

Supporting Information

Engineering Two-Dimensional Nanobranched Architecture in PdAuAg for Enhanced Ethanol Electrooxidation

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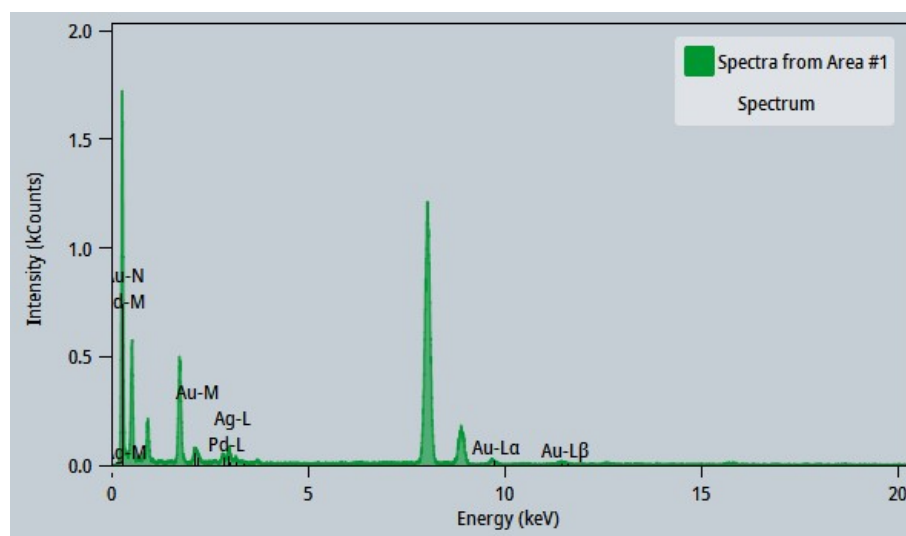


Figure S1. EDS spectrum of 2D PdAuAg NBs.

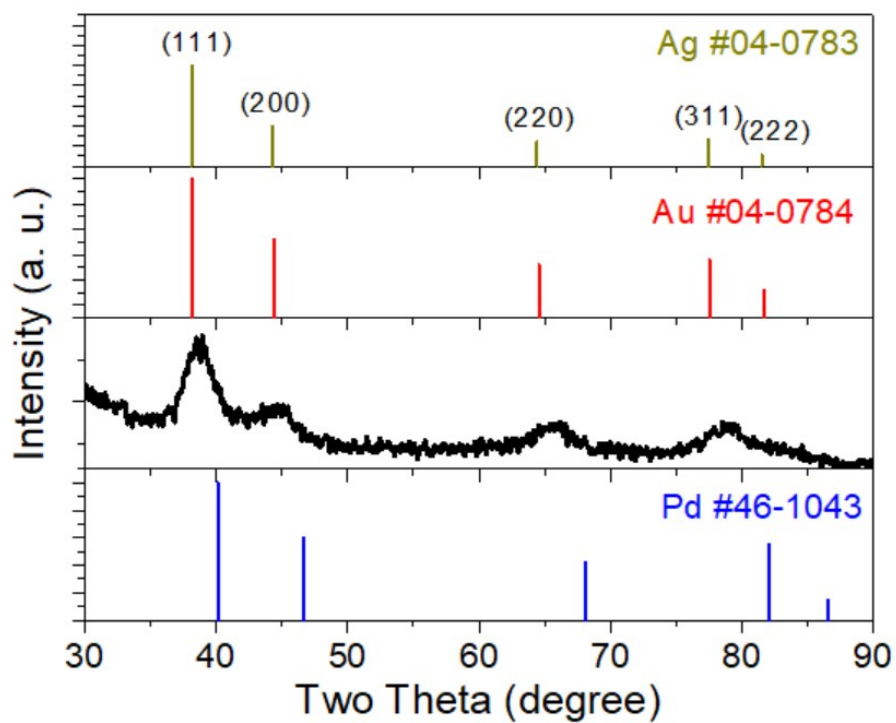


Figure S2. X-ray diffraction (XRD) pattern of 2D PdAuAg nanobranched.

