Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Pd nanoparticles decorating flower-like Co_3O_4 nanowire clusters to form an efficient, carbon/binder-free cathode for the Li–O_2 battery

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Supporting information:

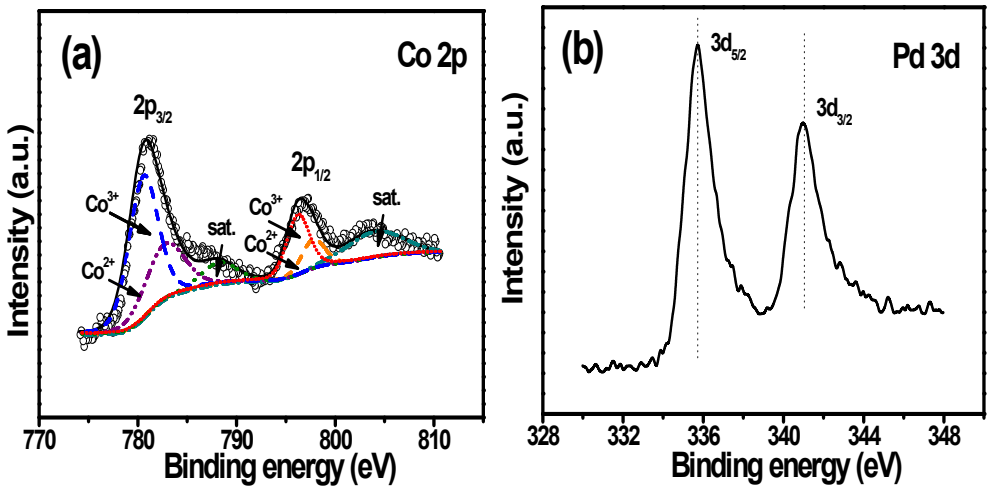

Fig. S1 (a) Co 2p XPS and (b) Pd 3d XPS of Pd/Co_3O_4.

In Figure S1a, the peaks at 780.4 eV and 795.8 eV are the Co 2p spectra of Co^{3+}, and the peaks at 781.8 eV and 797.8 eV are the Co 2p spectra of Co^{2+1}. In Figure S1b, the peaks at 335.6 eV and 341.1 eV are the Pd 3d spectra of metallic Pd[2].

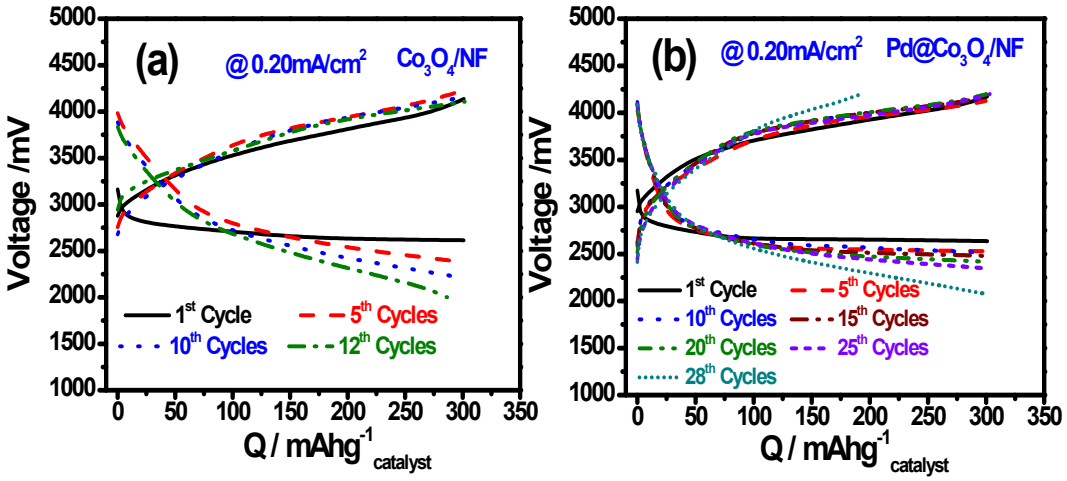

Fig. S2 Discharge-charge profiles at various cycles of Li−O_2 batteries with (a) Co_3O_4/NF and (b) Pd/Co_3O_4/NF cathodes at a limited capacity of 300 $mAhg^{-1}$ under current density of 0.20 $mAcm^{-2}$.

