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Green synthesis of Polyimide by using Ethanol Solvothermal Method for Aqueous Zinc Batteries

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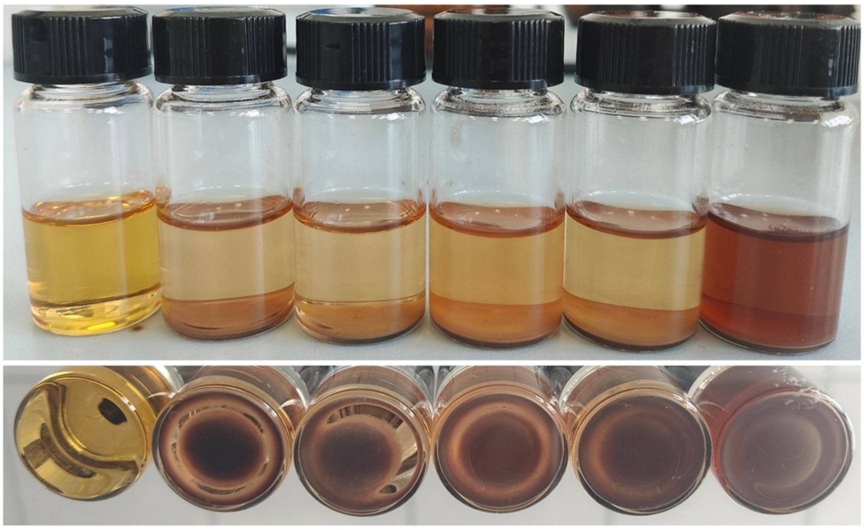