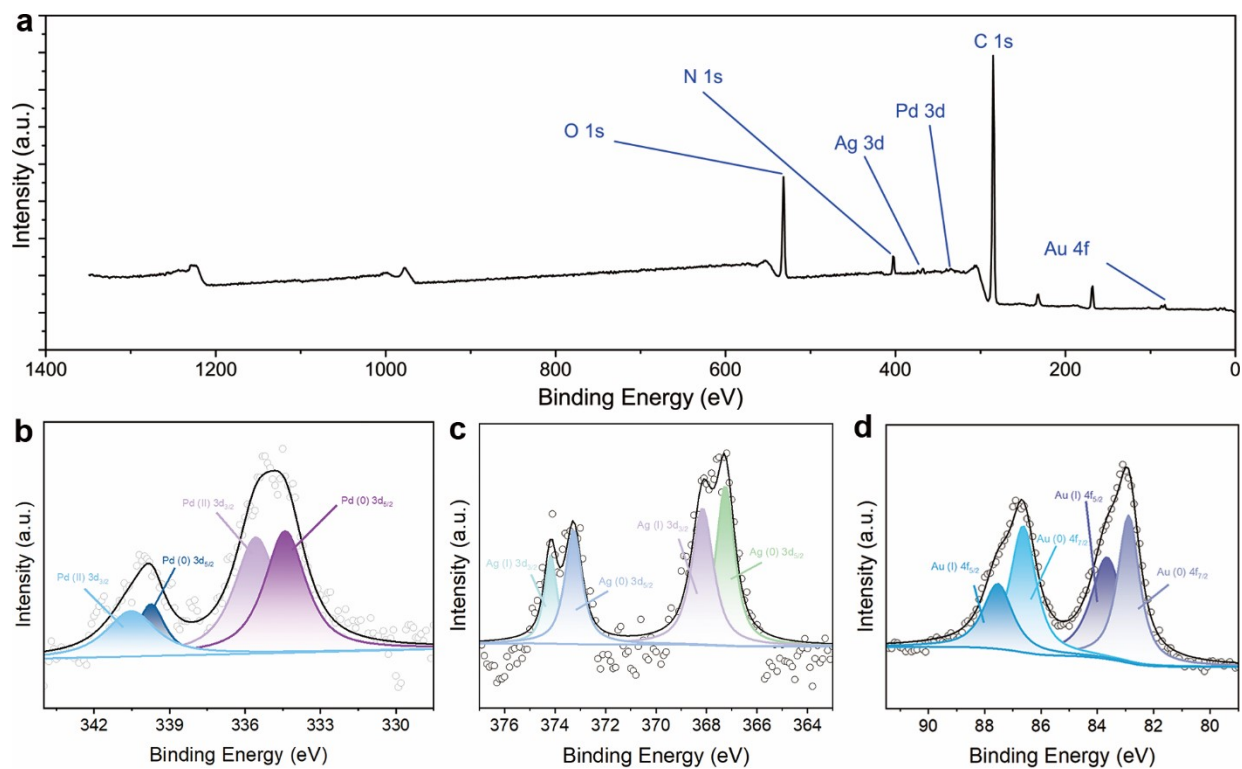


Figure S3. X-ray photoelectron spectroscopy (XPS) spectra of 2D PdAuAg nanobranched: a) survey scan; b) Pd 3d, c) Ag 3d, and d) Au 4f regions.

