

CNF composite electrodes derived from MOP-18 and Matrimid for hybrid supercapacitors.

Syed Fahad Bin Haque, Yafen Tian, Daniel W. Tague, Kenneth J. Balkus Jr., and John P.

*Ferraris**

Department of Chemistry and Biochemistry, The University of Texas at Dallas, Richardson, TX

75080-3021, United States of America

Corresponding author e-mail: ferraris@utdallas.edu

Supplementary Characterization

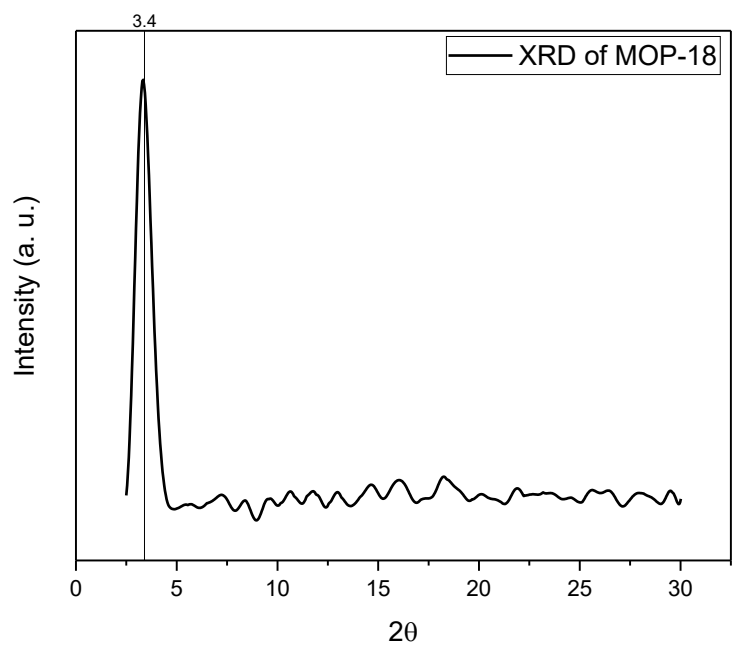


Figure S1 XRD of MOP-18

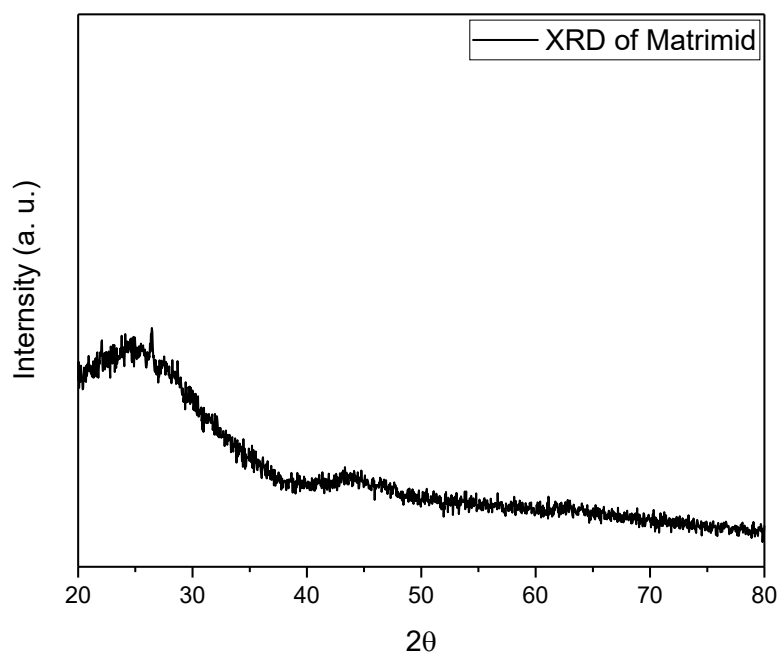


Figure S2 XRD of carbonized Matrimid

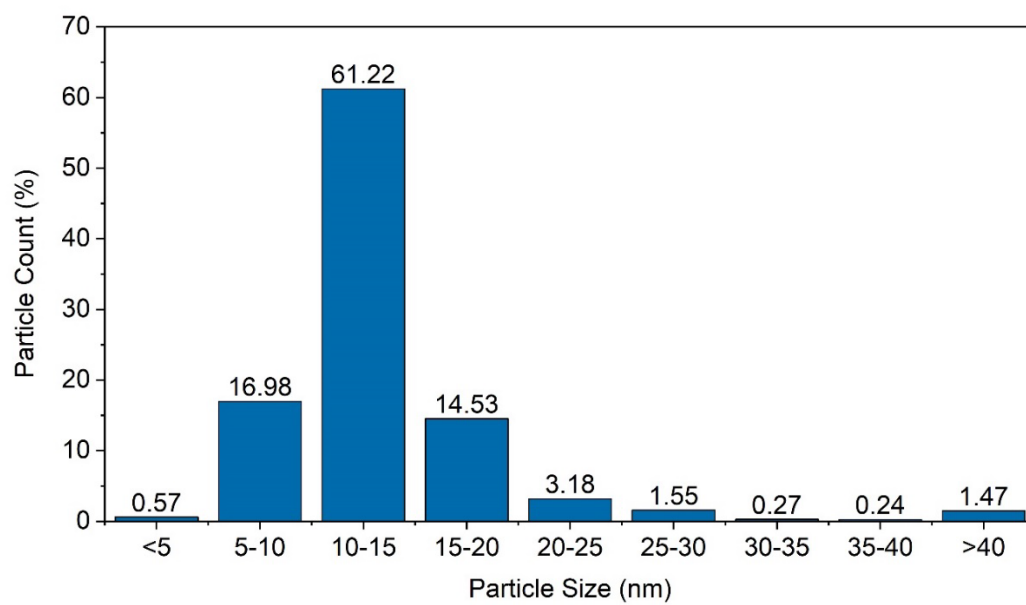


Figure S3 Particle size distribution histogram from TEM images of carbonized and activated 1:1 Matrimid/MOP-18 composite fibers.