Fig. S1 Solubility of NTCDA, U-PIs in NMP Solvent over 25 days

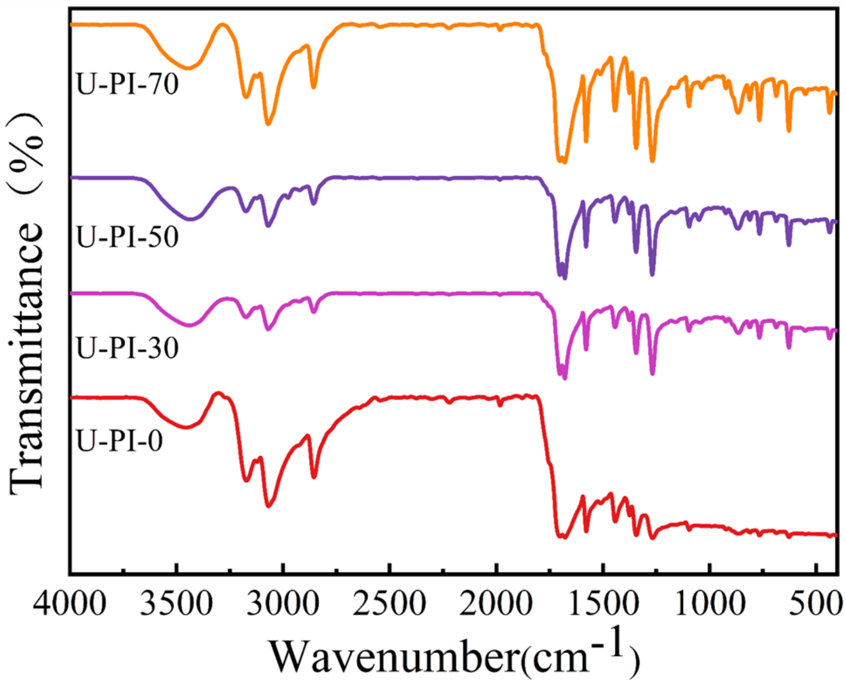

Fig. S2 FTIR spectra

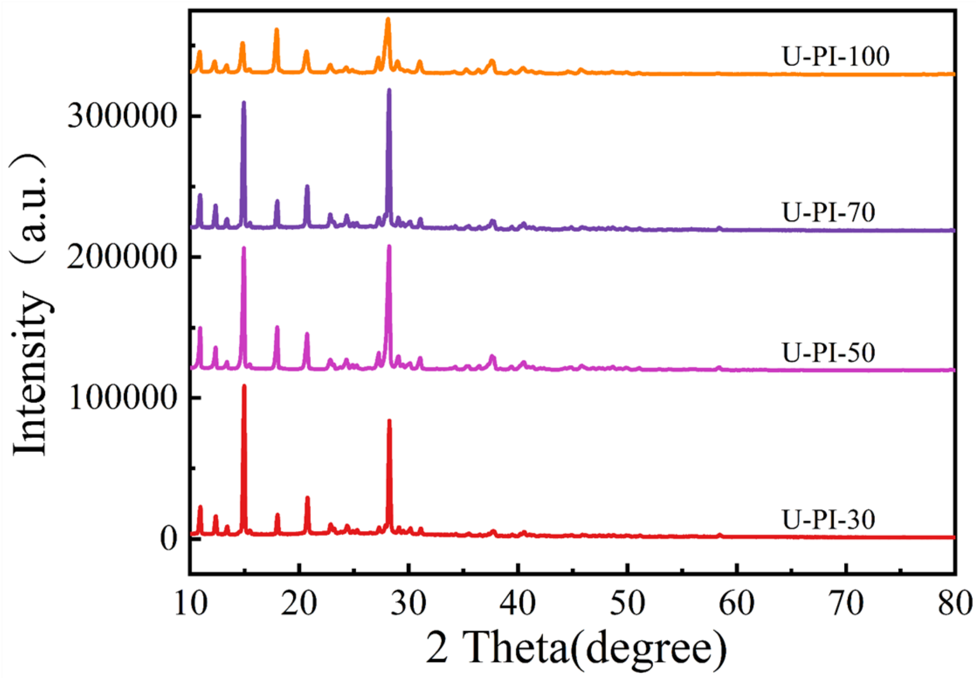

Fig. S3 XRD patterns

