Supporting Information

Ultrasonic-assisted growth of porous cobalt/nickel composite hydroxides as super high-energy and stable cathode for aqueous zinc batteries

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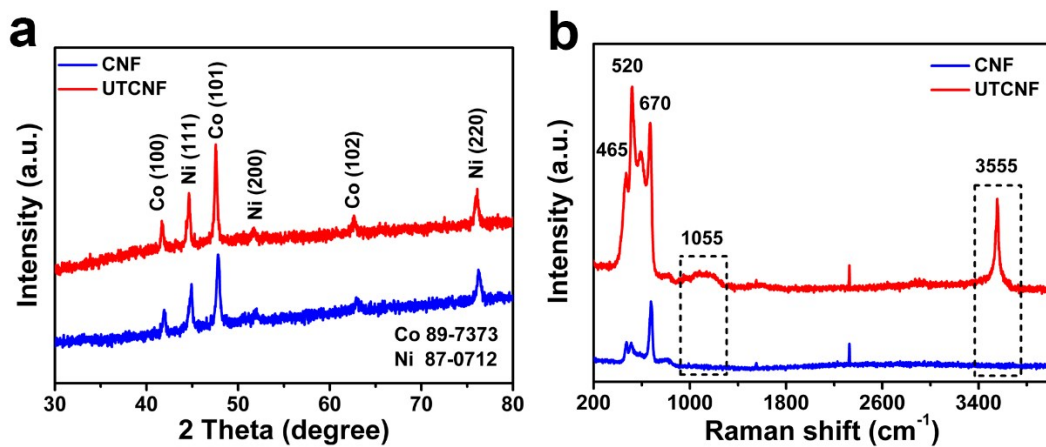
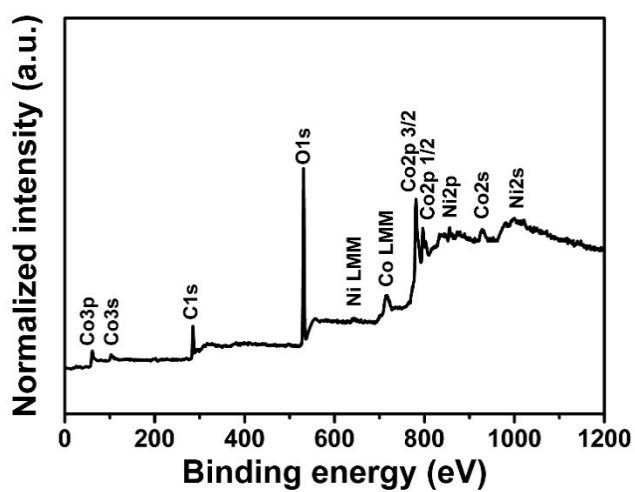**Fig. S1.** XRD and Raman characterization. (a) XRD patterns and (b) Raman spectra.

Fig. S2. Survey XPS spectra of UTCNF.
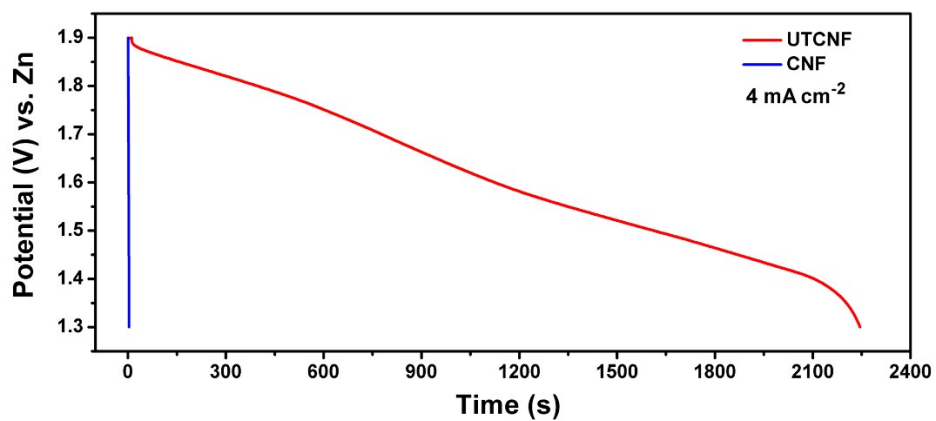
Fig. S3. GCD curves of CNF//Zn and UTCNF//Zn batteries at 4 mA·cm^{-2}.
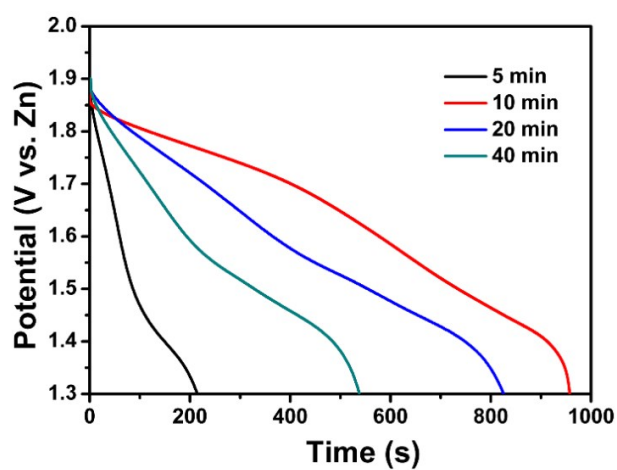

