Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Design and synthesis of MnCo-MOF modified flexible 3D graphene sponge electrode for an asymmetric supercapacitor with high power and energy density

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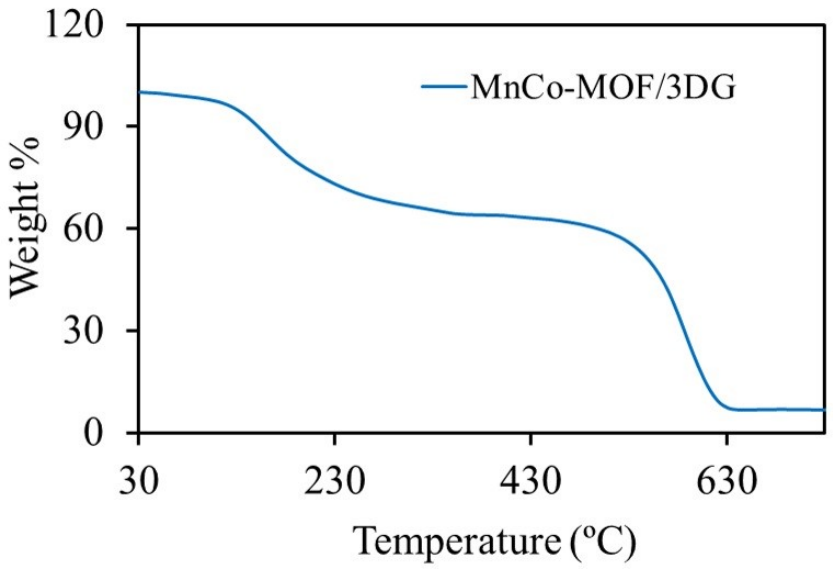

Figure S1. TGA thermogram of MnCo-MOF/3DG.