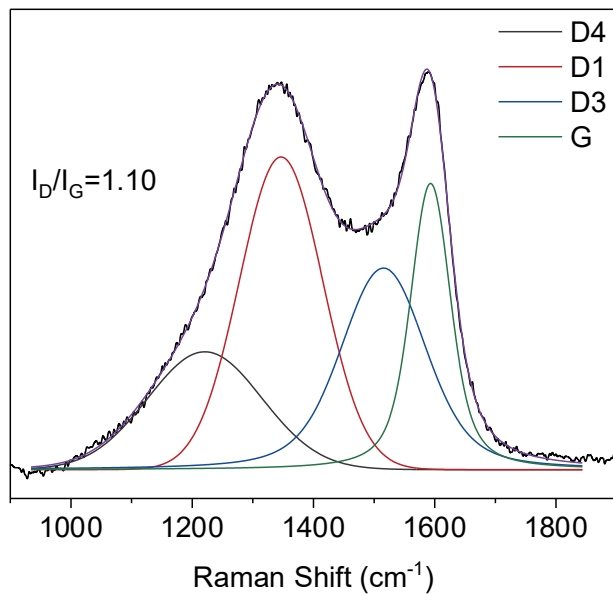


Figure S4 Raman Spectrum of Carbonized and Activated Matrimid

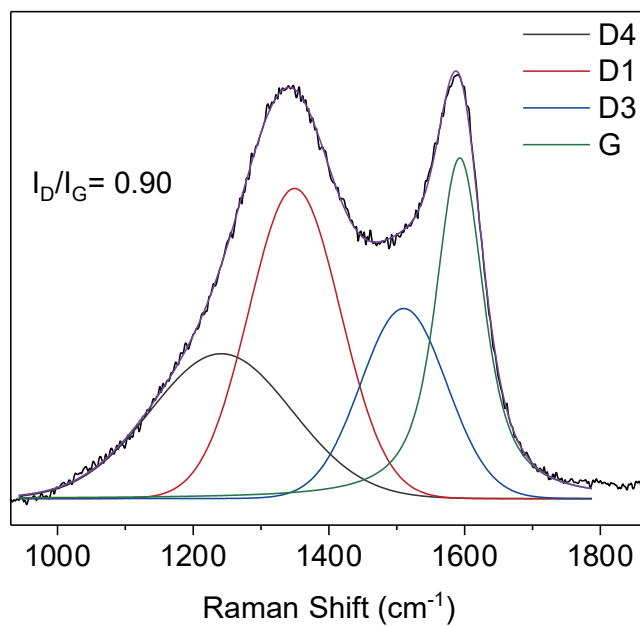


Figure S5 Raman Spectrum of Carbonized and Activated 2:1 Matrimid/MOP-18

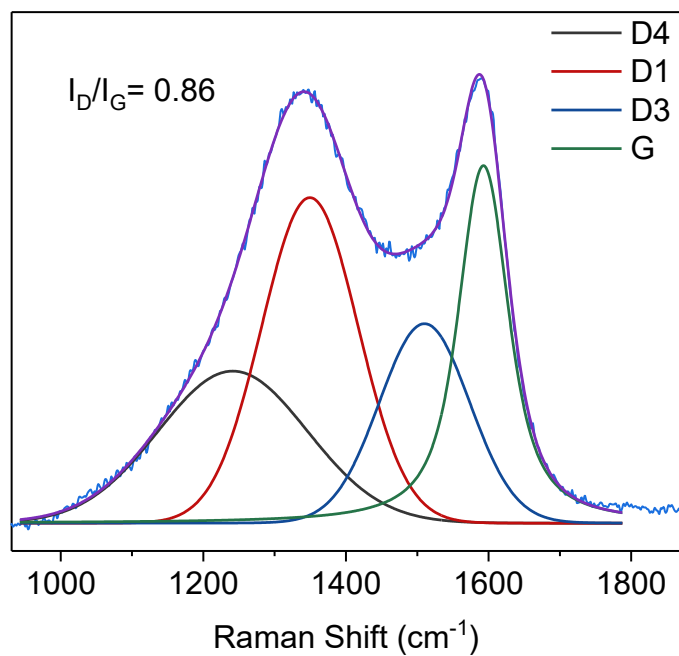


Figure S6 Raman Spectrum of 1:2 Matrimid MOP-18

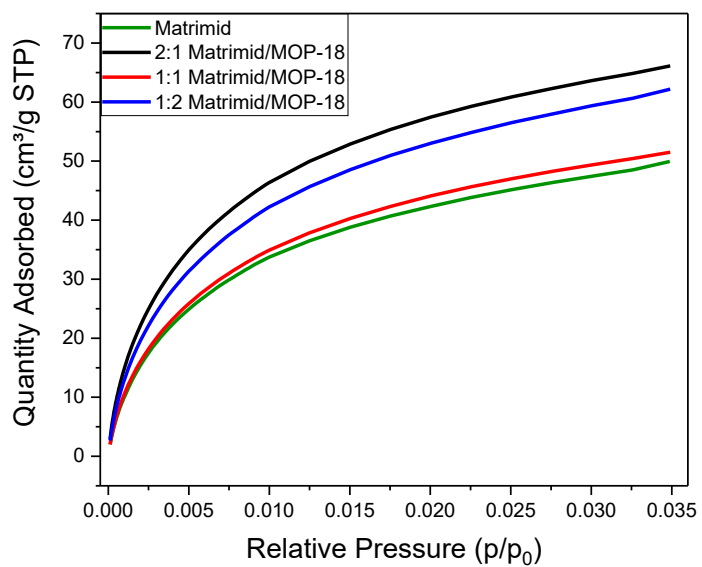


Figure S7 CO_2 Adsorption isotherm of carbonized and activated Matrimid and 2:1, 1:1 and 1:2 Matrimid/MOP-18 composite at 273 K.

