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

Supporting information

Ultrathin CoFe-layered double hydroxide nanosheets embedded in high conductance Cu_3N nanowire arrays with 3D core-shell architecture for ultrahigh capacitance supercapacitor

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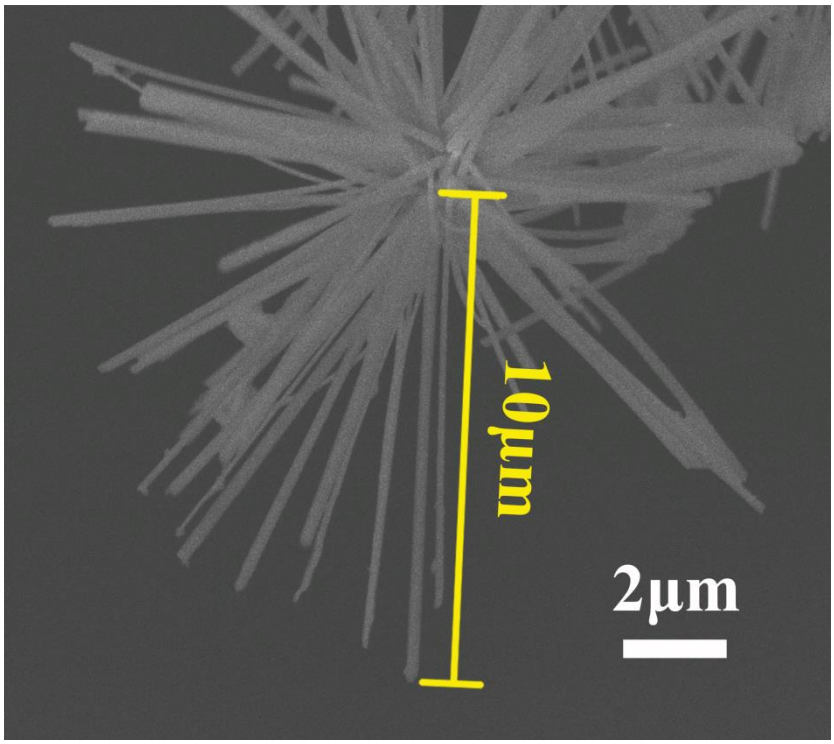

Fig. S1 SEM image of single $Cu(OH)_2$ nanowire with the length about 10 μm.

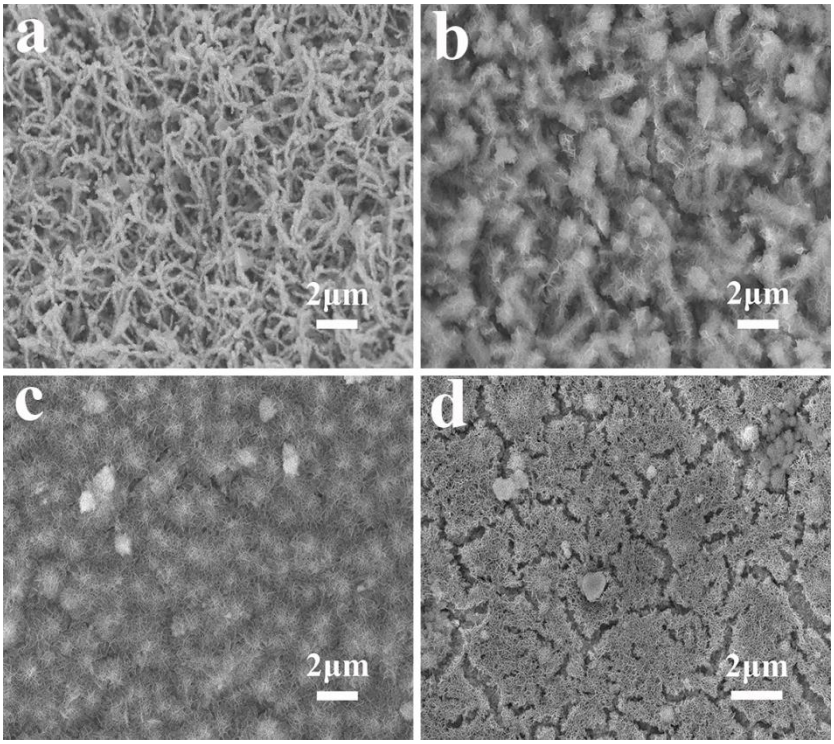

Fig. S2 SEM images of Cu_3N@CoFe-LDH core-shell NWAs synthesized with various LDH electrodeposition time: (a) 25 s, (b) 50 s, (c) 100 s, (d) 200 s, respectively.

