Conducting polymer PEDOT:PSS coated Co_3O_4 nanoparticles as the anode for sodium-ion battery applications

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Supplementary materials

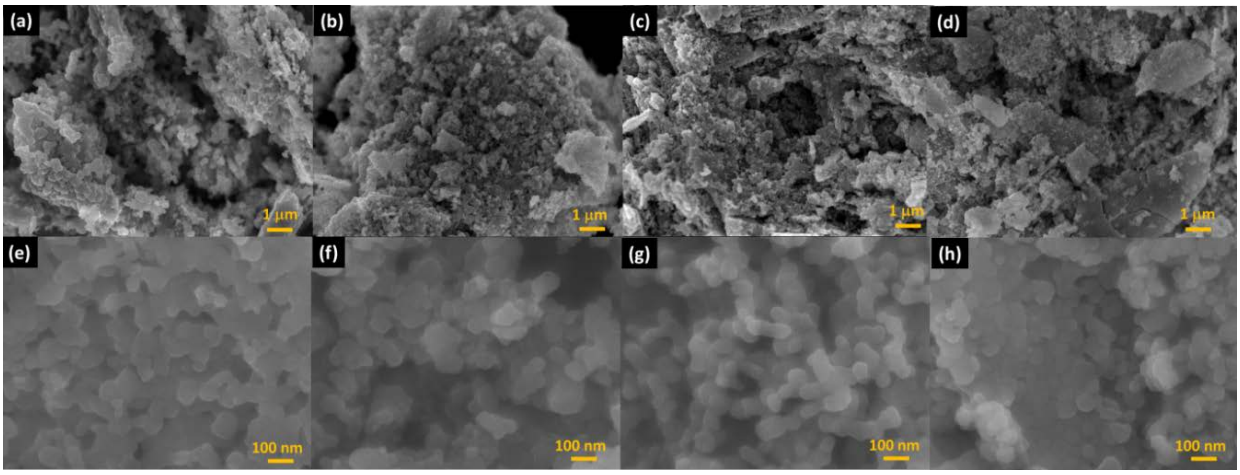

Fig. S1 Low-magnification (upper) and high-magnification (lower) FESEM images of **(a)(e)** Co_3O_4, **(b)(f)** Co_3O_4@P-0.5, **(c)(g)** Co_3O_4@P-1.0, and **(d)(h)** Co_3O_4@P-2.0.

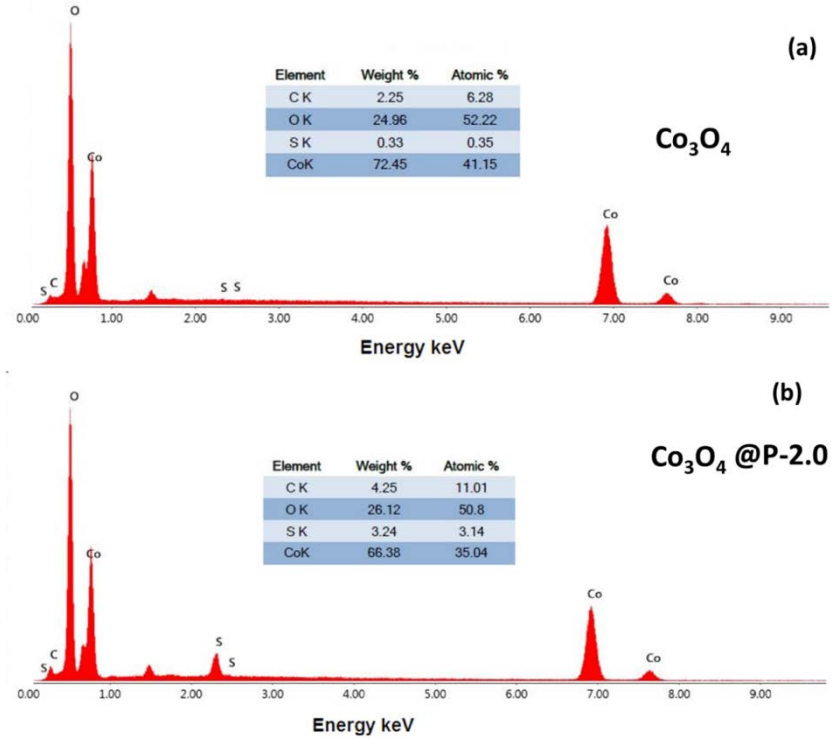

Fig. S2 EDAX results of **(a)** Co_3O_4 and **(b)** Co_3O_4@P-2.0.