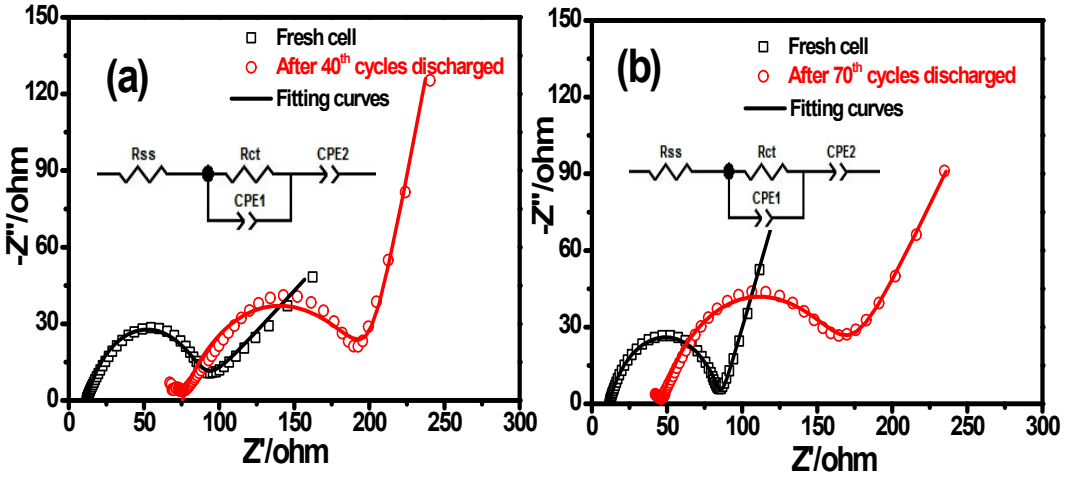

Fig. S3 Electrochemical impedance spectra (EIS) of Li−O_2 batteries based Co_3O_4 and Pd/Co_3O_4 catalysts after discharged with different cycles (The inset shows the equivalent circuit[3, 4] that the data (circles) were fitted with (solid lines)).

Rss is electronic resistance of the Li−O_2 cell consists of the electrodes, contacts, and electrolyte resistance. *Rct* is the charge transfer resistance and CPE1, CPE2 are the constant phase elements. The CPE2 is related to diffusion of active species to the surfaces of the electrodes.

Table 1 Values of the fitting parameters evaluated from the equivalent circuit with different cathode catalysts after discharged at various cycles.

	Li/O_2 batteries (Co_3O_4)				**Li/O_2 batteries (Pd/Co_3O_4)**			
	Fresh cell	Error%	After 40^{th} cycles discharged	Error%	Fresh cell	Error%	After 70^{th} cycles discharged	Error%
Rss /Ω	12.34	1.6335	76.3	0.725	11.76	0.52185	46.02	0.58281
Rct /Ω	71.67	1.1697	124.9	1.7382	73.99	0.70773	119.5	1.3686
CPE1-T/F	2.34E-05	6.2539	2.05E-04	7.7034	2.18E-05	4.4269	1.43E-04	4.7314
CPE1-P	0.7928	1.0199	0.66842	1.9275	0.7771	0.63965	0.73634	1.1106
CPE2-T/F	0.013489	1.1566	0.01122	1.8377	0.0158	2.1261	0.01142	1.5853
CPE2-P	0.36323	1.854	0.81005	1.9107	0.70997	1.9711	0.57375	1.9495

References

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