Electronic Supplementary Material (ESI) for RSC Advances.

Au-based bimetallic catalysts: how the synergy between two metals affects their catalytic activity

Jin Sha[a], Sébastien Paul[a], Franck Dumeignil[a] and Robert Wojcieszak[a]*

Supporting Information

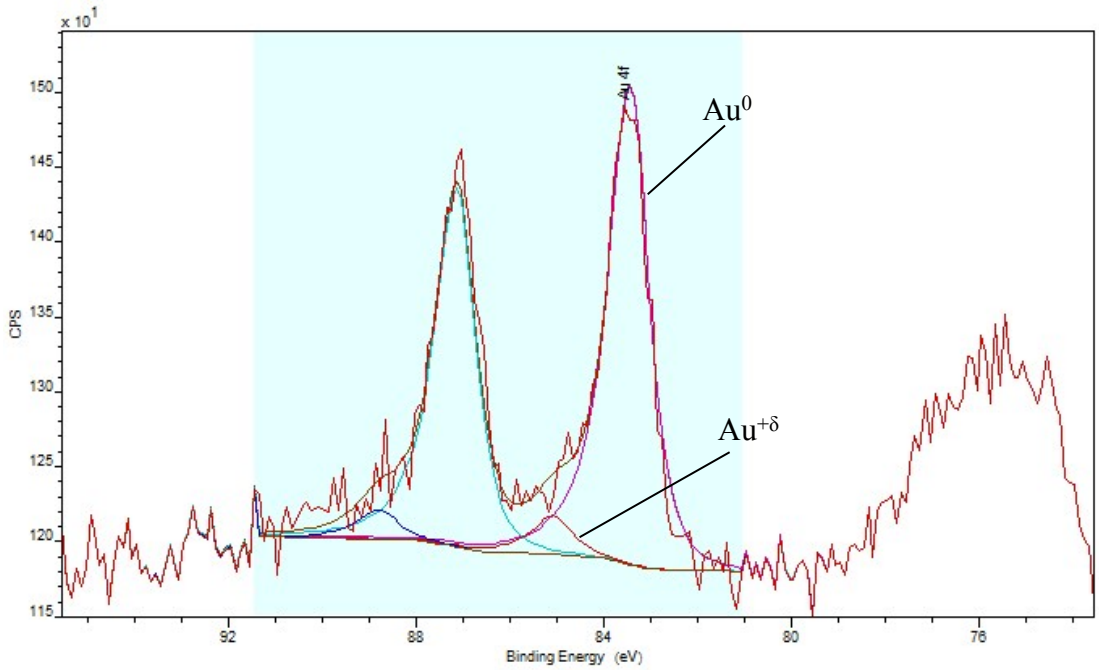

Figure S1 XPS curves of the Au 4f photoelectron peak and its fitting in the 0.3%Au0.7%Cu/TiO_2 catalyst

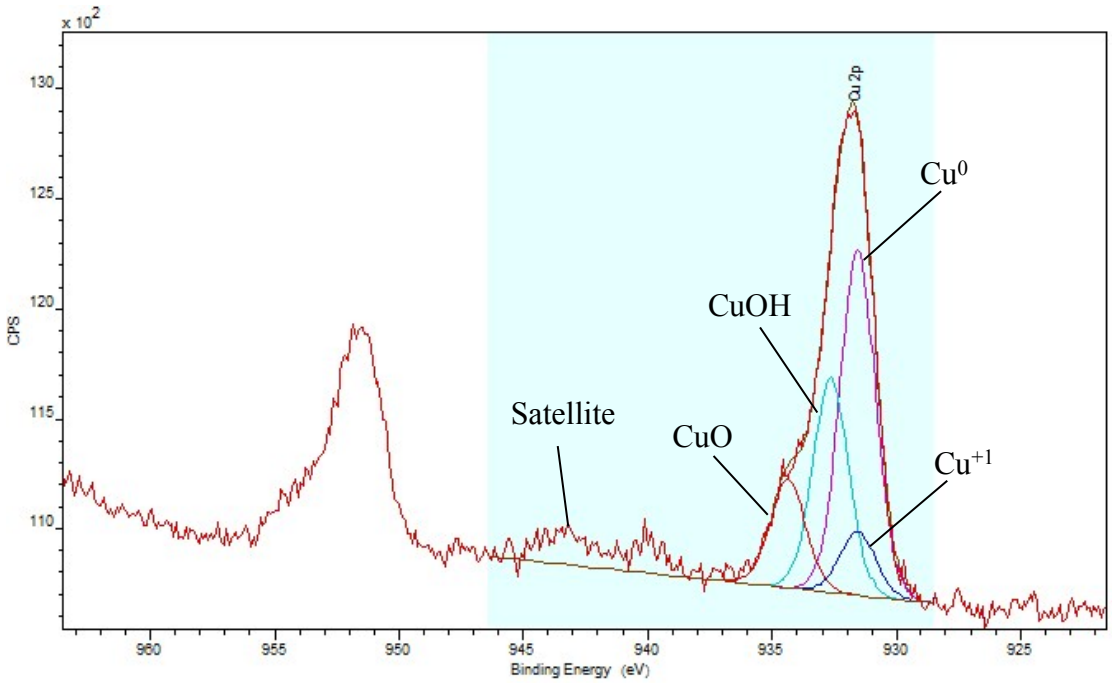

Figure S2 XPS curves of the Cu 2p photoelectron peak and its fitting in the 0.3%Au0.7%Cu/TiO_2 catalyst

