Supporting Information

Eco-Friendly Water-Processable Polyimide Binders with High Adhesion to Silicon Anodes for Lithium-Ion Batteries

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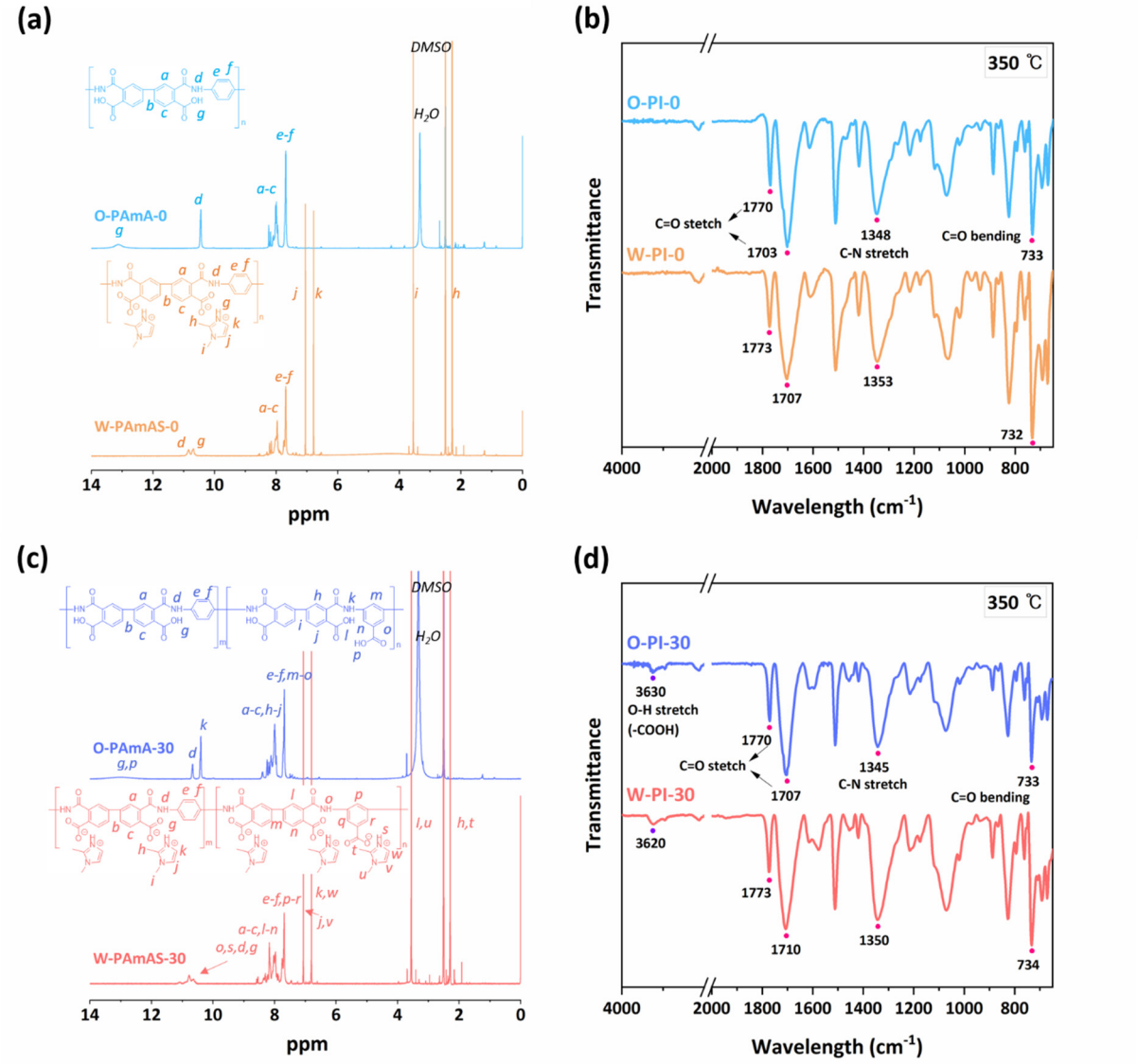

Figure S1. ^{1}H NMR spectra of (**a**) O-PAmA-0 and W-PAmA-0 and (**c**) O-PAmA-30 and W-PAmA-30 in DMSO-d_6. FT-IR spectra (**b**) O-PI-0 and W-PI-0 and (**d**) O-PI-30 and W-PI-30 after imidization at 350 °C.