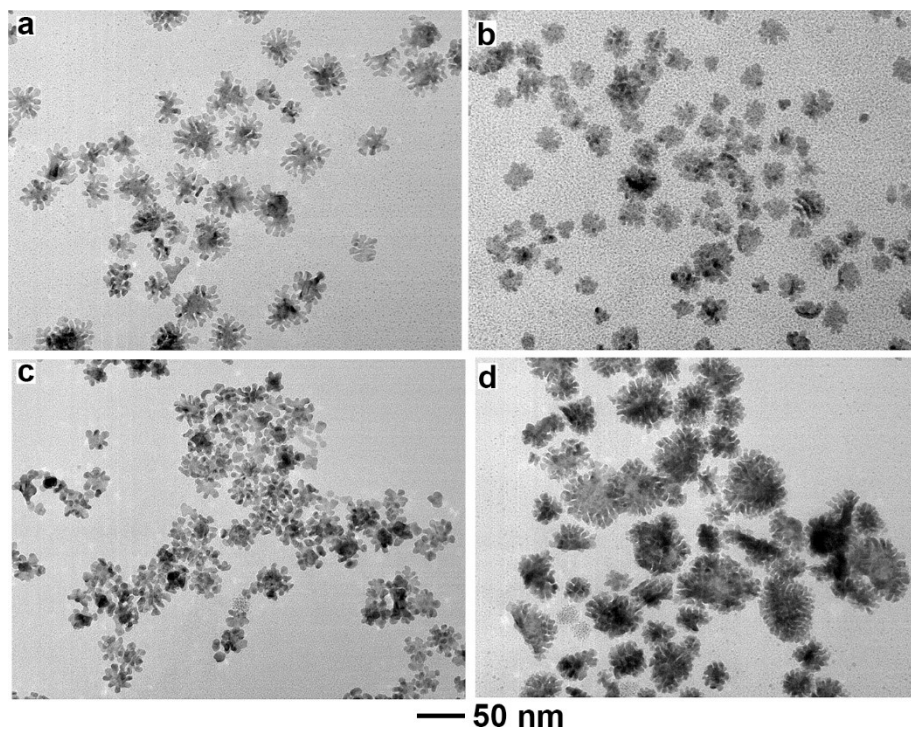


Figure S4. Effect of capping agent on product morphology. TEM images of the products synthesized using different types of capping agents: a) OTAB b) BTAC, c) CTAC, and d) CTAB respectively. All other synthesis parameters were held constant.

Table S1. Measured and reference lattice parameters for PdAuAg nanocrystals.

Material / Reference	Lattice Parameter (Å)	Notes
2D PdAuAg NBs (Measured)	~4.058	Calculated from the XRD data (111 peak at ~38.7°).
Theoretical PdAuAg (1:1:1)	~4.018	Linear average of pure metal values (Vegard's law).
Pure Silver (Ag)	4.0857	PDF# 00-001-1167
Pure Gold (Au)	4.0786	PDF# 00-001-1172
Pure Palladium (Pd)	3.8907	PDF# 00-001-1201

Table S2. Summary of XPS analysis for the 2D PdAuAg NBs/C.

Element	B. E. Peak (eV)	FWHM (eV)	Peak area (%)	Element /Oxidation State	Orbital
Au	82.89	0.92	27.80	Au (0)	4f _{7/2}
	83.66	1.35	27.95	Au (I)	4f _{5/2}
	86.63	1.07	27.70	Au (0)	4f _{7/2}
	87.53	1.25	16.55	Au (I)	4f _{5/2}
Ag	367.25	0.89	33.13	Ag (0)	3d _{5/2}
	368.15	1.03	32.80	Ag (I)	3d _{3/2}
	373.27	0.81	21.64	Ag (0)	3d _{5/2}
	374.17	0.60	12.43	Ag (I)	3d _{3/2}
Pd	335.56	2.04	36.34	Pd (0)	3d _{5/2}
	334.40	1.97	36.76	Pd (II)	3d _{3/2}
	339.74	1.32	10.47	Pd (0)	3d _{5/2}
	340.52	2.36	16.43	Pd (II)	3d _{3/2}

Table S3. EOR performances of the 2D PdAuAg NBs/C and Pd/C electrocatalysts.

Electrocatalyst	ECSA (cm ² mg ⁻¹)	E _s (mV)	E _p (mV)	j _r /j _f	Specific Activity (mA cm ⁻²)	Retaining Activity (mA cm ⁻²)
2D PdAuAg NBs/C	159.4	317	784	0.24	1.25	1.11
Pd/C	368.7	336	789	2.26	0.52	0.59