Table S1 Performance comparison of Co_3O_4-based composite anodes reported in the literature for Na-ion battery applications

Co_3O_4 sample	Method of synthesis	Current density/(mA·g^{-1})	Voltage window/V	Electrolyte	Capacity /(mAh·g^{-1}) and (cycle number)	Ref.
Co_3O_4 MNSs/3DGNs nanohybrids	CVD and hydrothermal	25 25 125 250 500	0.01–3	1 mol·L^{-1} $NaClO_4$ in PC:FEC	523 (50) 525.3 ~400 ~290 82.3	[S1]
Co_3O_4	Molten salt	25	0.01–3	–	447 (50)	[S2]
Bowl-like hollow Co_3O_4	Resorcinol formaldehyde assisted wet-chemical	178	0.01–2.0	1 mol·L^{-1} $NaclO_4$ in PC	290 (10)	[S3]
Co_3O_4@CNT (spheres)	Co_3O_4@CNT with acid treated CNT by refluxing	– 160 320 800 1600 3200	0.05–3	1 mol·L^{-1} $NaPF_6$ EC:DEC:FEC	487 (30) 425 343 279 230 184	[S4]
Co_3O_4@CNT	Molten salt Liquid plasma Co_3O_4/CNT	50 50 100 300 800 1600 3200	0.01–3	1 mol·L^{-1} $NaClO_4$ PC:FEC	~410 (100) 410 333 313 253 212 190	[S5]
Co_3O_4 needle	Hydrothermal method	89 89 (presodiated) 89 445 890 1780 4450		1 mol·L^{-1} $NaClO_4$ PC:FEC	360 (50) 508 (50) ~590 ~400 ~390 ~220 ~160	[S6]
Co_3O_4/MWCNT	Solid state	34.2	0.05–3	1 mol·L^{-1} $NaClO_4$ in EC:PC	293 (15)	[S7]
Meso-Co_3O_4	Pluronic soft micellar templates	445 890 2225	0.01–3	FE:DEC	204 (200) 175 75	[S8]
R-Co_3O_4-C	Hydrothermal	0.5 100 200 500 1000 2000 5000	0.01–3	1 mol·L^{-1} $NaClO_4$ PC:FEC	409 (500) 700 600 ~520 400 320 223	[S9]
Co_3O_4	Electrospun	90	0.01–3	1 mol·L^{-1} $NaClO_4$, FEC	407 (30)	[S10]
Co_3O_4@P-0.5	Coprecipitation Wet chemical PEDOT:PSS coating	1000 100 250 500 1000	0.01–2	1 mol·L^{-1} CF_3NaO_3S in diethylene glycol dimethyl ether	251 (100) 561 423 371 319	this work

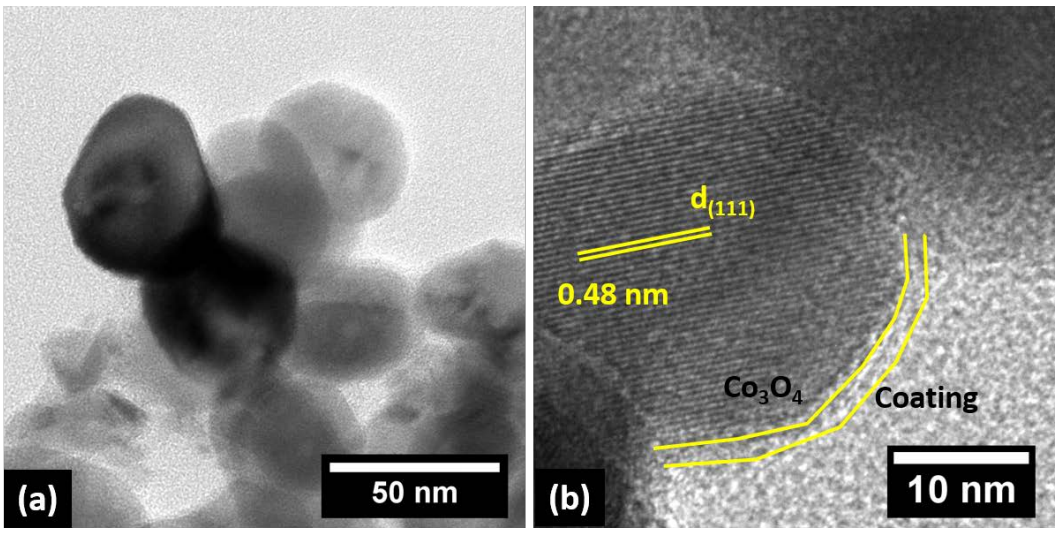

Fig. S3 (a) TEM and **(b)** HRTEM images of Co_3O_4@P-0.5.