Fig. S4. GCD curves of UTCNF//Zn batteries at current density of 8 mA cm^{-2} using UTCNF electrodes with different ultrasonic treatment time.
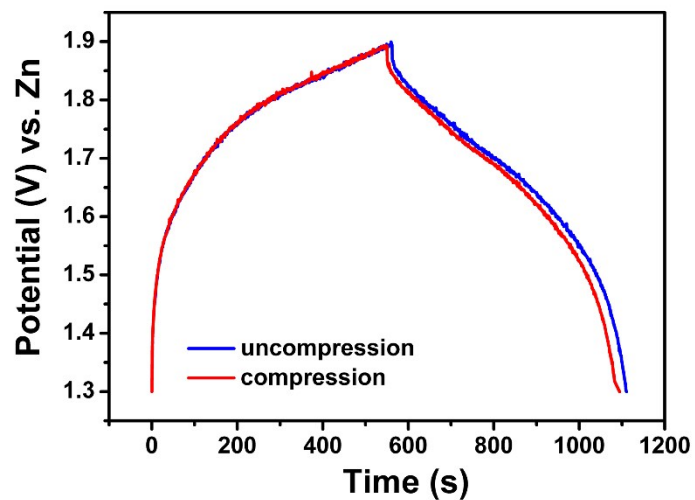
Fig. S5. The capacity performance of UTCNF with and without compression.

Fig. S6. The photograph of a timer lightened by the soft-package battery.

Table S1. The comparison of the capacity and stability of our UTCNF//Zn battery with other different aqueous batteries.

Battery	Capacity	Stability	Ref.
Ni_2P//Zn	0.12 mAh·cm^{-2} at 0.5 mA·cm^{-2}	~ 80% retention after 1500 cycles	1
Zn-Co	0.71 mAh·cm^{-2} at 1 mA·cm^{-2}	71.1% retention after 5000 cycles	2
Ni//Bi	1.79 mAh·cm^{-2} at 4 mA·cm^{-2}	94% retention after 5000 cycles	3
NiAlCo LDH//Zn	~ 0.59 mAh·cm^{-2} at 11.1 mA·cm^{-2}	~94% retention after 2000 cycles	4
NH^{4+} ion battery	0.31 mAh·cm^{-2} at 0.45 mA·cm^{-2}	67% retention after 1000 cycles	5
SANF//Zn battery	0.42 mAh·cm^{-2} at 0.8 mA·cm^{-2}	92.5% retention after 1800 cycles	6
Ni-NiO//Zn battery	--	96.6% retention after 10000 cycles	7
Co-Ni(OH)$_2$//NNA@Zn	--	~90% retention after 5000 cycles	8

Table S2. The comparison of the energy and power densities of our UTCNF//Zn battery with other energy store devices.

Battery	Energy Density	Power Density	Ref.
SANF//Zn	0.75 mWh·cm^{-2}	69.6 mW·cm^{-2}	6
Co-Ni(OH)$_2$//NNA@Zn	0.15 mWh·cm^{-2}	1.73 mW·cm^{-2}	8
Zn//NiCoO$_3$H$_x$	0.12 mWh·cm^{-2}	32.8 mW·cm^{-2}	9
flexible MnO$_2$//Zn	0.01 mWh·cm^{-2}	7 mW·cm^{-2}	10
Ni@Ni(OH)$_2$//Zn	0.26 mWh·cm^{-2}	1.73 mW·cm^{-2}	11
PPy SC	0.033 mWh·cm^{-2}	3.6 mW·cm^{-2}	12
CNT SC	0.0018 mWh·cm^{-2}	32 mW·cm^{-2}	13
3D RuO$_2$ SC	0.1 mWh·cm^{-2}	9.87 mW·cm^{-2}	14
grapheme fiber SC	0.006 mWh·cm^{-2}	0.19 mW·cm^{-2}	15
Co$_3$O$_4$@NiV-LDH//Zn	2.2 mWh·cm^{-2}	--	16
Zn//V$_2$O$_5$	~2.0 mWh·cm^{-2}	--	17

Table S3. Values of the equivalent circuit parameters of UTCNF//Zn and CNF//Zn batteries.

Element	CNF//Zn		UTCNF//Zn	
	Value (Ω)	Error%	Value (Ω)	Error%
R_s	1.29	1.8	1.31	2.1
R_{ct}	2.4	2.3	4.1	3.2
Z_w	6.15	1.6	8.90	1.7

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Y. Kuang, W. Liu, W. M. Yang and X. M. Sun, *J. Power Sources,* 2019, **436**, 226867.

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