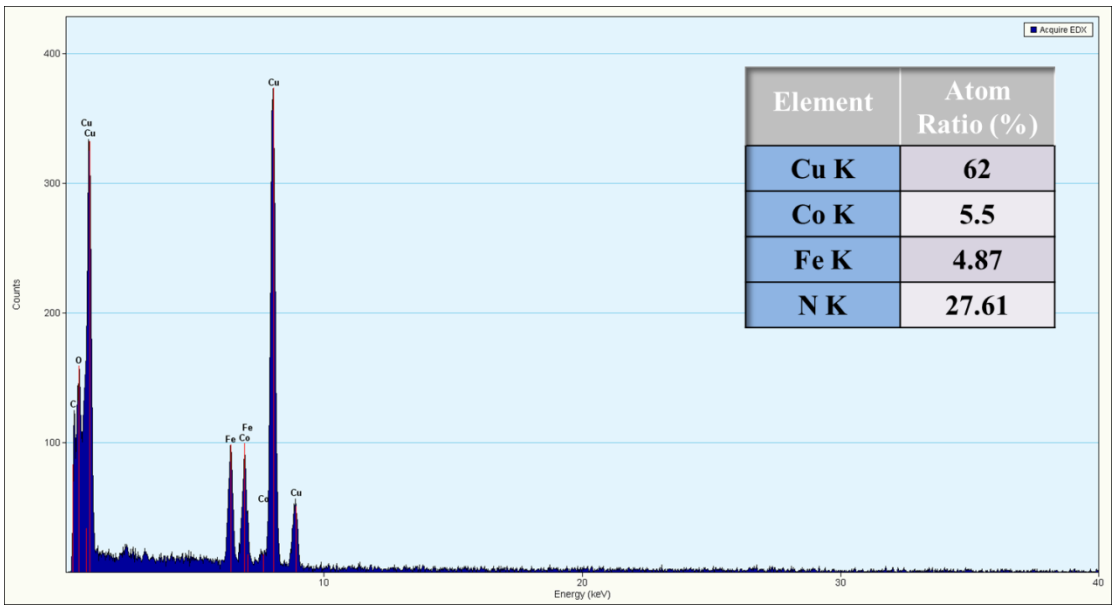

Fig. S3 EDX spectra of the Cu_3N@CoFe-LDH NWAs.