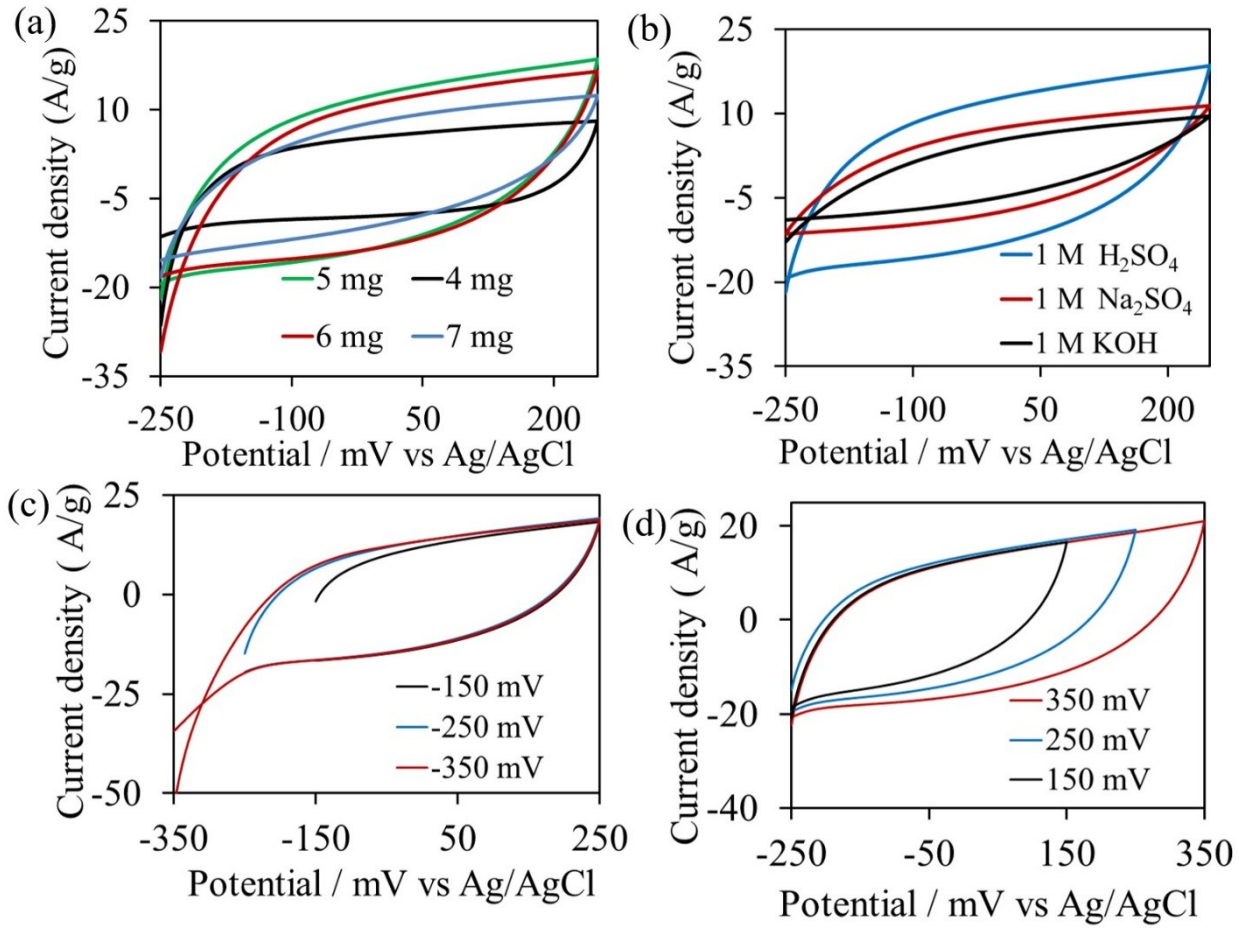

Figure S2. (a) CV graphs of MnCo-MOF/3DGs prepared using different amounts of MnCo-MOF. CVs of as-prepared MnCo-MOF/3DG (b) in different electrolytes, (c) in negative and (d) positive potential ranges.

Table S1. Specific capacitance values of 3DG and MnCo-MOF/3DG at different current densities and different scan rates.

	Cs (F/g)													
	$Cs_{(CV)}$ (different scan rates, mV/s)						$Cs_{(GCD)}$ (different current densities, A/g)							
Sample	2	5	10	25	50	75	1	2	4	6	8	10	20	30
3DG	348	285	206	85	62	45	416	333	250	209	105	73	41	20
MnCo-	401	318	222	156	103	60	408	328	272	216	152	104	60	42

MOF/3DG	6	6	9	3	7	9	6	6	0	0	0	0	0	0

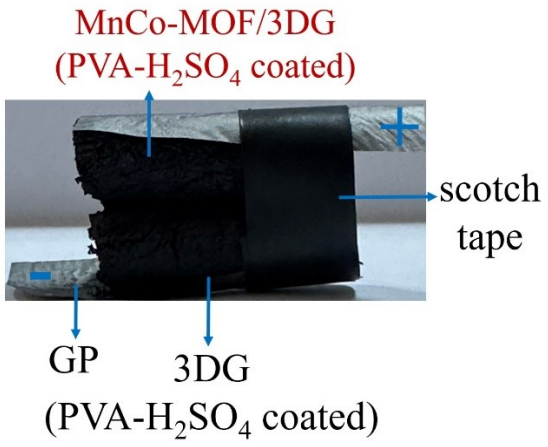

Figure S3. Digital camera photograph of MnCo-MOF/3DG//3DG circuit

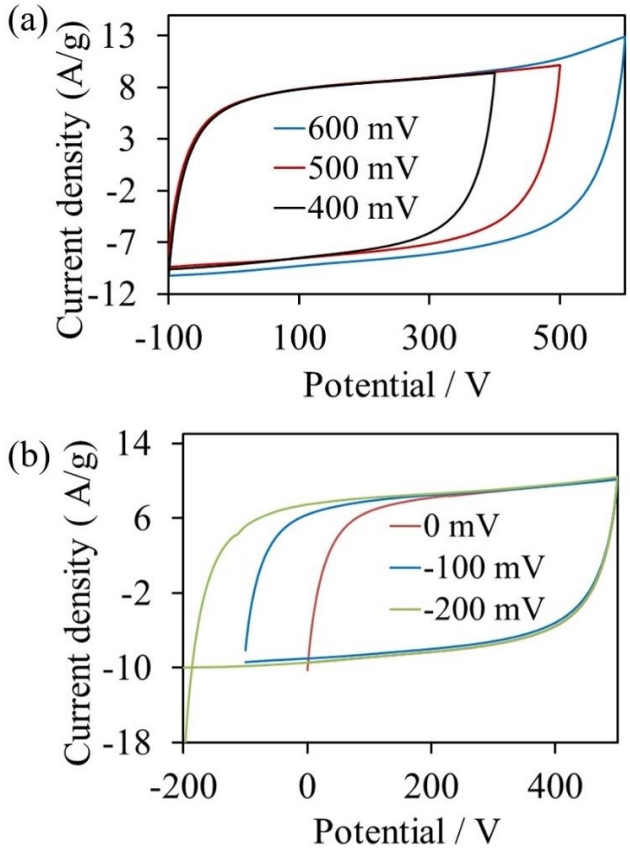

Figure S4. CVs of as-prepared MnCo-MOF/3DG//3DG circuit (a) in positive and (d) negative potential ranges.

