Electronic Supplementary Information for

Indium-doped flower-shaped PdIn nanocatalyst for enhanced ethanol oxidation

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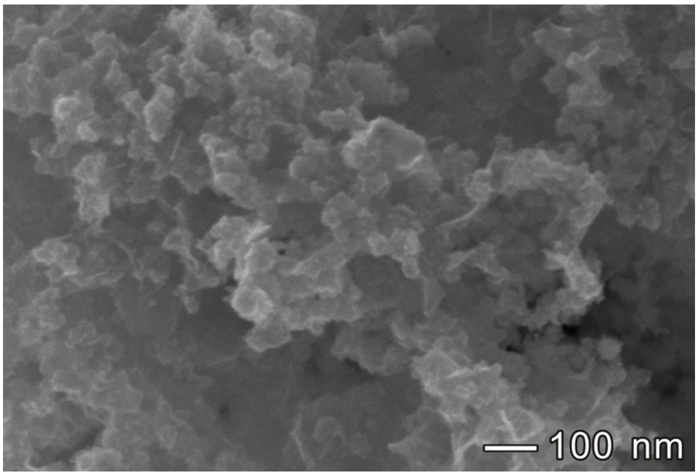

Figure S1. The SEM characterizations of $PdIn_{0.024}$ nanocatalysts.

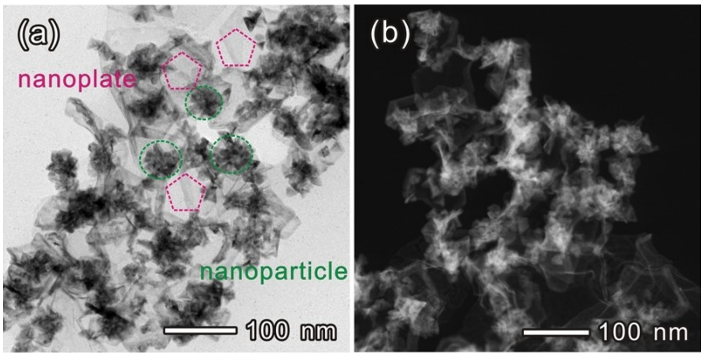

Figure S2. The TEM characterizations of Pd nanocatalysts without indium atoms at 80 ° C. (a) TEM images. (b) HAADF-STEM images.

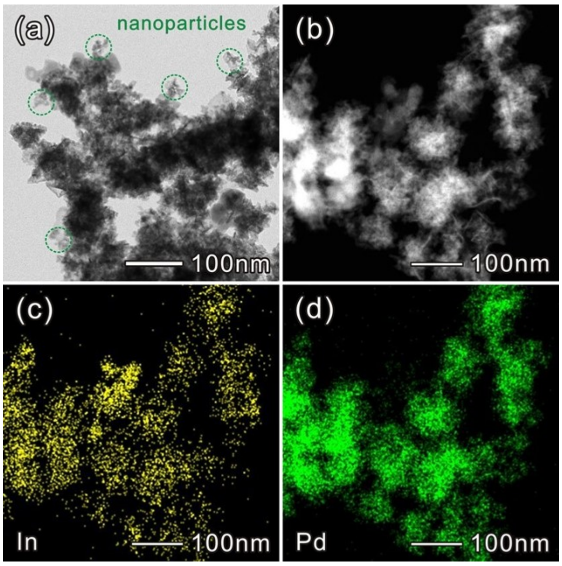

Figure S3. The TEM characterizations of indium-doped flower-shaped PdIn nanocatalysts when the reaction temperature is 60 ° C. (a) TEM images. (b) HAADF-STEM images. (c, d) EDX elemental mappings.