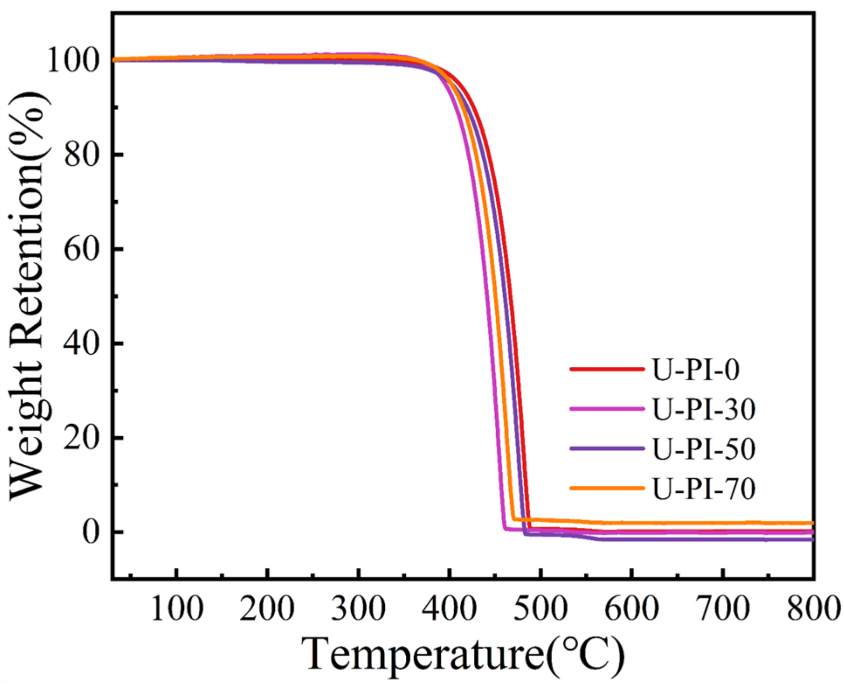

Fig. S4 TG curves

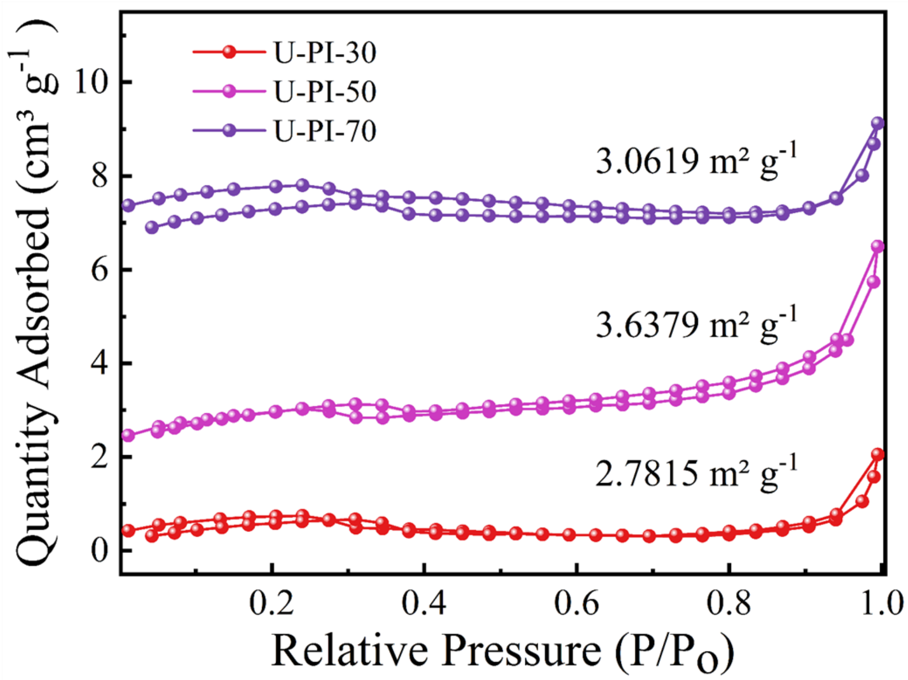

Fig. S5 BET curves

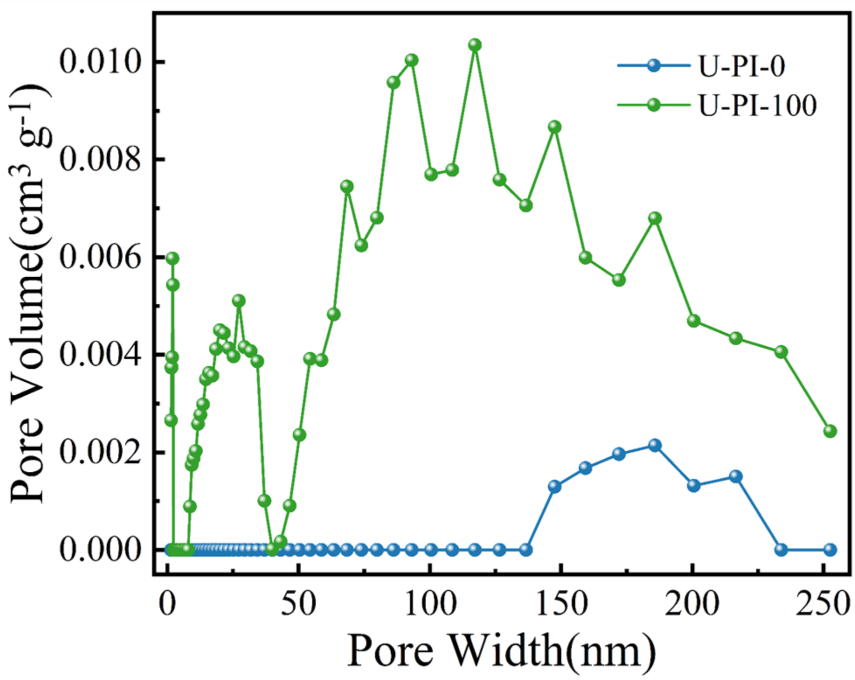

Fig. S6 Pore size distribution