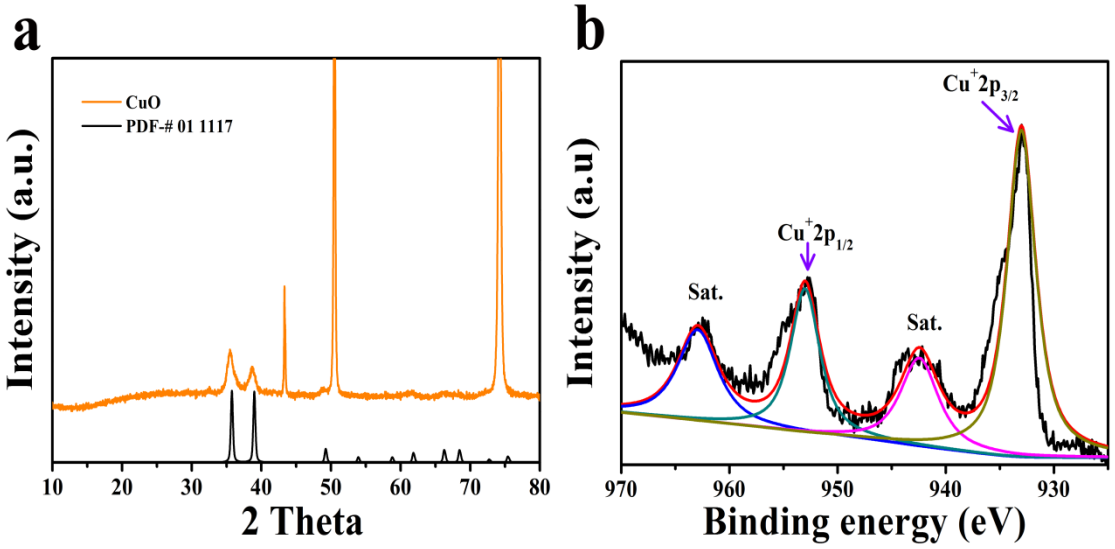

Fig. S4 (a) XRD spectra of CuO NWAs suported on Cu foam substrate; (b) Typical Cu 2*p* XPS spectra of the Cu_3N@CoFe-LDH NWAs

Table S1. Comparison of the electrochemical performance of Cu_3N@CoFe-LDH NWAs electrode in three-electrode systems with other previously reported electrodes.

Materials	Specific capacitance	Current density	Electrolyte	Retention-cycles	ΔV (V)	Reference (year)
CuO@CoFe-LDH core-shell structures	0.866 F cm^{-2}	1 mA cm^{-1}	1 M KOH	92.4%-1000	0.45	S1 (2016)
$CuCo_2O_4$@$Co(OH)_2$ core-shell structures	424 F g^{-1}	0.5 A g^{-1}	1 M KOH	85.8%-10000	0.4	S2 (2017)
NiO@CoFe-LDH core-shell structures	361 C g^{-1}	1 A g^{-1}	2 M KOH	19.1% - 5000	0.5	S3 (2017)
$NiCo_2O_4$@MnO_2 core-shell structures	2.05 F cm^{-2}	10 mA cm^{-2}	1 M LiOH	88% - 2000	0.6	S4 (2013)
Co_3O_4@NiO core-shell structures	1.35 F cm^{-2}	6 mA cm^{-2}	2 M KOH	95.1% - 6000	0.55	S5 (2012)
Co_xNi_{1-x}DHs@$NiCo_2O_4$ core-shell structures	1.64 F cm^{-2}	2 mA cm^{-2}	1 M KOH	81.3% - 2000	0.55	S6 (2013)
Cu_3N@CoFe-LDH core-shell structures	3.08 F cm^{-2}	1 mA cm-^{2}	2 M KOH	93.9% - 10000	0.45	The work