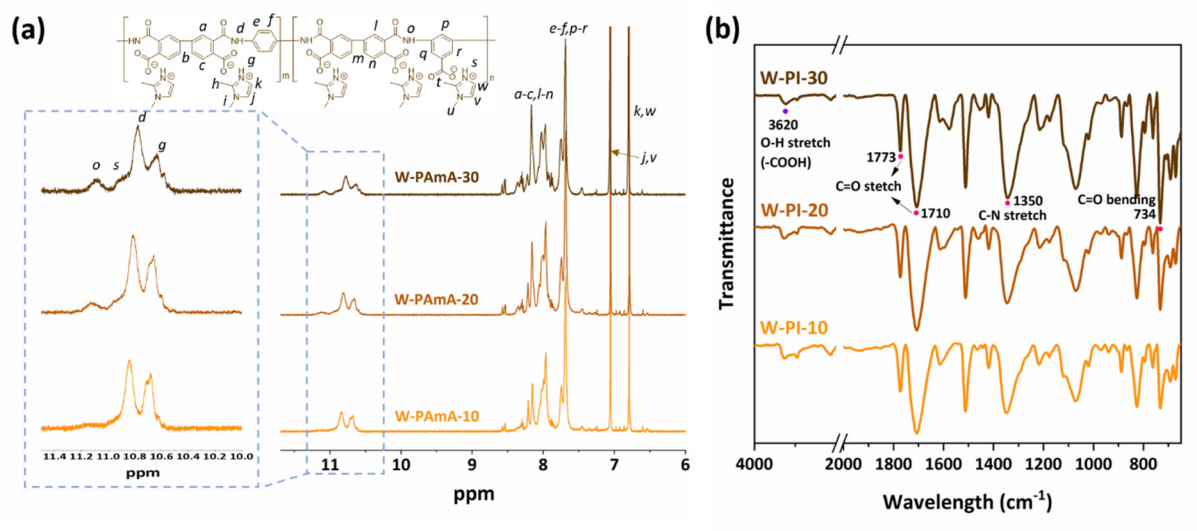

Figure S2. (**a**) ^{1}H NMR spectra of W-PAmAS-# and (**b**) FT-IR spectra of W-PI-# in proportion to the DABA content.

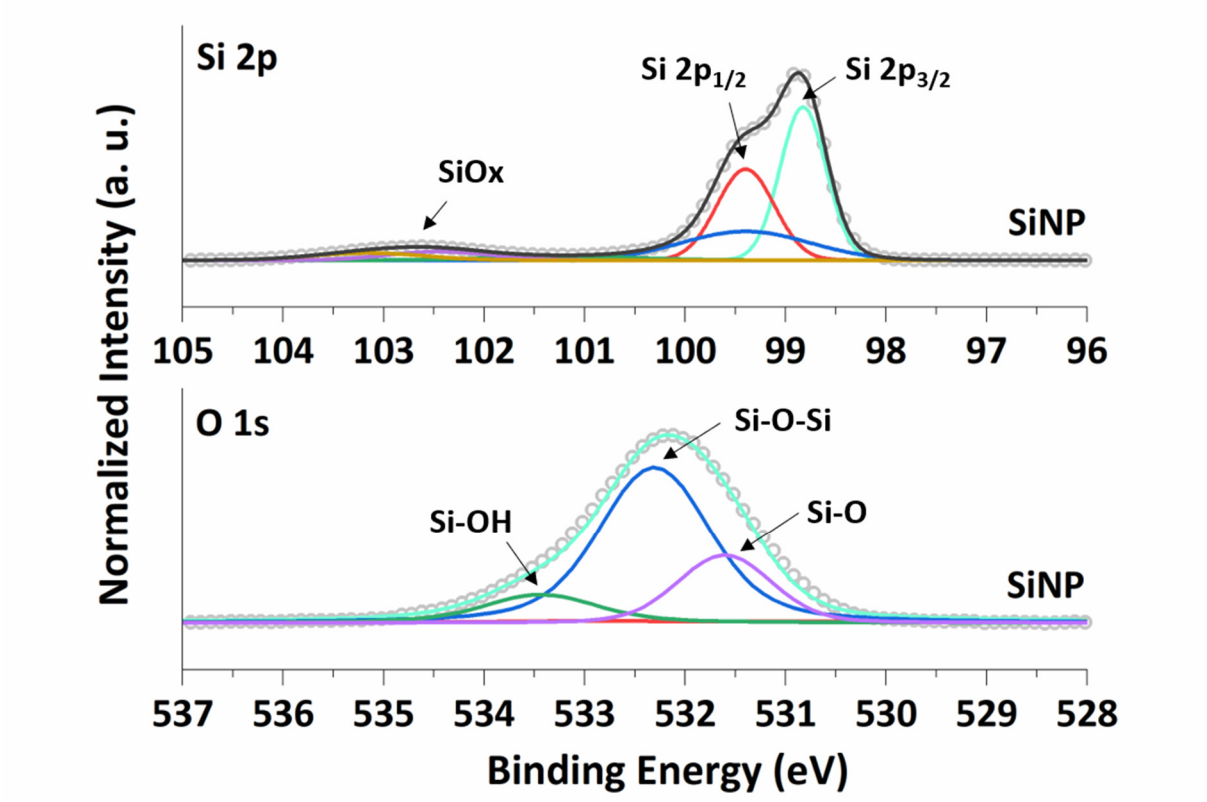

Figure S3. XPS spectra of Si 2p and O 1s in SiNPs.

