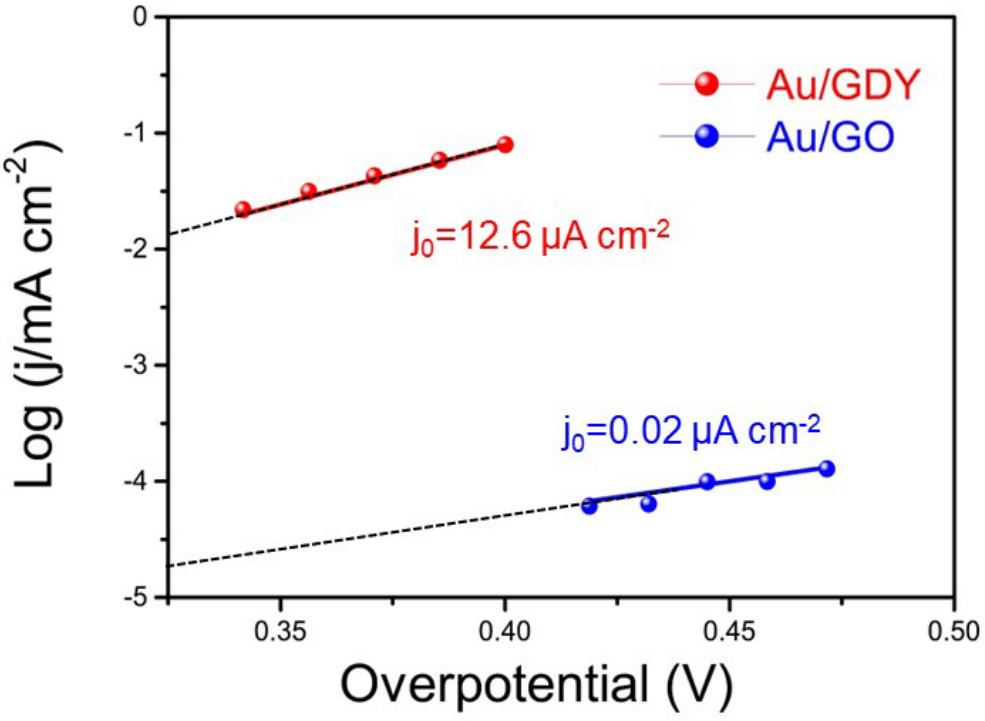

Figure S8. Exchange current density (j_0) of Au/GDY and Au/GO

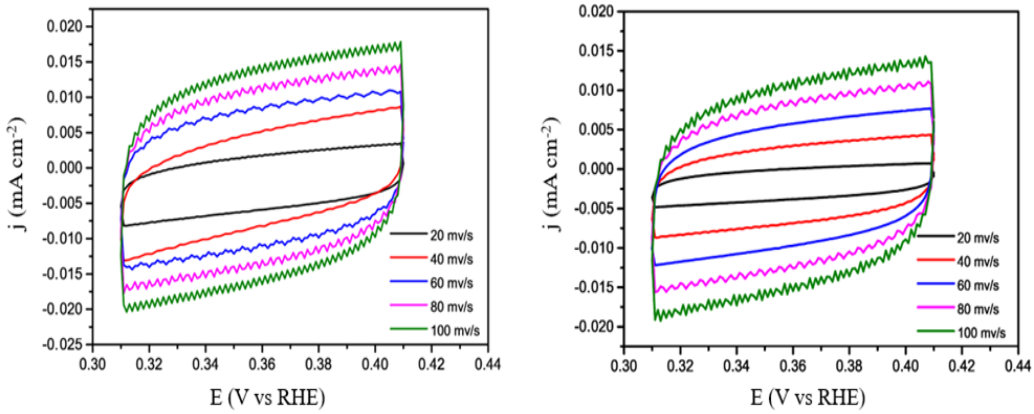

Figure S9. Typical cyclic voltammograms at different scan rates. Au/GDY (left) and Au/GO (right) with scan rates ranging from 20 mV s^{-1} to 100 mV s^{-1}.

