Supporting Information

Oxidized Sodium Alginate Regulates Water Activity and Zn^{2+} Transport in Polyacrylamide Hydrogel Electrolytes for Stable Aqueous Zinc-Ion Batteries

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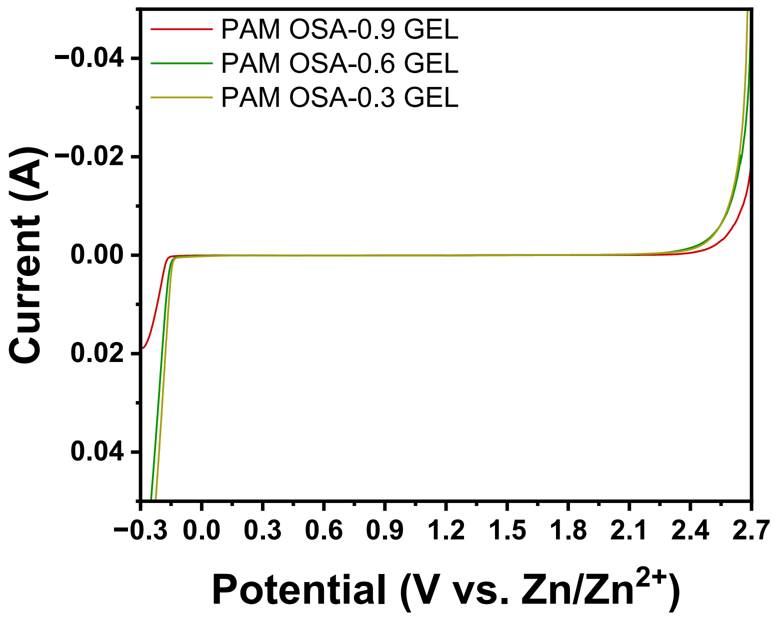

