

Comparative synthesis of ammonium manganese phosphate (NH₄MnPO₄) and its electrochemical performance enhancement using ammonium vanadate in sulfuric acid for supercapacitor applications

(Table S1) XRD peak details of ammonium manganese phosphate (manganese sulfate as precursor)

2θ	θ	Cosθ	FWHM(°)	FWHM(radian)	βcosθ	Size (nm)	Dislocation density (m ²)
10.1764	5.0882	0.9961	0.1181	0.0021	0.0021	67.5073	0.000219
18.611	9.3055	0.9868	0.1181	0.0021	0.0020	68.1380	0.000215
26.0995	13.0498	0.9742	0.1181	0.0021	0.0020	69.0238	0.00021
31.5687	15.7844	0.9623	0.1181	0.0021	0.0020	69.8762	0.000205
35.7456	17.8728	0.9517	0.1574	0.0027	0.0026	53.0106	0.000356
36.7595	18.3798	0.9490	0.1574	0.0027	0.0026	53.1644	0.000354
37.9252	18.9626	0.9457	0.2362	0.0041	0.0039	35.5499	0.000791
39.1554	19.5777	0.9422	0.1181	0.0021	0.0019	71.3672	0.000196
41.9888	20.9944	0.9336	0.1181	0.0021	0.0019	72.0225	0.000193
48.2288	24.1144	0.9127	0.3149	0.0055	0.0050	27.6293	0.00131
48.9736	24.4868	0.9101	0.2362	0.0041	0.0038	36.9435	0.000733
50.1319	25.0660	0.9058	0.2362	0.0041	0.0037	37.1162	0.000726
52.5097	26.2549	0.8968	0.2362	0.0041	0.0037	37.4881	0.000712
55.7933	27.8967	0.8838	0.1181	0.0021	0.0018	76.0826	0.000173
60.9314	30.4657	0.8619	0.2755	0.0048	0.0041	33.4419	0.000894

(Table S2) XRD peak details of ammonium manganese phosphate (manganese acetate as precursor)

2Θ	Θ	Cos Θ	FWHM($^{\circ}$)	FWHM(radian)	$\beta\cos\Theta$	Size (nm)	Dislocation Density (m^{-2})
10.244	5.122	0.9960	0.4723	0.0082	0.0082	16.8813	0.00351
18.7231	9.3615	0.9866	0.2362	0.0041	0.0041	34.0745	0.0009
26.2443	13.1221	0.9738	0.1574	0.0028	0.0027	51.8050	0.0004
31.6898	15.8449	0.9620	0.1181	0.0021	0.0020	69.8971	0.0002
35.8879	17.9439	0.9513	0.1181	0.0021	0.0020	70.6792	0.0002
38.0271	19.0135	0.9454	0.4723	0.0082	0.0078	17.7842	0.0032
39.2889	19.6444	0.9417	0.1181	0.0021	0.0019	71.3968	0.0002
42.1884	21.0942	0.9329	0.3149	0.0055	0.0051	27.0294	0.0014
44.2647	22.1323	0.9263	0.1574	0.0028	0.0025	54.4656	0.0003
48.2762	24.1381	0.9125	0.4723	0.0082	0.0075	18.4249	0.0029
52.3858	26.1929	0.8973	0.7872	0.0137	0.0123	11.2423	0.0079
54.6886	27.3443	0.8882	0.3149	0.0055	0.0049	28.3904	0.0012
62.0698	31.0349	0.8568	0.3936	0.0069	0.0059	23.5464	0.0018
75.533	37.7665	0.7905	0.4723	0.0082	0.0065	21.2696	0.0022
78.5008	39.2501	0.7443	0.4723	0.0082	0.0064	21.7124	0.0021

Table (S3) Comparison of the work with other published works

Electrode	Electrolyte	C _{sp}	Energy Density (Wh/Kg)	Ref
Mn ₃ (PO ₄) ₂ /100 mg GF	6 M KOH	28 F/g	7.6 at 0.5 A/g	63
AAS	PVA/KOH	128 F/g	45.7 at 1 A/g	64
NiMn(PO ₄) ₂ //AC	1 KOH	-	63.8 at 0.4 A/g	65
NH₄MnPO₄- Mn(CH₃COO)₂//AC	2M H₂SO₄ + 0.025M NH₄VO₃	99.16 mAh/g	69.44 at 1.0 A/g	This Work

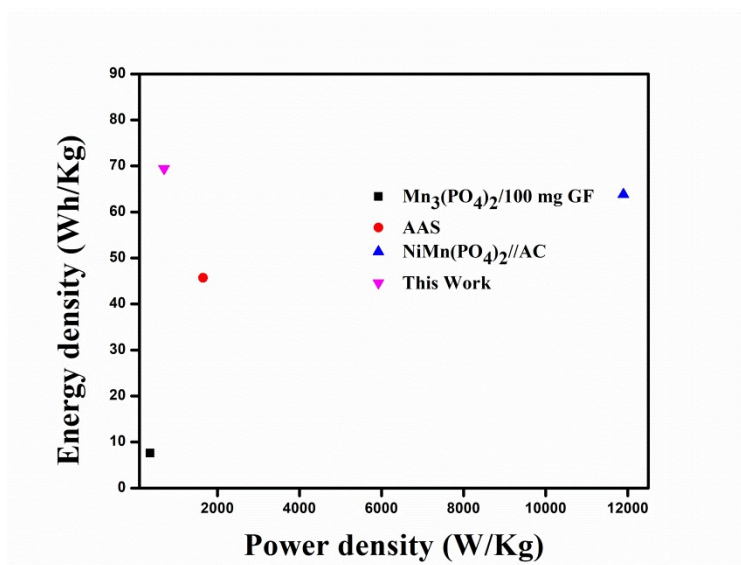


Figure S1 Ragone plot NH₄MnPO₄-Mn(CH₃COO)₂//AC asymmetry device with other reported articles