Supporting Information J. Electrochem. Sci. Technol., **2022**, *13(3)*, *354-361*

Phosphate-decorated Pt Nanoparticles as Methanol-tolerant Oxygen Reduction Electrocatalyst for Direct Methanol Fuel Cells

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Table S1. DMFC characteristics reported by other groups.

Cathode Catalyst	Anode catalyst	Membrane	Methanol concentration [M]	Cathode gas	Temperature [°C]	PPD [mV]	Ref.
Pt/C-P (1.0 mg_{Pt}/cm^2)	PtRu (3.0 mg_{PtRu}/cm^2)	Nafion 115	1	O_2	80	198	This work
Pt@CS/CNF900 (0.3 mg_{Pt}/cm^2)	PtRu (2.0 mg_{PtRu}/cm^2)	Nafion 115	1	Air	70	115	[1]
Pt1Pd4.8/N-CNF (1.2 mg_{Pt}/cm^2)	PtRu (3.0 mg_{PtRu}/cm^2)	Nafion 115	1	Air	60	108	[2]
Pt-nanowire (2.0 mg_{Pt}/cm^2)	PtRu (4.0 mg_{PtRu}/cm^2)	Nafion 117	1	Air	75	67	[3]
PtCoRu/C (1.0 mg_{Pt}/cm^2)	PtRu (3.0 mg_{PtRu}/cm^2)	Nafion 117	2	O_2	90	28	[4]
(2:1) Pt-Au (2.0 mg_{Pt}/cm^2)	PtRu (4.0 mg_{PtRu}/cm^2)	Nafion 117	0.5	O_2	70	120	[5]
Pt/C (3.0 mg_{Pt}/cm^2)	PtRu (3.0 mg_{PtRu}/cm^2)	Nafion 115	1	Air	70	117	[6]
1Pt2.7Fe/C (1.0 mg_{Pt}/cm^2)	PtRu (1.52 mg_{PtRu}/cm^2)	Nafion 117	1	O_2	90	68	[7]
Pt/CNTs (1.0 mg_{Pt}/cm^2)	PtRu (2.0 mg_{PtRu}/cm^2)	Nafion 115	1	O_2	90	103	[8]
PtPdCo (3.0 mg_{PtPdCo}/cm^2)	PtRu (4.0 mg_{PtRu}/cm^2)	Nafion 115	1.5	Air	55	70	[9]

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DOI: https://doi.org/10.33961/jecst.2022.00115

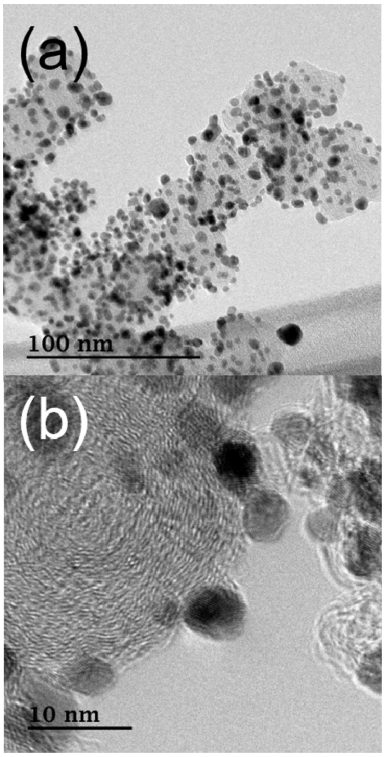

Fig. S1. HR-TEM images with (a) low magnification (x 100 k) and (b) high magnification (x 600 k) of synthesized Pt/C.

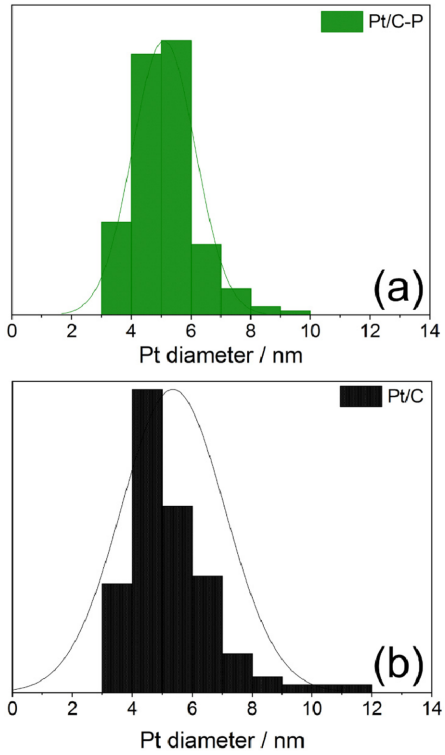

Fig. S2. Histograms of Pt particle diameter of (a) Pt/C-P and (b) Pt/C.