Fig. S1 LSV profiles of PAM OSA-x GELs

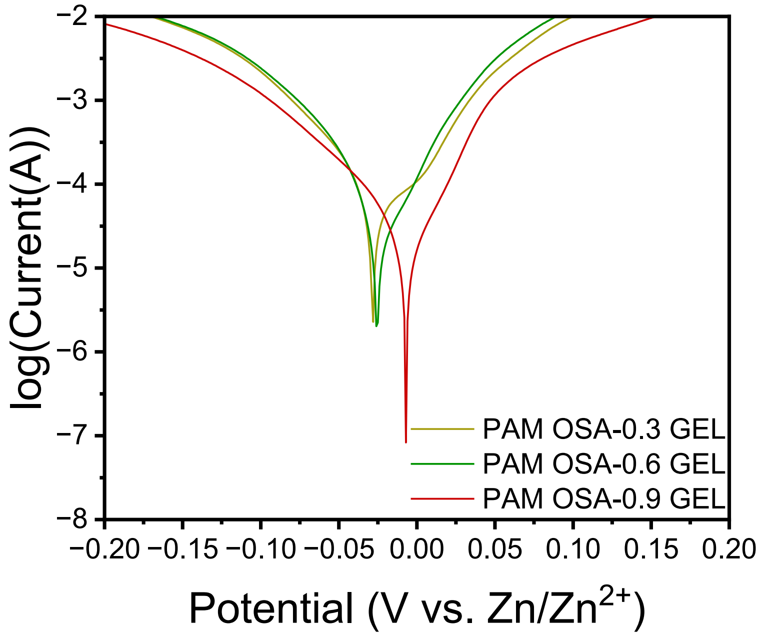

Fig. S2 Tafel profiles of PAM OSA-x GELs

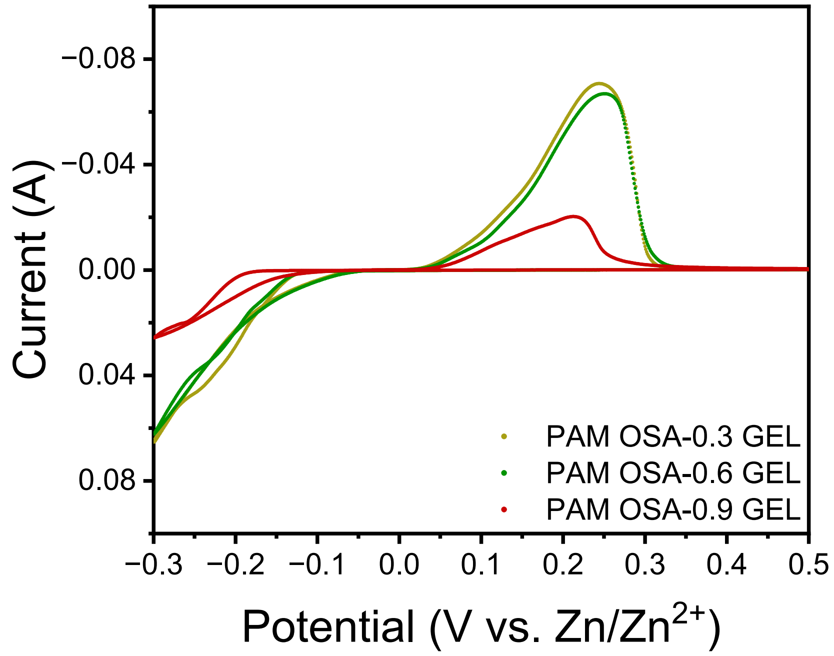

Fig. S3 CV curves of PAM OSA-x GELs

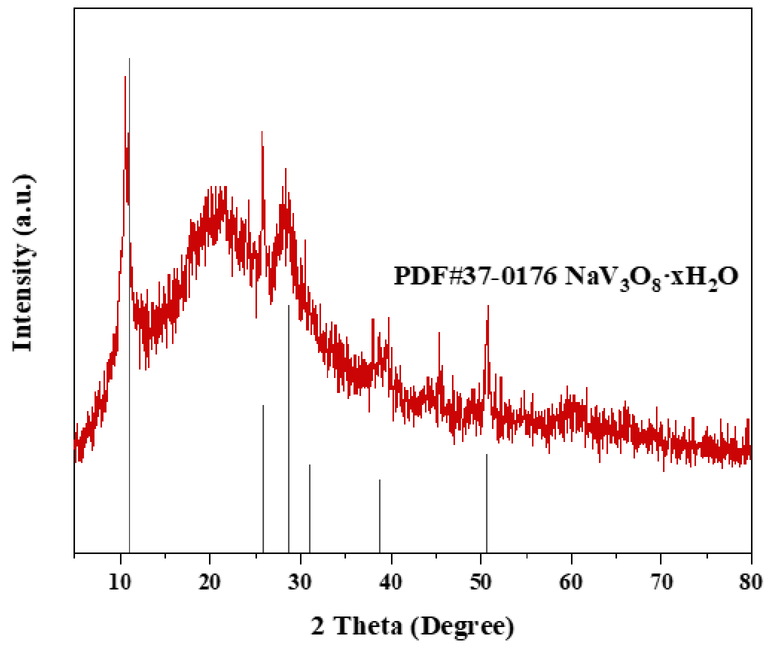

Fig. S4 XRD patterns of NVO

Table S1 Comparison of electrochemical performance of hydrogel electrolytes for aqueous Zn-based batteries

Gel electrolyte	**Ionic conductivity (mS cm^{-1})**	**Zn//Zn test conditions**	**Zn//Zn cycling life**	**Full-cell cathode**	**Full-cell test conditions**	**Full-cell cycling life**	**Capacity retention**
PCT-3[1]	40.98	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	1000 h	MnO_2@CNT	0.2 A g^{-1}	500 cycles	74.7%
PAM/BFEE-2%[2]	62.874	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	1000 h	V_2O_5	0.5 A g^{-1}	300 cycles	97.5%
PAMSCOHE[3]	25.35	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	500 h				
PAM/CMC/CD[4]	32.01	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	1200 h	MnO_2	0.2 A g^{-1}	120 cycles	
G-PAM[5]	33.2	0.5 mA cm^{-2} / 0.5 mAh cm^{-2}	1500 h	β-MnO_2	1.0 A g^{-1}	500 cycles	86.3%
P(AM-co-SBMA)/TA[6]	28.82	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	700 h	MXene@PANI	5.0 A g^{-1}	1000 cycles	77.1%
PAM/SC-5%[7]	20.6	0.5 mA cm^{-2}	2100 h	MnO_2	0.2 A g^{-1}	500 cycles	54.5%
PCNG[8]	45.5	0.2 mA cm^{-2} / 0.2 mAh cm^{-2}	1000 h	G@NVO	1.0 A g^{-1}	400 cycles	80.5%
PC-PAM[9]	25.3	1.0 mA cm^{-2} / 1.0 mAh cm^{-2}	1510 h	α-MnO_2	5.0 A g^{-1}	1000 cycles	58.8%
PAM OSA-0.9 GEL (this work)	**28.6**	**1.0 mA cm^{-2} / 1.0 mAh cm^{-2}**	**1300 h**	**$NaV_3O_8 \cdot xH_2O$ (NVO)**	**1.0 A g^{-1}; 5.0 A g^{-1}**	**220 cycles; 3500 cycles**	**79% (220 cycles); 58% (3500 cycles)**

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