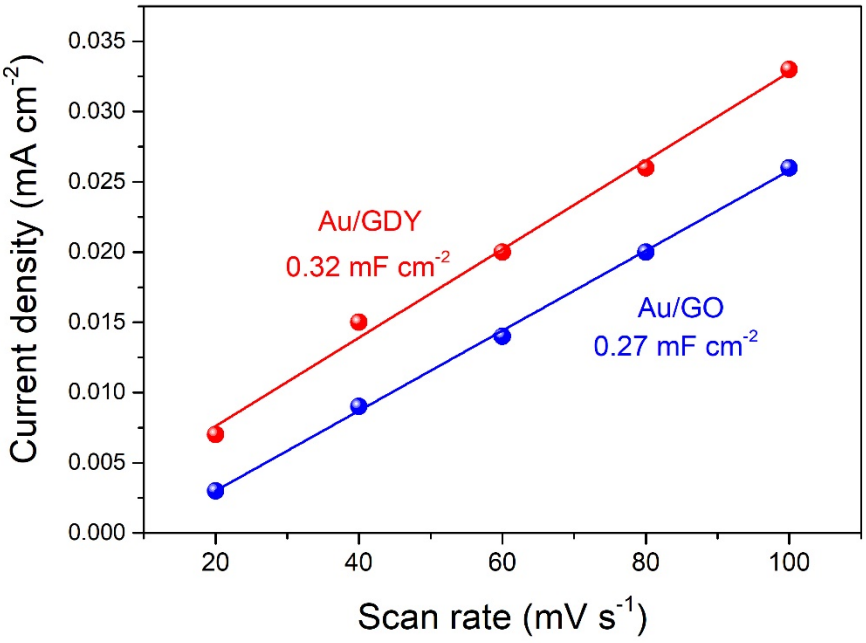

Figure S10. The capacitive currents as a function of scan rates

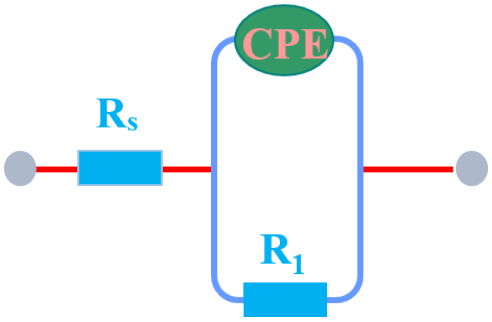

Figure S11. The equivalent circuit model of Au/GDY

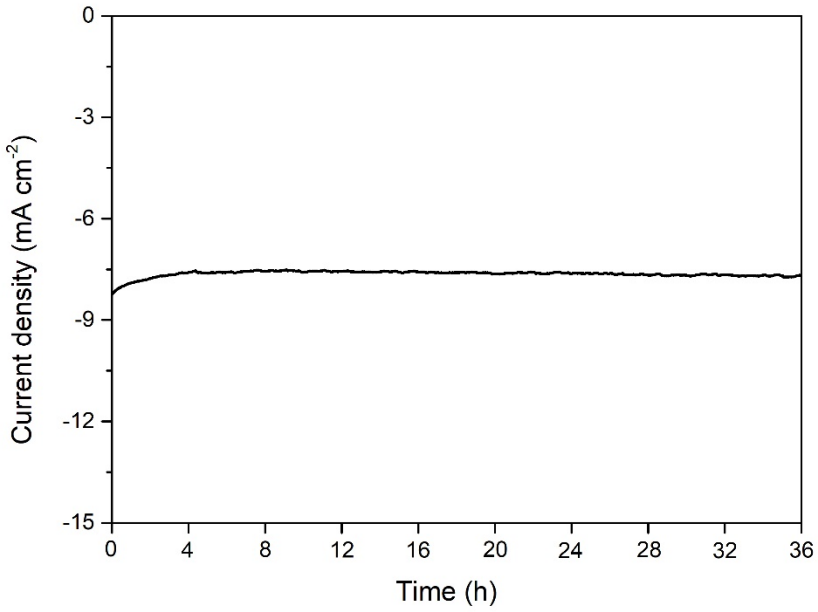

Figure S12. The time-dependent current density curve of Au/GDY at −0.75 V

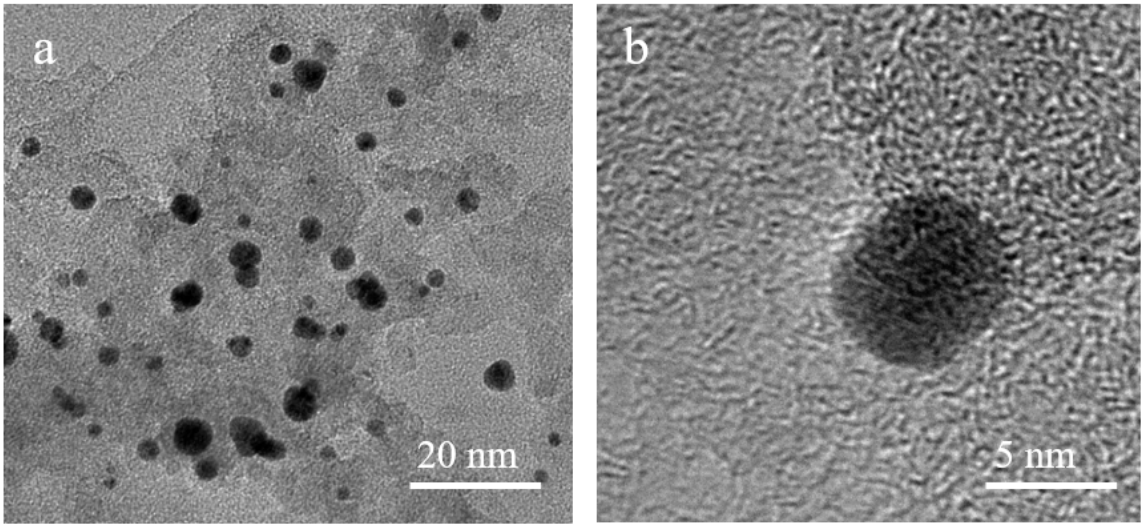

Figure S13. TEM images of Au/GDY after stability test

Table S1. Au loading and ECSA for Au/GDY and Au/C

	Au/GDY	Au/C
Au (wt.%)	28	25

Table S2. Summary of Au electrocatalysts studied for electrochemical reduction of CO_2 to CO

Catalyst	Electrolyte	Potential (V vs. RHE)	FE $_{CO}$	j_{co} (mA cm^{-2})	Ref
Au/GDY	0.5 M $KHCO_3$	-0.75	94.6%	16	This work
Au-CeOx/C	0.1 M $KHCO_3$	-0.59	72%	12.9	[1]
NGQDs-SCAu	0.5 M $KHCO_3$	-0.65	91%	~11.4	[2]
Au-C_3N_4	0.5 M $KHCO_3$	-0.6	91%	~9	[3]

Au-CDots-C_3N_4	0.5 M $KHCO_3$	-0.6	75%	4.8	[4]
Au-2@CN	0.5 M $KHCO_3$	-0.58	88%	1.06	[5]
8 nm Au NPs	0.5 M $KHCO_3$	-0.67	90%	NA	[6]
Au-Cb NPs	0.1 M $KHCO_3$	-0.57	83%	~9.5	[7]
AuNPs/GDL	0.5 M $NaHCO_3$	-0.55	77%	~11.6	[8]
AuNP GNR	0.5 M $NaHCO_3$	-0.57	90%	NA	[9]
Au/Py-CNTs-O	0.1 M $KHCO_3$	-0.58	93%	~6.5	[10]

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