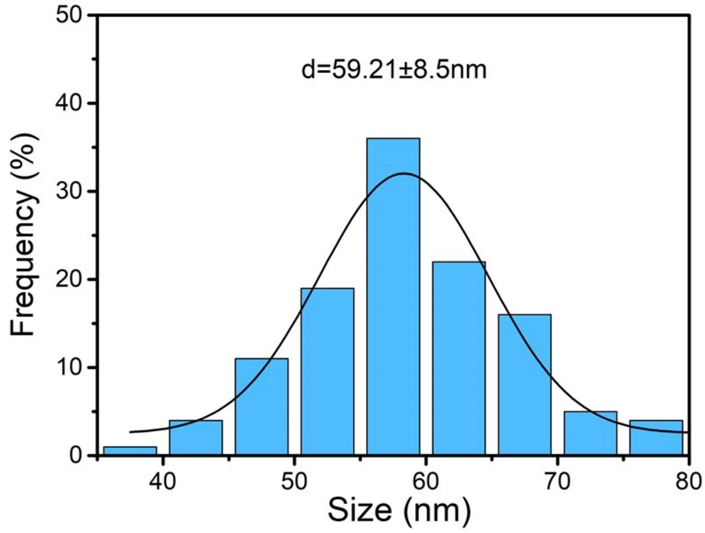

Figure S4. The size distribution of indium-doped flower-shaped PdIn nanocatalysts when reaction temperature is 60 ° C.

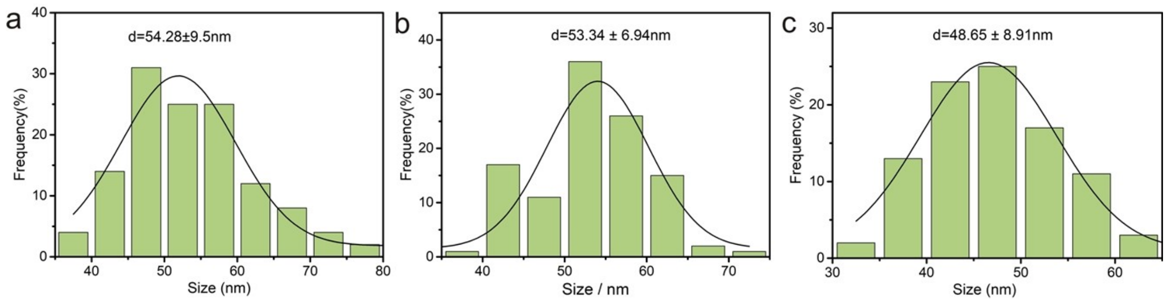

Figure S5. The size distribution of indium-doped flower-shaped PdIn nanocatalysts with different contents of indium atoms. (a) $PdIn_{0.017}$. (b) $PdIn_{0.024}$. (c) $PdIn_{0.052}$.

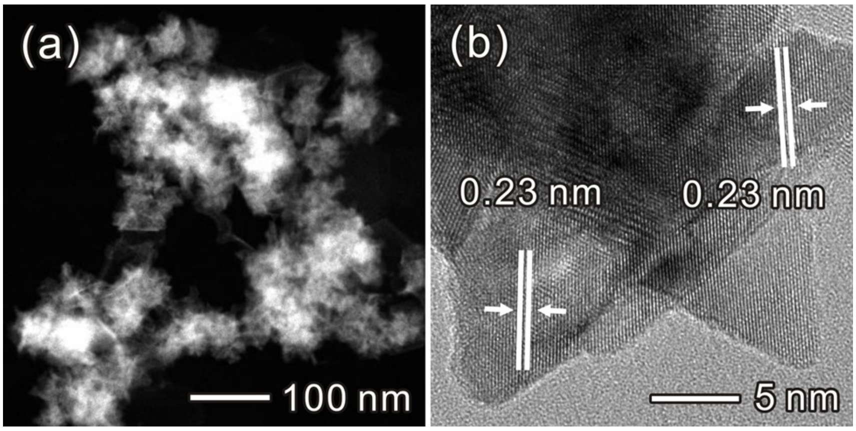

Figure S6. The TEM characterizations of indium-doped flower-shaped $PdIn_{0.017}$ nanocatalyst. (a) HAADF-STEM image. (b) HRTEM image.

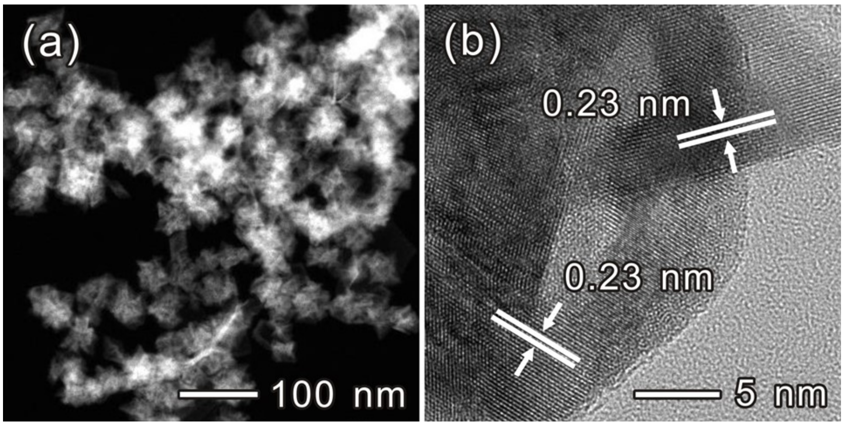

Figure S7. The TEM characterizations of indium-doped flower-shaped $PdIn_{0.052}$ nanocatalyst. (a) HAADF-STEM image. (b) HRTEM image.