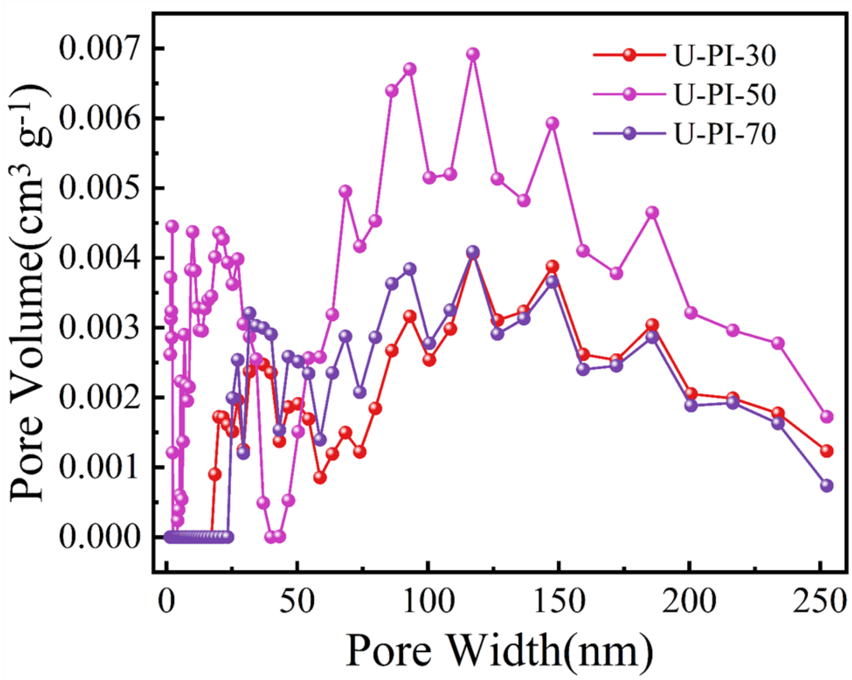

Fig. S7 Pore size distribution

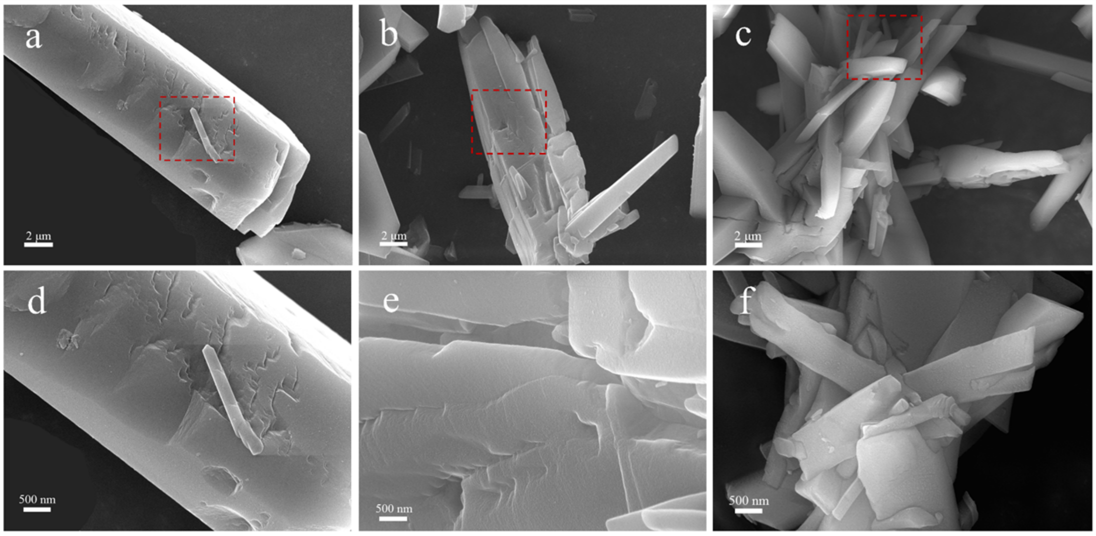

Fig. S8 SEM image: (a) U-PI-0; (b) U-PI-30; (c) U-PI-70; (d) ~(f) corresponding magnified SEM images