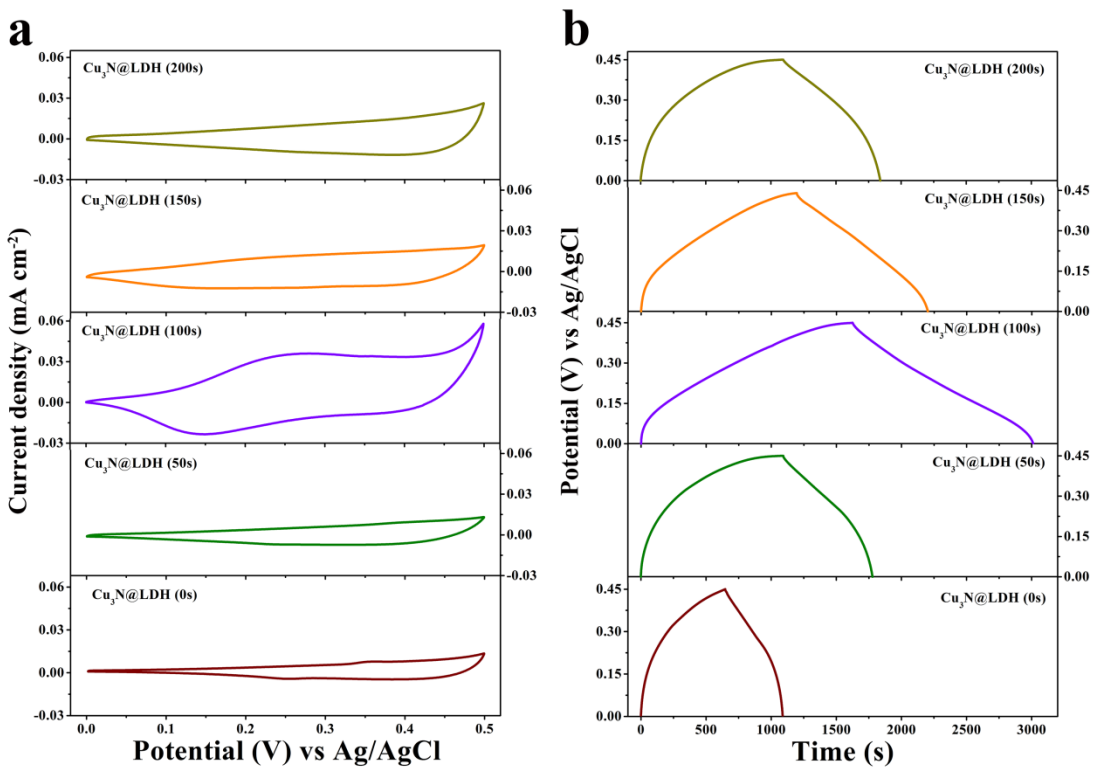

Fig. S5 (a) CVs curves at a scan rate of 5 mV s^{-1} and (b) the corresponding GCD curves at 1 mA cm^{-2} for the Cu_3N@CoFe-LDH (LDH deposition time: 0, 25, 50, and 100 s) in 2 M KOH solution.