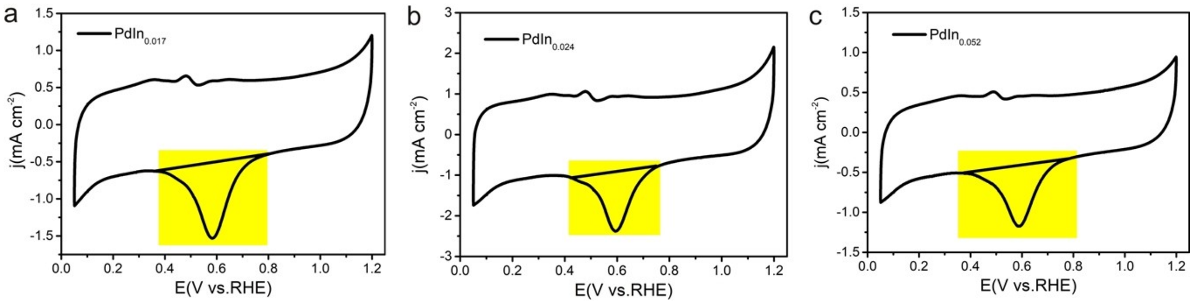

Figure S8. Cyclic voltammetry curves of indium-doped flower-shaped PdIn nanocatalysts with different contents of indium atoms in N_2-saturated KOH (1 M) solution at a scanning rate of 50 mV s^{-1}.

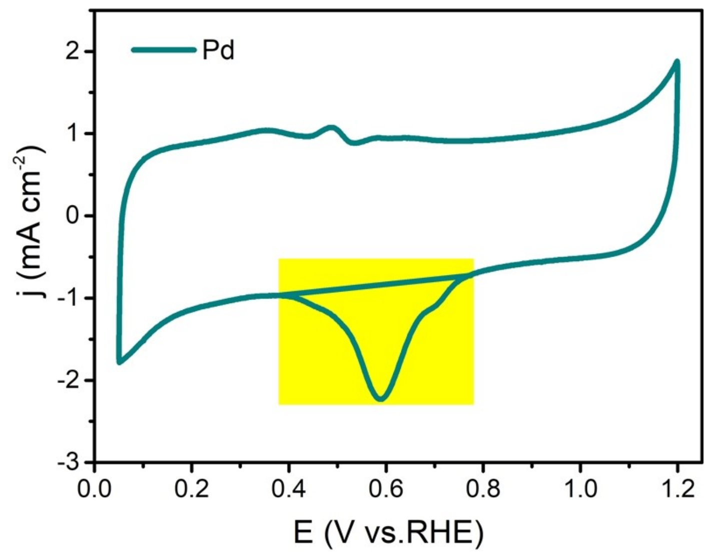

Figure S9. Cyclic voltammetry curve of Pd nanocatalyst without indium atoms in N_2-saturated KOH (1 M) solution at a scanning rate of 50 mV s^{-1}.

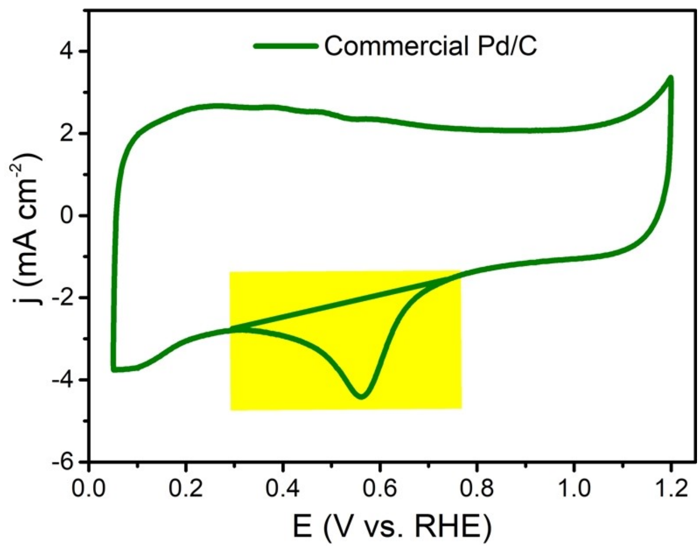

Figure S10. Cyclic voltammetry curve of commercial Pd/C nanocatalyst in N_2-saturated KOH (1 M) solution at a scanning rate of 50 mV s^{-1}.