Table S1 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Pd supported on TiO_2 prepared by SIM method at 60˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
1%Au	7.4	52.9	0	0	96.2
0.9%Au0.1%Pd	12.4	73.0	0	0	96.3
0.7%Au0.3%Pd	13.8	75.8	0	0	96.3
0.5%Au0.5%Pd	11.0	71.8	0	0	96.7
0.3%Au0.7%Pd	2.6	71.8	0	0	98.9
0.1%Au0.9%Pd	4.3	38.8	0	0	97.0
1%Pd	1.2	35.3	0	0	98.9

Reaction conditions: 2 mL 1wt.% of glucose aqueous solution, 1wt.% bimetallic catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.

Table S2 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Pd supported on TiO_2 prepared by SIM method at 80˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
1%Au	39.9	74.3	0	0	89.8
0.9%Au0.1%Pd	41.1	74.7	0	0	89.6
0.7%Au0.3%Pd	48.6	75.6	0	0	88.1
0.5%Au0.5%Pd	52.7	75.3	0	0	87.0
0.3%Au0.7%Pd	22.0	72.3	0	0	93.9
0.1%Au0.9%Pd	9.5	47.6	0	0	95.0
1%Pd	3.8	53.6	0	0	98.2

Reaction conditions: 2 mL 1wt.% glucose aqueous solution, 1wt.% bimetallic catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.

Table S3 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Pd supported on TiO_2 prepared by SIM method at 100˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
1%Au	100.0	61.5	0	6.6	66.5
0.9%Au0.1%Pd	86.3	68.4	0	7.9	79.6
0.7%Au0.3%Pd	100.0	66.5	0	6.8	72.2
0.5%Au0.5%Pd	100.0	64.4	0	6.4	68.6
0.3%Au0.7%Pd	85.5	65.6	0	7.1	76.6
0.1%Au0.9%Pd	43.0	58.7	0	9.2	86.2
1%Pd	13.5	53.6	0	13.2	95.5

Reaction conditions: 2 mL 1wt.% glucose aqueous solution, 1wt.% bimetallic catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.

Table S4 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Cu supported on TiO_2 prepared by PR method at 60˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
0.9%Au0.1%Cu	14.8	58.1	0	0	94.3
0.7%Au0.3%Cu	13.6	46.2	0	0	92.7
0.5%Au0.5%Cu	21.7	44.8	0	0	88.3
0.3%Au0.7%Cu	18.0	36.2	0	0	88.5
0.1%Au0.9%Cu	17.1	6.4	0	0	83.7
1%Cu	1.5	0	0	0	97.9

Reaction conditions: 2 mL 1wt.% glucose aqueous solution, 1wt.% catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.

Table S5 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Cu supported on TiO_2 prepared by PR method at 80˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
0.9%Au0.1%Cu	61.7	64.8	0	0	78.3
0.7%Au0.3%Cu	44.7	61.7	0	0	82.9
0.5%Au0.5%Cu	47.7	61.2	0	0	81.5
0.3%Au0.7%Cu	30.4	58.2	0	0	87.3
0.1%Au0.9%Cu	10.2	43.2	0	0	94.2
1%Cu	3.7	0.0	0	0	96.5

Reaction conditions: 2 mL 1wt.% glucose aqueous solution, 1wt.% catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.

Table S6 Oxidation of glucose over a series of mono- and bi-metallic catalysts containing Au and Cu supported on TiO_2 prepared by PR method at 100˚C

Catalyst	Glucose Conversion %	Gluconic acid Select%	Glucuronic acid Select%	Fructose Select%	Carbon Balance
0.9%Au0.1%Cu	100.1	58.4	0	6.1	60.3
0.7%Au0.3%Cu	101.7	58.0	0	5.9	63.3
0.5%Au0.5%Cu	104.5	58.1	0	5.4	61.9
0.3%Au0.7%Cu	92.3	57.2	0	5.4	65.5
0.1%Au0.9%Cu	35.5	48.0	0	7.0	84.1
1%Cu	9.8	0	0	13.1	93.0

Reaction conditions: 2 mL 1wt.% glucose aqueous solution, 1wt.% catalyst (21.9 mg), air pressure = 5 bar, 5 h of reaction.