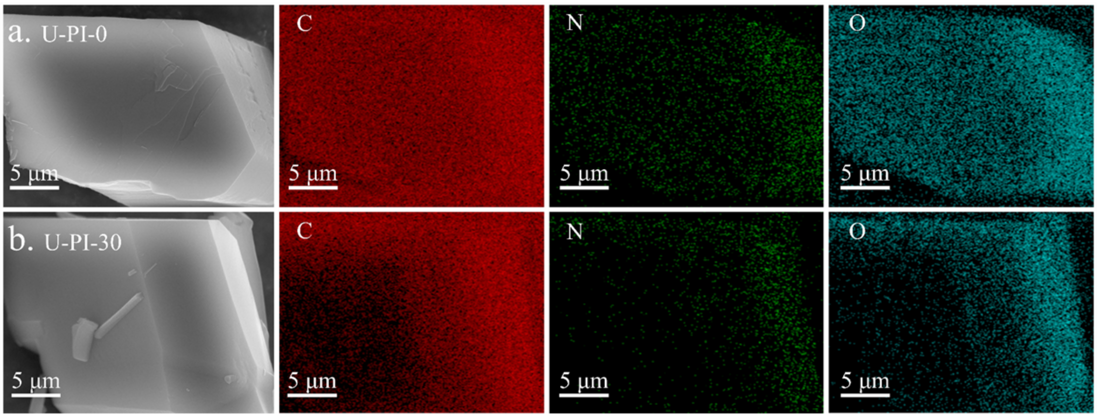

Fig. S9 EDS mapping of (a) U-PI-0, (b) U-PI-30

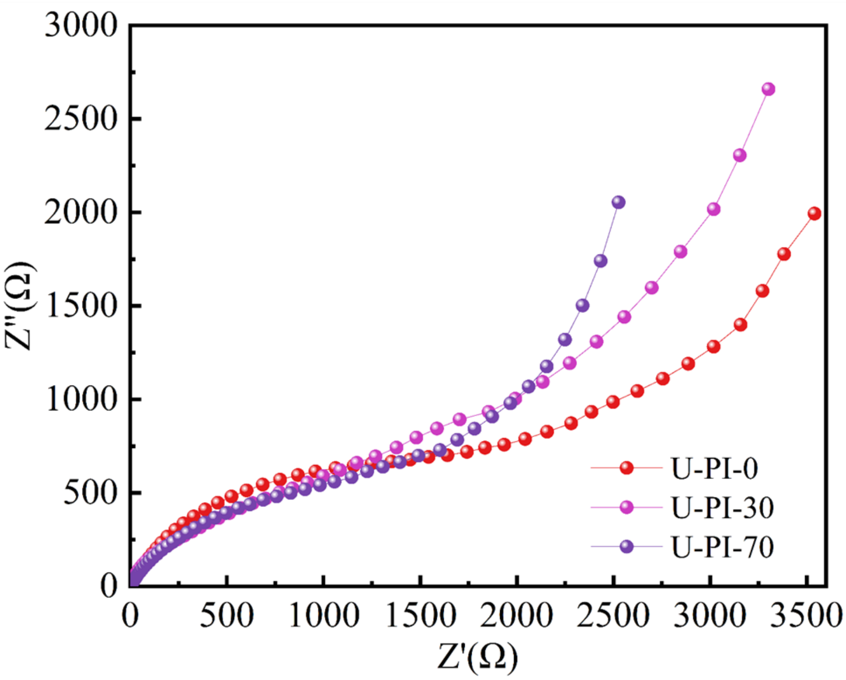

Fig. S10 Nyquist plots

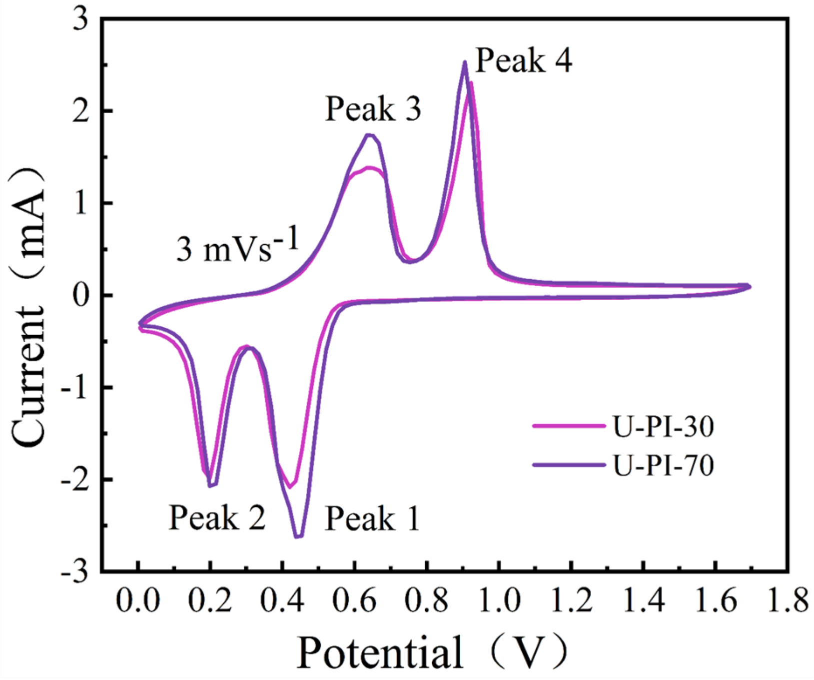

Fig. S11 CV curves

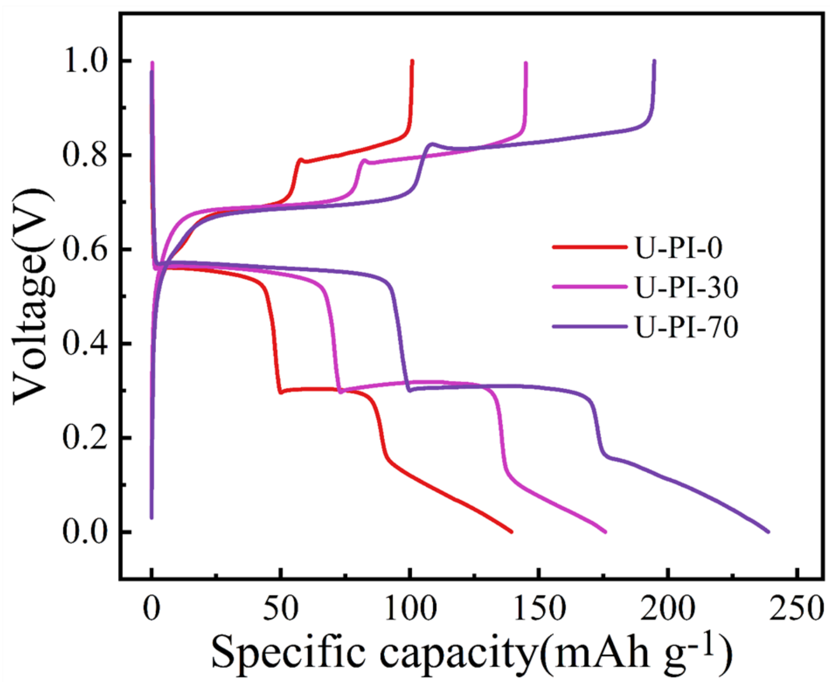

Fig. S12 GCD curves in the voltage range of 0-1 V at 0.05C

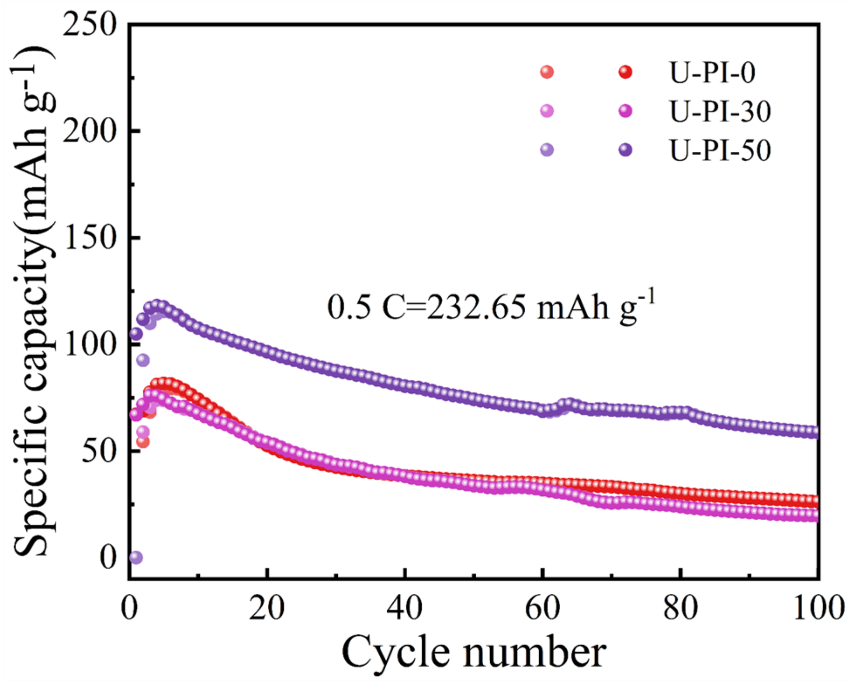

Fig. S13 Cycling performances

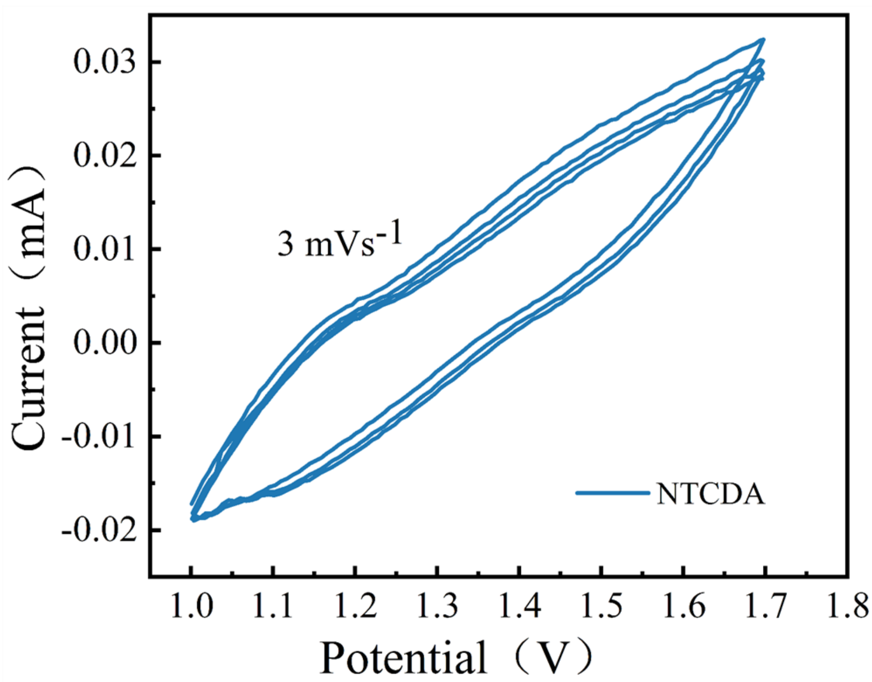

Fig. S14 CV curves

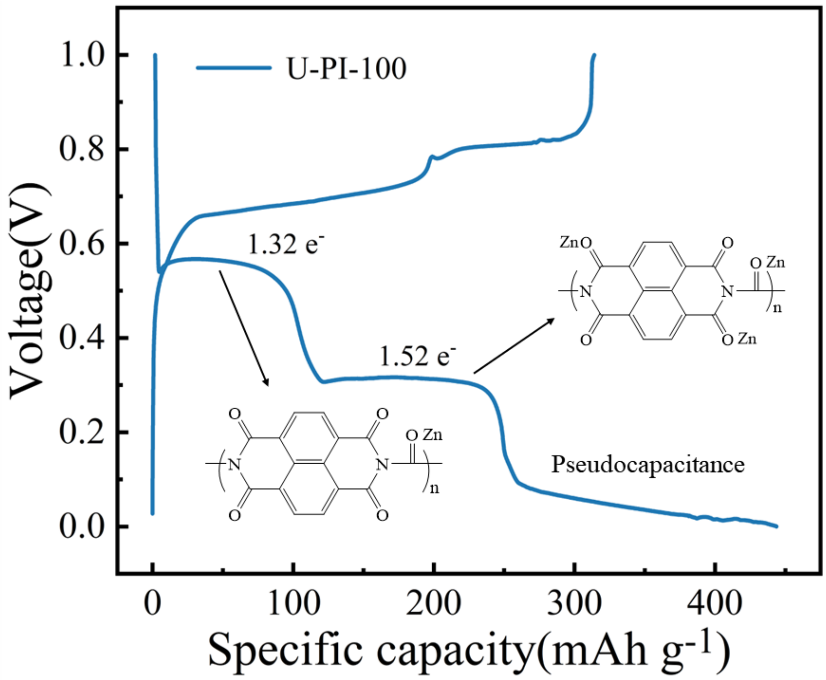

Fig. S15 The reduction reactions of U-PI-100 during the initial discharge process