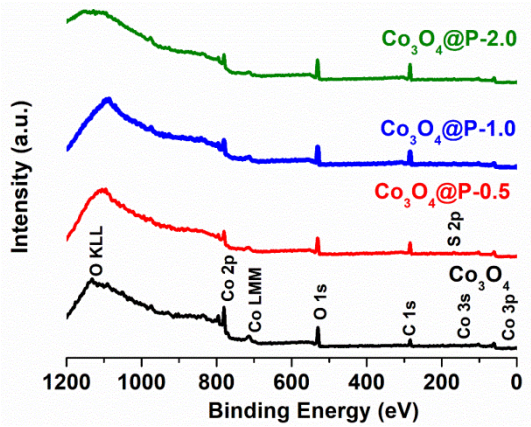

Fig. S4 XPS survey spectra of Co_3O_4, Co_3O_4@P-0.5, Co_3O_4@P-1.0, and Co_3O_4@P-2.0.

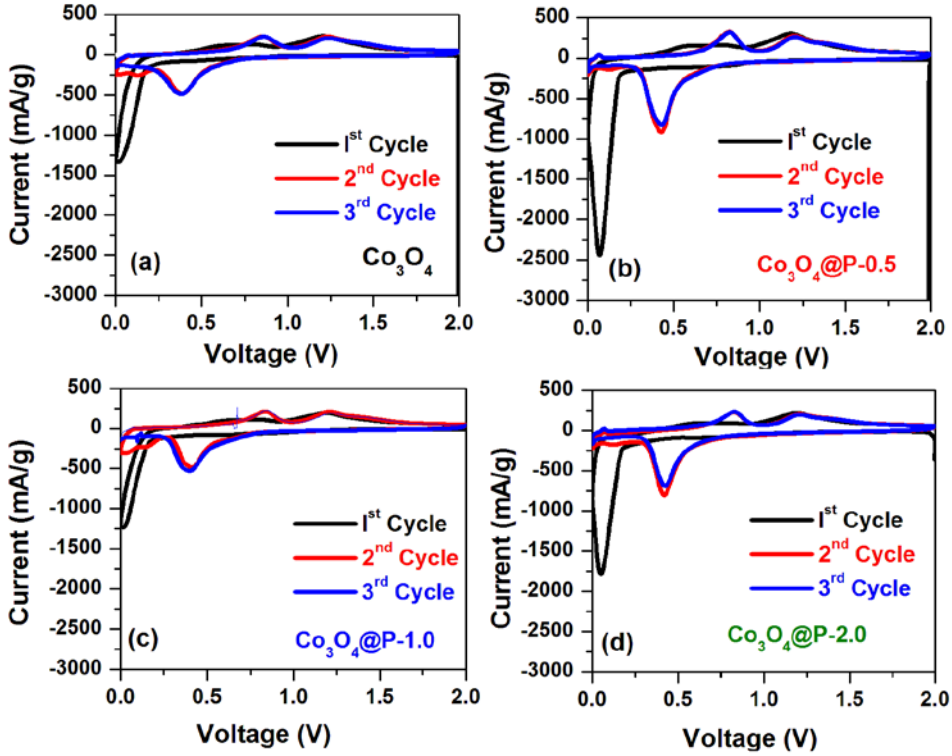

Fig. S5 Cyclic voltammetry results of **(a)** Co_3O_4, **(b)** Co_3O_4@P-0.5, **(c)** Co_3O_4@P-1.0, and **(d)** Co_3O_4@P-2.0.

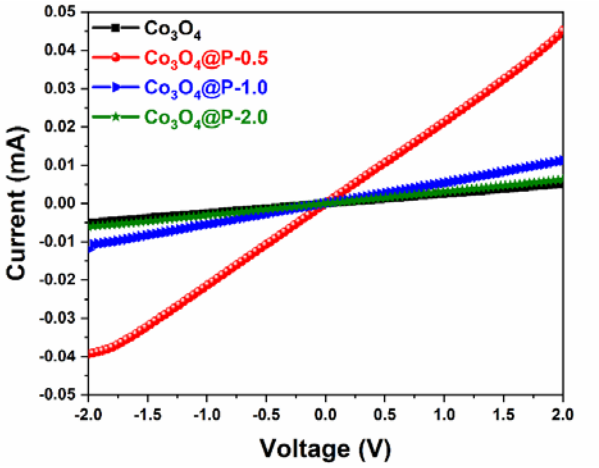

Fig. S6 Two-probe measurement results: current *vs.* voltage graph of all samples.

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