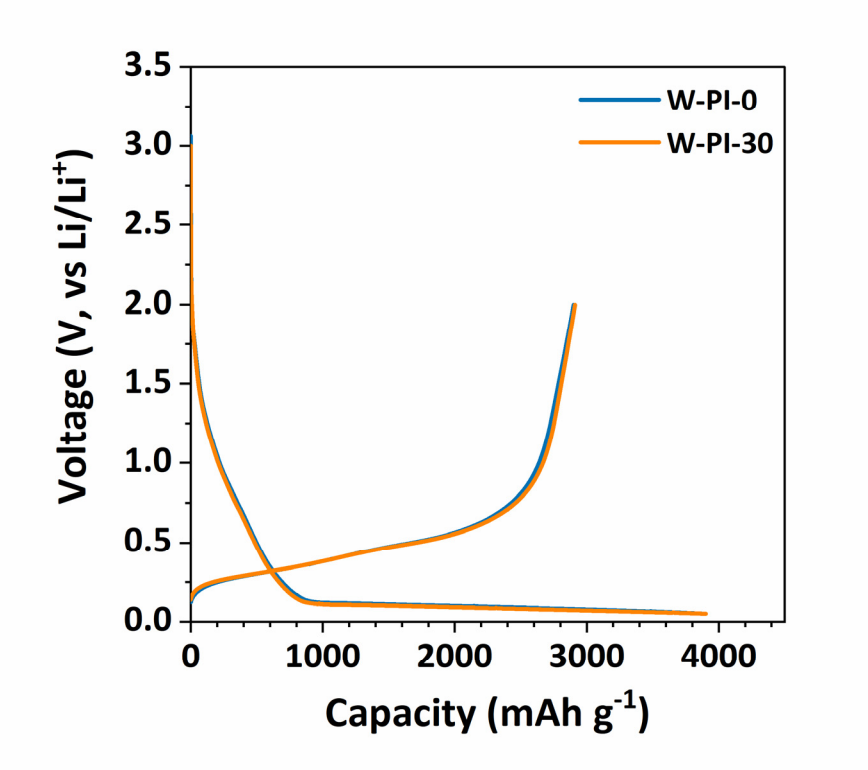

Figure S4. Precycling curves of Si anodes with W-PI binders (0.005–2.0 V vs. Li/Li$^+$, 200 mA g^{-1} at 25 °C).

Table S1. Cycle performance of Si-based anodes with different polymer binders

Binder	Anode material	Specific Capacity (mAh g^{-1})	Retention (%)	Current rate	Content of binder (%)	Ref.
Our polyimide (W-PI-30)	***Nano-Si***	***2061***	***1883 mAh g^{-1} (91.3 %) (200 cycles)***	***1200 mA g^{-1}***	***20***	**-**
Carboxymethyl chitosan	Si	1990	950 mAh g^{-1} (50 cycles)	500 mA g^{-1}	8	[22]
PVA-PEI	Nano-Si	3072.9	1063 mAh g^{-1} (300 cycles)	1 A g^{-1}	20	[23]
PAA-PANI	Nano-Si	1979	56.5 % (300 cycles)	1.0 C	25	[24]
PPyMAA	Nano-Si	3928.8	2200 mAh g^{-1} (over 180 cycles)	420 mA g^{-1} (0.1 C)	10	[25]
Gum arabic (GA)	Nano-Si	4056	2708 mAh g^{-1} (75.7%) (100 cycles)	420 mA g^{-1} (0.1 C)	25	[26]
Polyimide	Si	~800 (after 2nd cycle)	800 mAh g^{-1} (195 cycles)	800 mA g^{-1}	15	[41]
Polyimide	Si	2077	75.9 % (20 cycles)	200 mA g^{-1}	10	[42]
Polyimide	Si	1195.6	93.6 % (30 cycles)	0.1 C	25	[43]
Copolyimide (P84)	Si	1929	1313 mAh g^{-1} (300 cycles)	1.2 A g^{-1}	20	[4]
Copolyimide (PI-200)	Si	2989.7	2235.5 mAh g^{-1} (200 cycles)	420 mA g^{-1} (0.1 C)	20	[44]
Polyamide imide (PAI)	Nano-Si	~2000	1700 mAh g^{-1} (20 cycles)	0.56 mA cm^{-2}	10	[45]