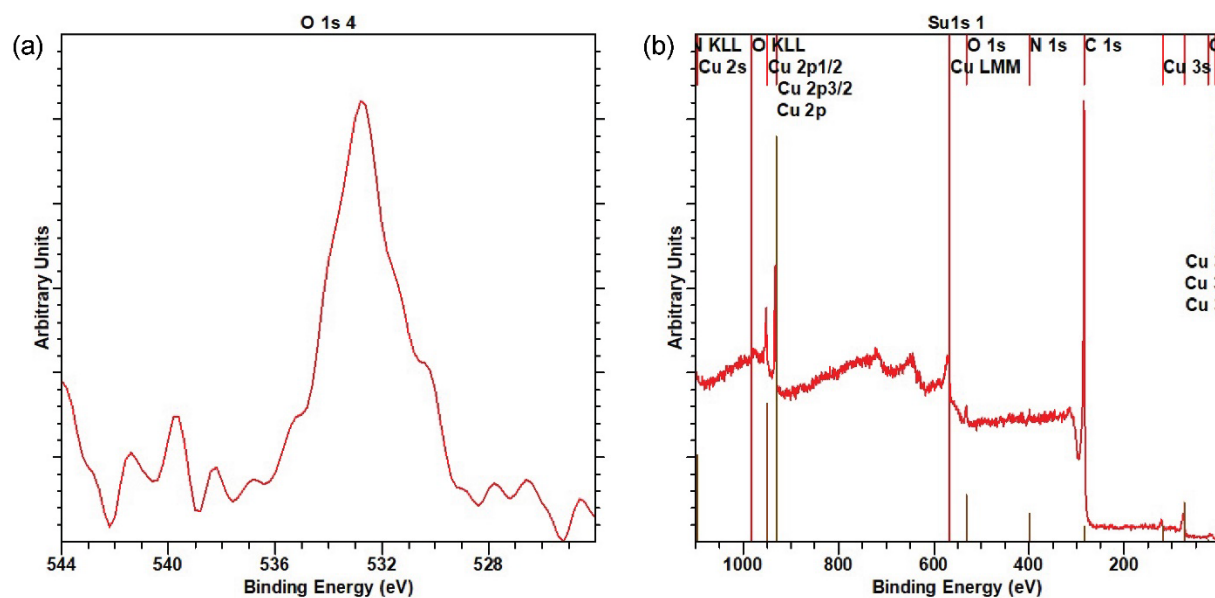


Figure S8 XPS spectra of carbonized and activated 1:1 Matrimid/MOP-18 (a) O 1s (b) Survey

Electrochemical Performance of Matrimid

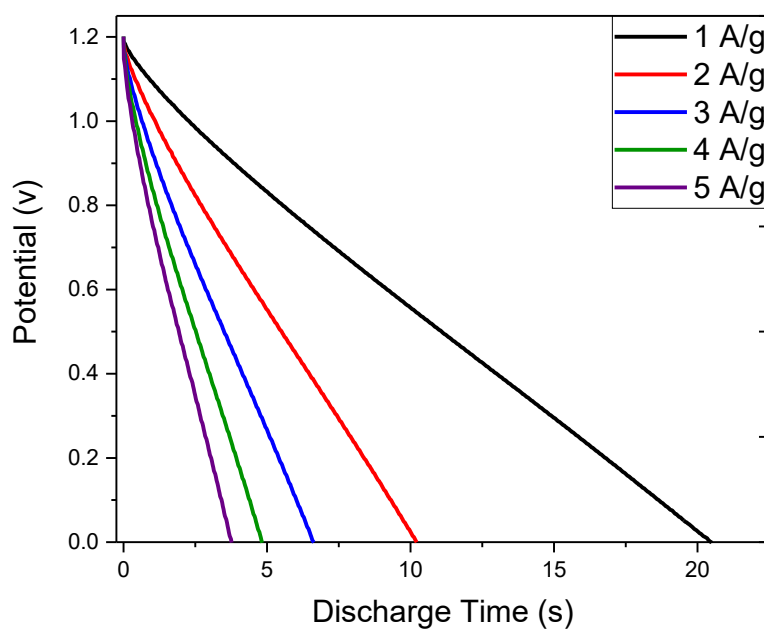


Figure S9 Galvanostatic charge-discharge (GCD) of Carbonized and Activated Matrimid

Table 1 Electrochemical performance of carbonized and activated Matrimid.

Current Density (A/g)	Discharge Time (s)	Specific Capacitance (F/g)	Energy density (Wh/kg)	Power density (W/kg)