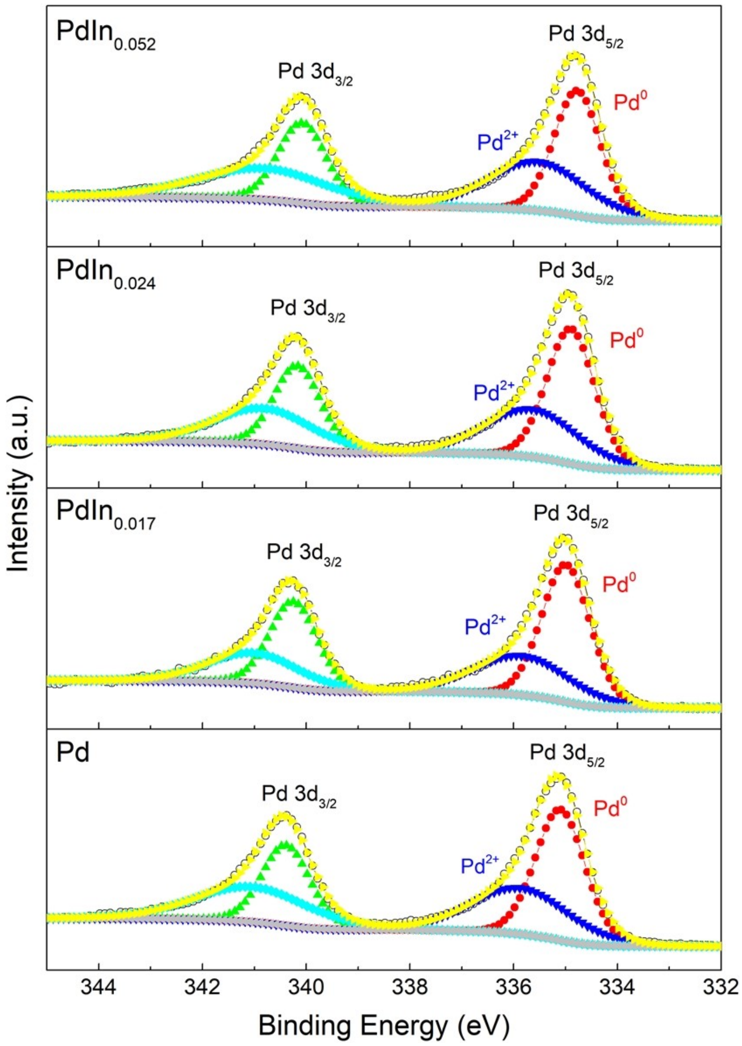

Figure S11. The XPS characterizations of Pd 3d core levels for PdIn nanocatalyst with different contents of In atoms.