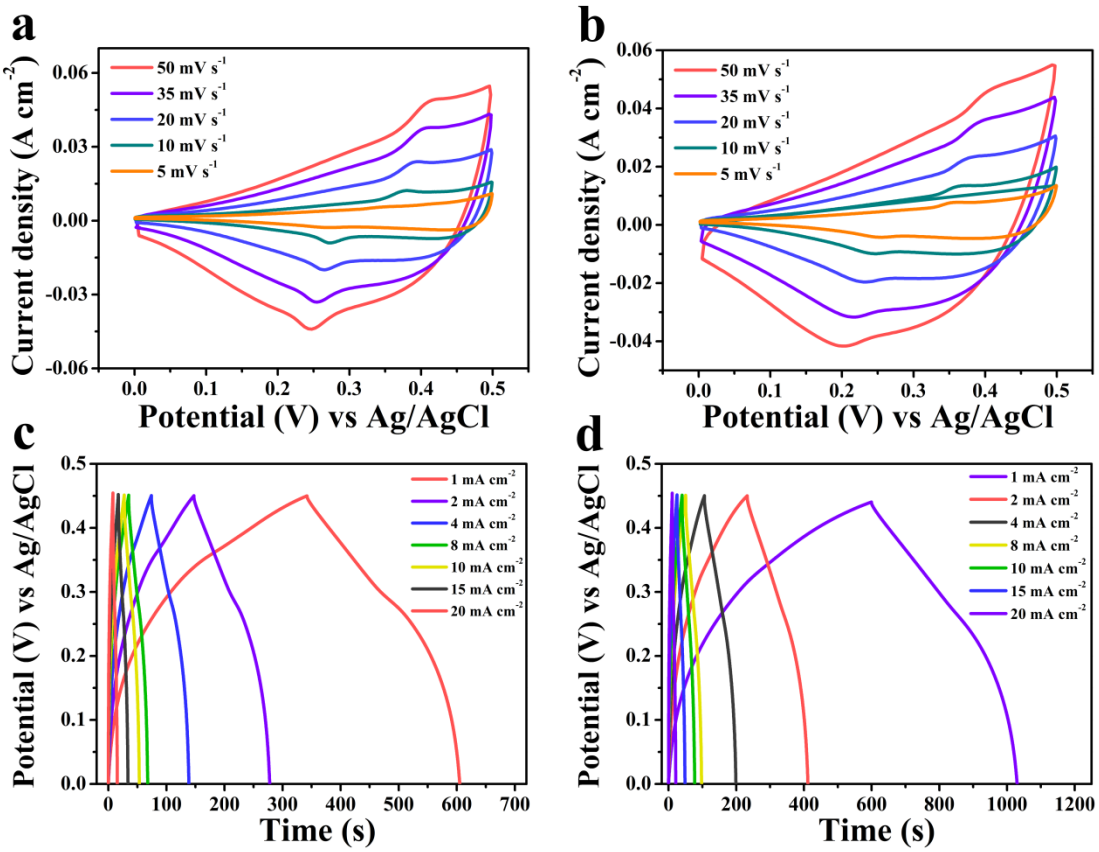

Fig. S6 CVs curves for the pristine CuO (a) and Cu_3N (b) NWAs in 2 M KOH solution at various scan rates; (c,d) The corresponding GCD curves for the two samples at various current densities.

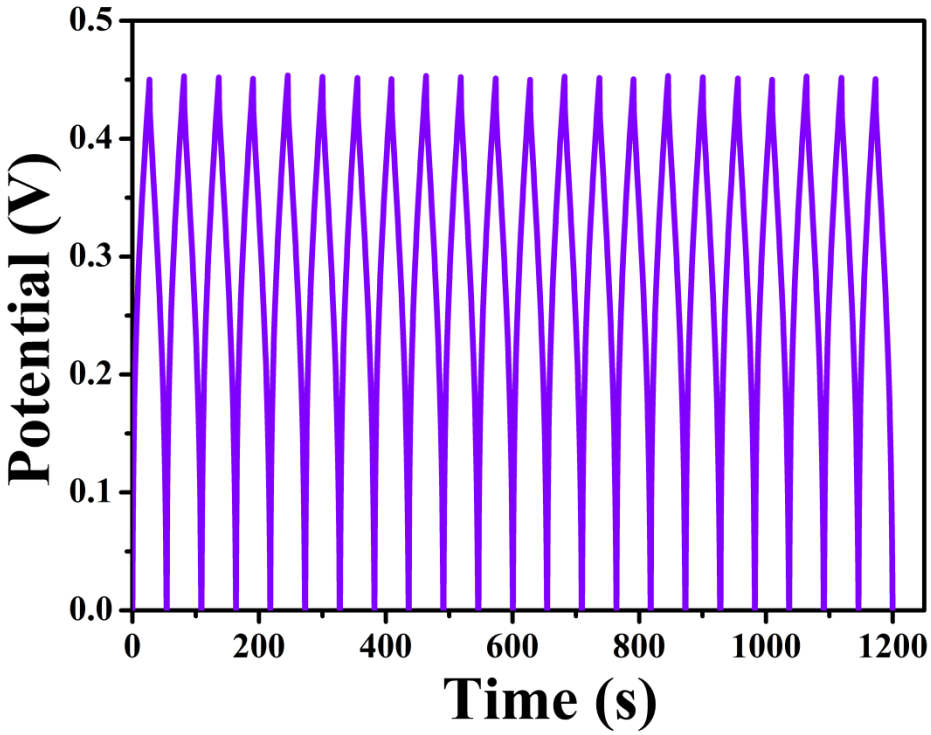

Fig. S7 GCD results of the last 20 cycles for Cu_3N@CoFe-LDH in 10000 cycles.