1	21.67	72.2	3.6	600
2	10.23	68.2	3.4	1200
3	6.64	66.4	3.3	1800
4	4.85	64.6	3.2	2400
5	3.77	62.8	3.1	3000
6	3.12	62.3	3.1	3600
7	2.28	53.1	2.7	4200
8	1.85	49.2	2.5	4800
9	1.65	49.5	2.5	5400
10	1.55	51.7	2.6	6000

Electrochemical Performance of 2:1 Matrimid/MOP-18

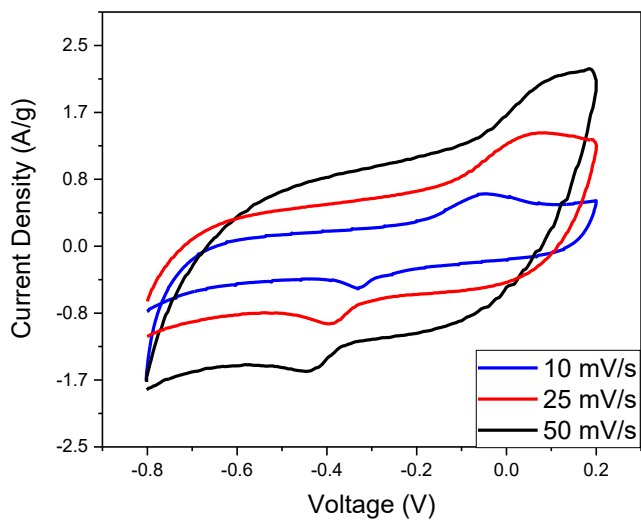


Figure S10 CV of Carbonized and Activated 2:1 Matrimid/MOP-18 (2-electrode)