Table S1 Organic Elemental Analysis of U-PI-100

	N (%)	C (%)	H (%)	O (%)
Theoretical value	9.589	61.643	1.369	27.39
Tested value	9.594	63.048	2.665	24.182

Table S2 The comparison between previous studies and this work

Dianhydride	diamine	Solvent	Capacity （mAh g^{-1}）		Cycle performance	Ref.
NTCDA	Urea	NMP	174.5(20 mA g^{-1})	(vs. Li/Li$^+$)	50 mA g^{-1} 60 cycles 153 mAh g^{-1}(50 mA g^{-1})	[1]
NTCDA	TAPBA/ MWCNTs	NMP /mesitylene / iso-quinoline	98.4(0.1 A g^{-1})	(vs. Na/Na$^+$)	100 cycles 93.8 mAh g^{-1}	[2]
NTCDA	TAPA/CNT	Dimethylimidazolidone/mesitylene/iso-quinoline	104.4(0.1 A g^{-1})	(vs. Li/Li$^+$)	8000 cycles 100 mAh g^{-1}	[3]
NTCDA	EDA	NMP	112.0(50 mA g^{-1})	(vs. Mg/Mg^{2+})	100 cycles 113 mAh g^{-1}	[4]
NTCDA	TAPB	NMP	70.6(25 mA g^{-1})	(vs. Li/Li$^+$)	1.5 A g^{-1}10000 cycles 40 mAh g^{-1}(1.5 A g^{-1})	[5]

NTCDA	**2,5-Diamino-benzoquinone**	**quinoline**	**180.0(43.3 mA g^{-1})**	**(vs. Li/Li^{+})**	**80 cycles 85 mAh g^{-1}**	**[6]**
NTCDA	**EDA/G**	**NMP**	**142.0(100 mA g^{-1})**	**(vs. K/K^{+})**	**100 cycles 137 mAh g^{-1}**	**[7]**
PTCDA	**Urea**	**DMF**	**107.0(0.05 A g^{-1})**	**(vs. Zn/Zn^{2+})**	**100 cycles 26 mAh g^{-1}**	**[8]**
NTCDA	**1,2-Diamino-anthraquinone**	**NMP**	**192.9(0.05 A g^{-1})**	**(vs. Zn/Zn^{2+})**	**50 cycles 133.5 mAh g^{-1}**	**[9]**
NTCDA	**AQ-NH_2**	**Zinc acetate /imidazole**	**191.9(50 mA g^{-1})**	**(vs. Zn/Zn^{2+})**	**100 cycles 167.2 mAh g^{-1}**	**[10]**
PTCDA	**EDA**	**NMP**	**91.0(0.05 A g^{-1})**	**(vs. Zn/Zn^{2+})**	**1500 cycles 53 mAh g^{-1}(1 A g^{-1})**	**[11]**
NTCDA	**Urea**	**ethanol**	**378.9(23.3 mA g^{-1})**	**(vs. Zn/Zn^{2+})**	**200 cycles 40.7 mAh g^{-1}(0.46 A g^{-1})**	**This work**

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