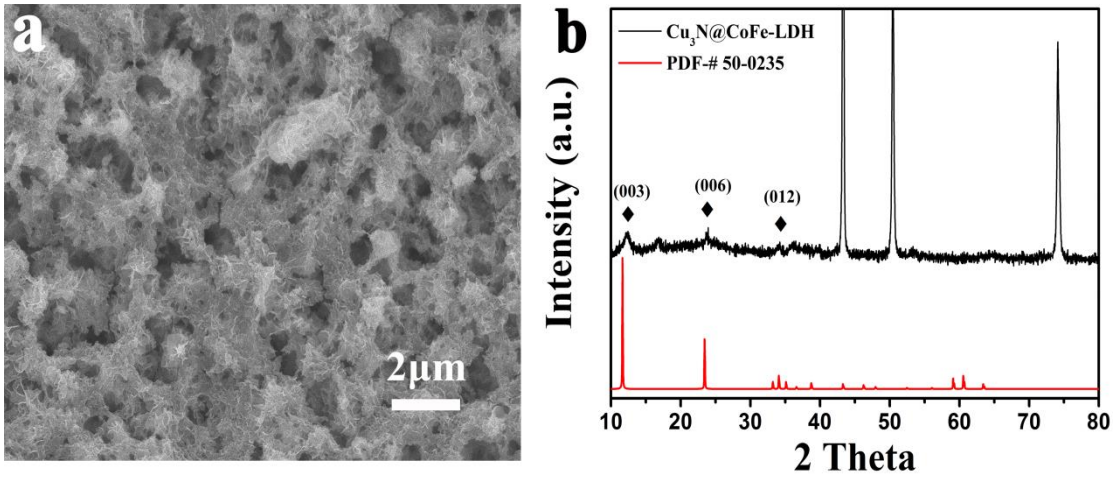

Fig. S8 SEM image (a) and XRD spectrum (b) of Cu_3N@CoFe-LDH NWAs electrode after 10000 cycles

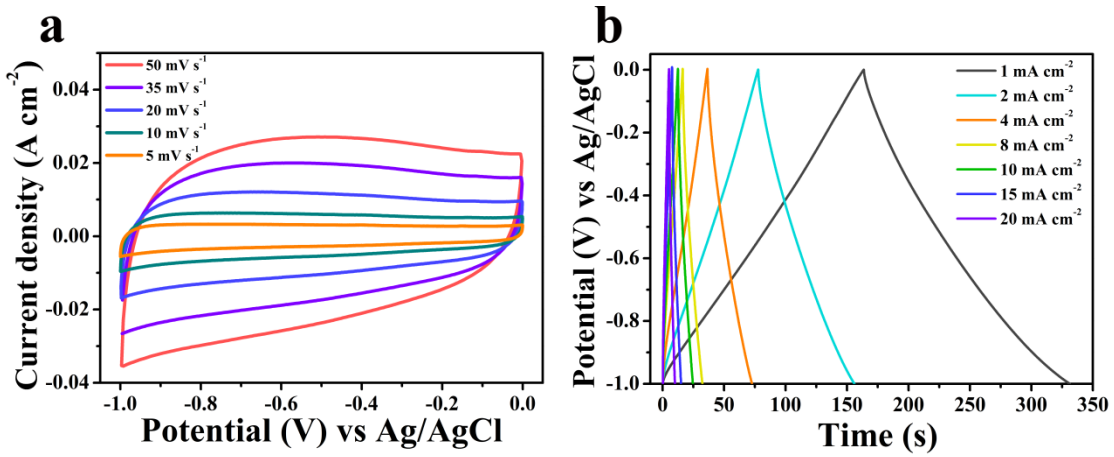

Fig. S9 CVs curves for the AC electrode (a) at various scan rates and The corresponding GCD curves (b) at various current densities in 2 M KOH solution.