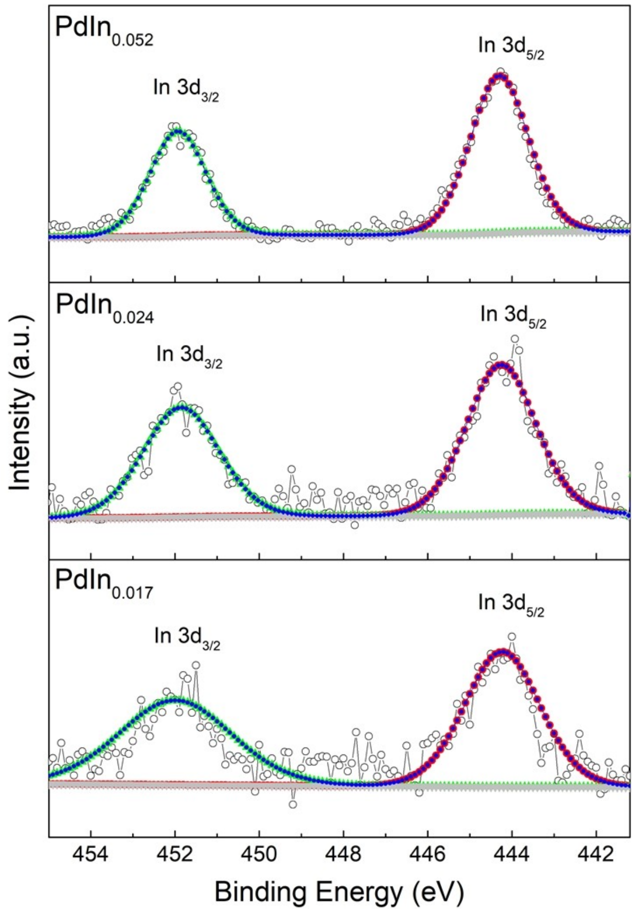

Figure S12. The XPS characterizations of In 3d core levels for PdIn nanocatalyst with different contents of In atoms.

Table S1. The metal loadings of indium-doped flower-shaped PdIn nanocatalysts with different contents of indium atoms on electrode determined by ICP-MS.

Sample	Temp. (°C)	Mass (Pd) / μg	Mass (In) / μg	Mass (Mo) / μg	M (Pd) / M (In)
PdIn-1	80	5.12	0.09	0	1:0.017
PdIn-2	100	5.09	0.12	0	1:0.024
PdIn-3	120	5.09	0.26	0	1:0.052

Table S2. The EOR performances of the indium-doped flower-shaped PdIn nanocatalysts with different contents of indium atoms and commercial Pd/C nanocatalyst.

Sample	ECSA (m^2/g)	Mass Activities (mA/mg)	Specific Activities（mA/cm^{-2}）
Pd/C	23.7	598	2.52
Pd	19.6	1411	7.19
$PdIn_{0.017}$	22.2	2246	10.09
$PdIn_{0.024}$	22.6	2380	10.51
$PdIn_{0.052}$	22.4	2178	9.73

Table S3. Summary of the EOR performances of recently reported Pd-based electrocatalysts in alkaline electrolytes.

Catalysts	Electrolyte	J_{mass} (A mg^{-1})	$J_{specific}$ (mA cm^{-2})	References
$PdIn_{0.024}$	1.0 M KOH + 1.0 M ethanol	2.38	10.5	This work
Pd/CuO-Ni(OH)$_2$/C	1.0 M KOH + 1.0 M ethanol	3.74	6.88	*Green Chem.*, 2022, 24(6): 2438-2450.
PdZn nanosheets	1.0 M NaOH + 1.0 M ethanol	2.73	-	*ACS nano*, 2019, 13(12): 14329-14336.
PdCu nanosheets	1.0 M KOH + 1.0 M ethanol	2.54	4.02	*Langmuir*, 2022, 38(14): 4287-4294.
PdPb nanochains	1.0 M KOH + 1.0 M ethanol	2.52	6.27	*Rare Metals*, 39, 792–799 (2020).
PdSn nanoparticle	1.0 M KOH + 1.0 M ethanol	2.46	4.12	*ChemCatChem*, 2023, 15(5): e202201357.
PdNi nanowires	1.0 M KOH + 1.0 M ethanol	2.12	-	*Sci. China Chem.*, 2021, 64, 245-252.

Catalysts	Electrolyte	J_{mass} (A.mg^{-1})	$J_{specific}$ (mA.cm^{-2})	References
PdB nanowires	1.0 M KOH + 1.0 M ethanol	2.05	5.94	*ACS Appl. Mater. & Interface*, 2021, 13(15): 17599-17607.
$Pt_{36}Pd_{41}Cu_{23}$ nanocomposite	0.5 M H_2SO_4 + 1.0 M ethanol	1.88	4.38	*Nanotechnology*, 2022, 33 (33), 335401.
PdAg nanaosheets	1.0 M KOH + 1.0 M ethanol	1.87	-	*Langmuir*, 2020, 36(37): 11094-11101.
Pd/Ni(OH)$_2$	1.0 M KOH + 1.0 M ethanol	1.55	3.83	*Adv. Mater.*, 2017, 29, 1703057.
CuPdNiP nanohollow structures	1.0 M KOH + 1.0 M ethanol	1.19	1.39	*ACS Appl. Energy Mater.*, 2019, 2, 5525-5533.
PdRuCu nanoassemblies	0.5 M KOH + 0.5 M ethanol	1.16	3.78	*Appl. Surf. Sci.*, 2020, 506, 144791.