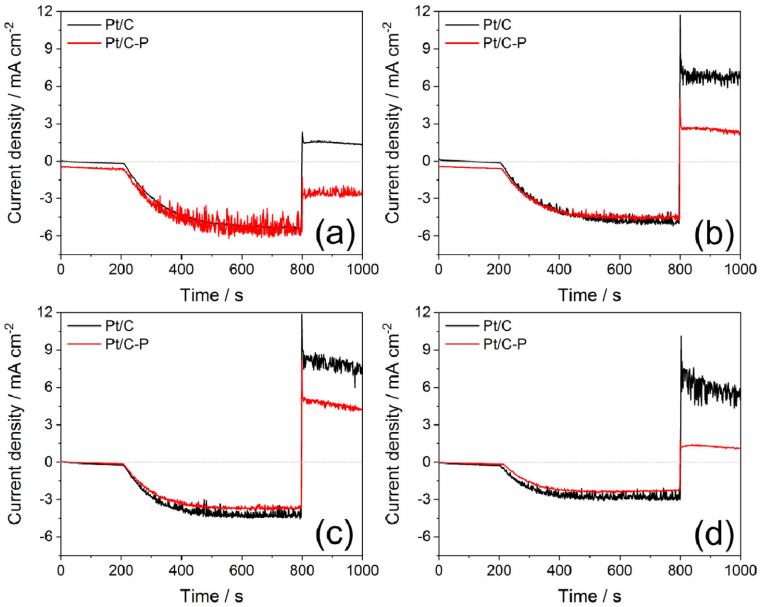

Fig. S3. Current-time response at (a) 0.65, (b) 0.75, (c) 0.80 and (d) 0.85 V_{RHE} of Pt/C-P and Pt/C in N_2-saturated 0.1 M $HClO_4$ with the switch to O_2 atmosphere at 200 s and the addition of methanol solution to make 0.5 M methanol + 0.1 M $HClO_4$ electrolyte around 800 s.

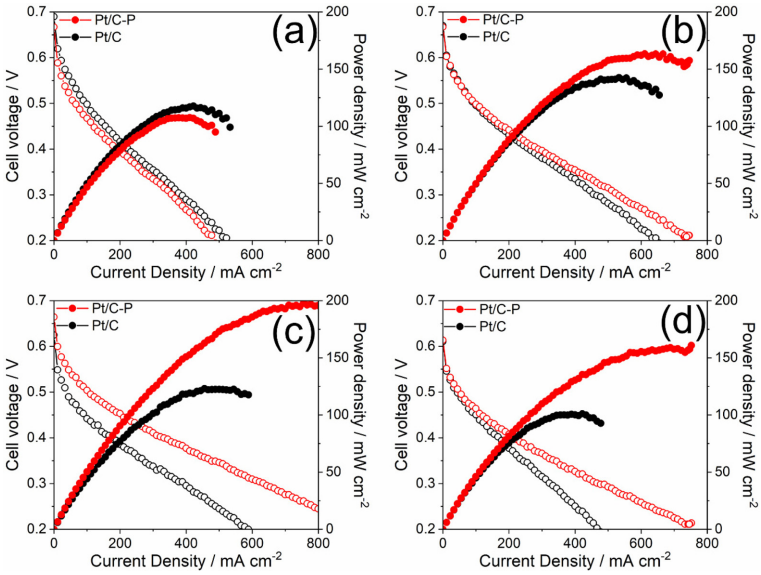

Fig. S4. Current-voltage curves for DMFC performance evaluation of Pt/C-P and Pt/C as cathode catalyst with (a) 0.5 M, (b) 0.75 M, (c) 2.0 M, and (e) 3.0 M methanol as anode fuel and oxygen (flow rate = 250 sccm) as cathode gas.

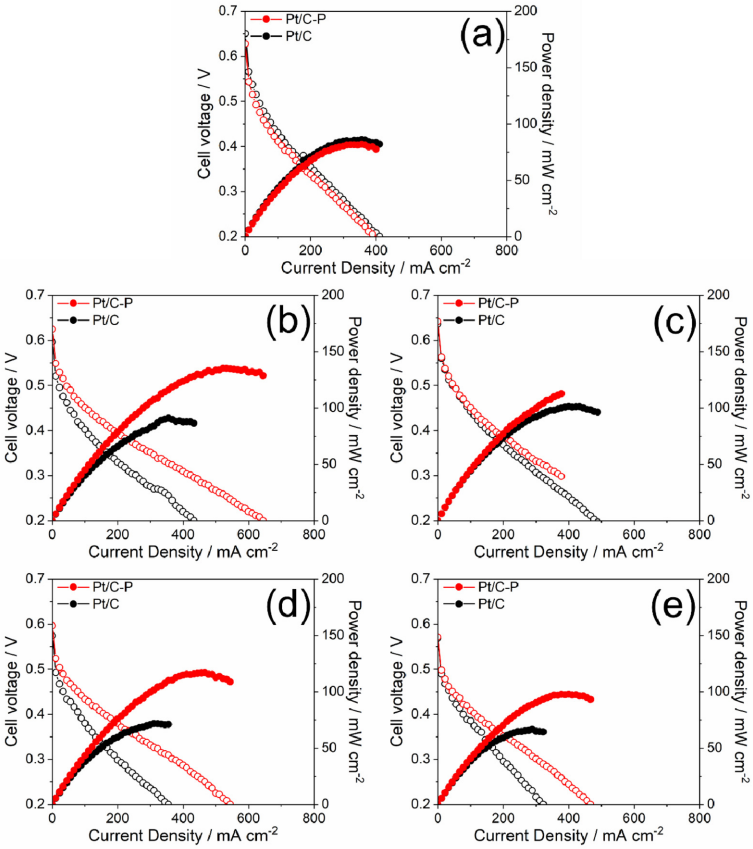

Fig. S5. Current-voltage curves for DMFC performance evaluation of Pt/C-P and Pt/C as cathode catalyst with (a) 0.5 M, (b) 0.75 M, (c) 1.0 M, (d) 2.0 M, and (e) 3.0 M methanol as anode fuel and air (flow rate = 1000 sccm) as cathode gas.

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