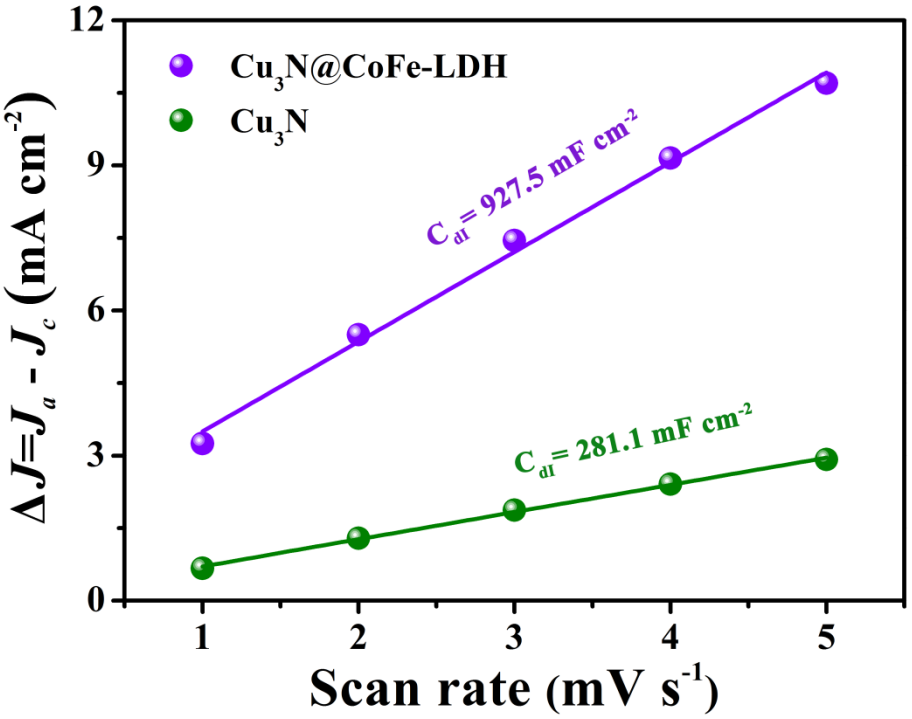

Fig. S10 Charging current density differences ($\Delta j = j_a - j_c$) plotted against scan rates of Cu_3N@CoFe-LDH NWAs electrode. The linear slope is equivalent to twice of the double-layer capacitance C_{dl}.

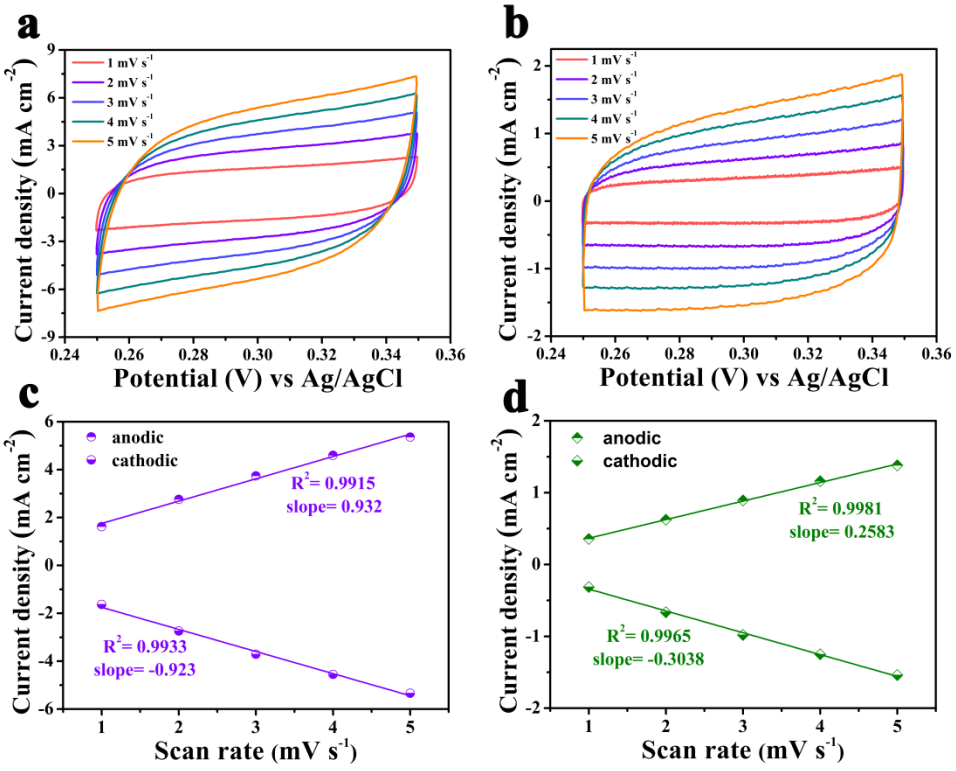

Fig. S11 CV curves at different scan rates (1, 2, 3, 4 and 5 mV s^{-1}) in a potential window where no Faradaic processes occur (0.25 - 0.35 V vs. Ag/AgCl) for Cu_3N@CoFe-LDH NWAs electrode.[S7]

References

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