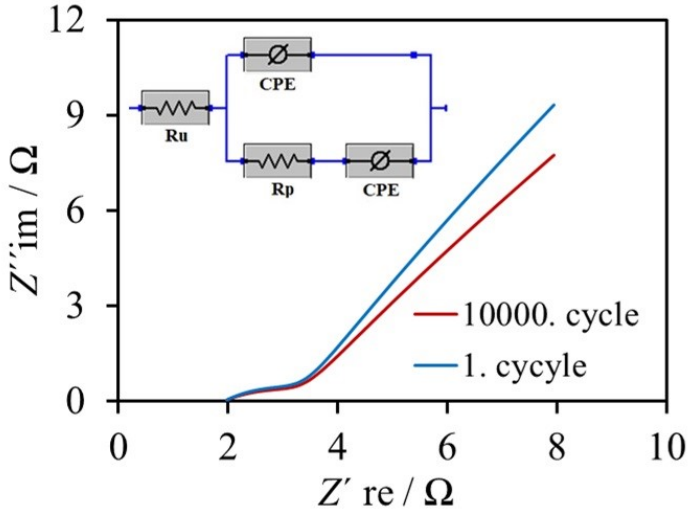

Figure S5. Nyquist plots of MnCo-MOF/3DG//3DG circuit after 1. and 10000. cycles.

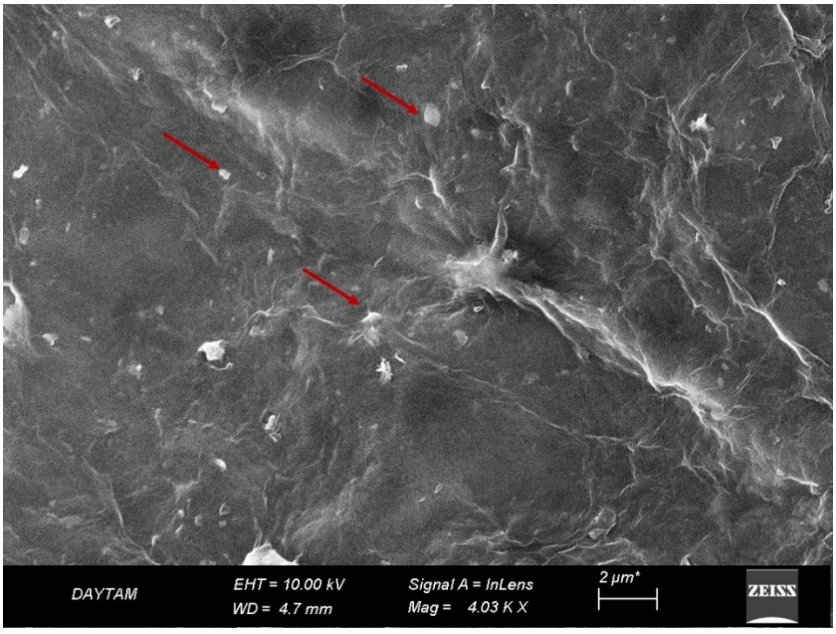

Figure S6. FESEM image of MnCo-MOF/3DG after 10000 cycles.

Table S2. Comparison of capacitance performances of MnCo-MOF/3DG with various 3D electrode materials.

Electrode	Cycle number /Change in capacitance (%)	Electrolyte	Current Density (A/g)	Specific capacitance (F/g)	Capacitance of ASC circuit (F/g)	Energy density (Wh/kg)	Power density kW/kg	Ref
PPy/FeCoS-rGO/NF	2500 / 5	3 M KOH	1	3178	94	28.3	0.81	[1]
ZnP-rGO/NF	2000 / 29	1 M KOH	0.6	278.7	171.3	24.26	2.5	[2]
FeNiP@CoNi-LDH	20.000 / 26	2 M KOH	1	2280.6	240.1	87.3	0.408	[3]
rGO/PPY	1000 / 50	3 M $NaClO_4$	1.5	350	-	14	0.72	[4]
ZnP@LIG	5000 / 32	PVA/KCl	1	1425	-	52	0.12	[5]
NiP@CoAl-LDH	4000 / 5	2 M KOH	1	2593	260.2	37.18	0.45	[6]
FeP-rGO/NF	5000 / 10	3 M KOH	1	376.5	202.10	63.15	-	[7]
CoS	5000 / 5	3 M KOH	5	310	47	5.3	1.8	[8]
FeCoP/GS	10000/20	1 M H_2SO_4	1	2100	1100	185	5.6	[9]
FeZnP/GS	10000/26	1 M	1	1100	780	98	3.8	[9]

		H_2SO_4						
FeP/GSM	10 000/15	1 M H_2SO_4	1	1872	745	265	5.5	[10]
ZnP/GSM	10000/30	2. M H_2SO_4	1	908	310	62	3.05	[10]
ZnCo-MOF/GS	7500/22	3 M KOH	1	695	302	108	5.03	[11]
MnCo-MOF/3DG	10000/17	2 M H_2SO_4	1	4086	2383	198.5	5.8	**This work**

rGO: reduced graphene oxide, PPY: polypyrrole, NF: Nickel foam, LDH: Layered double hydroxides, LIG: Laser induced graphene foam, PVA: Poly vinyl alcohol gel.GS: Graphene sponge, GSM:Graphene sponge material.

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