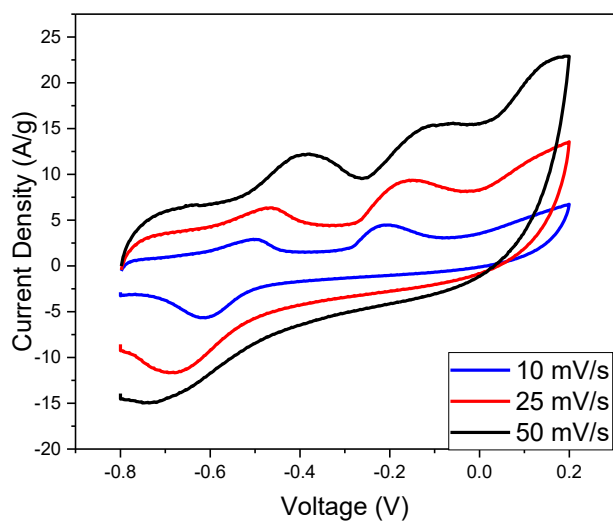


Figure S11 CV of Carbonized and Activated 2:1 Matrimid/MOP-18 (against Ag/AgCl reference electrode)

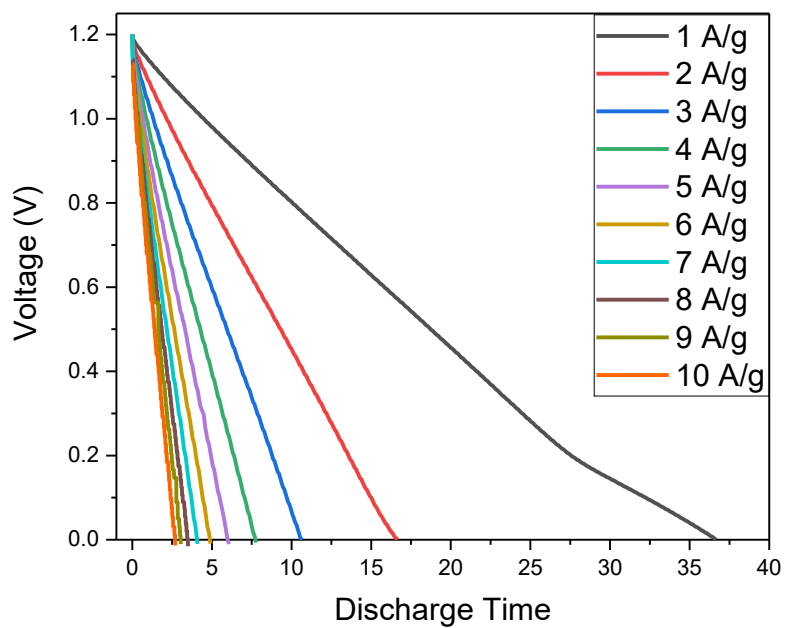


Figure S12 GCD of Carbonized and Activated 2:1 Matrimid/MOP-18

Table 2 Electrochemical performance of carbonized and activated 2:1 Matrimid/MOP-18

Current Density (A/g)	Discharge Time (S)	Specific Capacitance (F/g)	Energy Density (Wh/Kg)	Power Density (W/kg)
1.0	36.1	120.5	6.0	600
2.0	17.0	113.0	5.7	1200
3.0	10.7	106.8	5.3	1800
4.0	7.5	99.6	5.0	2400
5.0	5.9	98.5	4.9	3000
6.0	4.9	97.9	4.9	3600
7.0	4.1	95.0	4.7	4200
8.0	3.5	93.6	4.7	4800
9.0	3.0	90.5	4.5	5400
10.0	2.7	90.0	4.5	6000

Electrochemical Performance of 1:1 Matrimid/MOP-18

Table 3 Electrochemical performance of 1:1 Matrimid/MOP-18

Current Density (A/g)	Discharge Time (S)	Specific Capacitance (F/g)	Energy Density (Wh/Kg)	Power Density (W/kg)
1	76.05	253.3	12.69	600
2	31.75	211.4	10.59	1200
3	19.60	195.8	9.81	1800
4	14.10	187.6	9.44	2400
5	11.15	185.1	9.29	3000
6	9.20	184.1	9.24	3600
7	7.85	183.0	9.21	4200
8	6.85	187.0	8.87	4800
9	6.00	185.5	8.76	5400
10	5.35	181.8	8.77	6000

Electrochemical Performance of 1:2 Matrimid/MOP-18

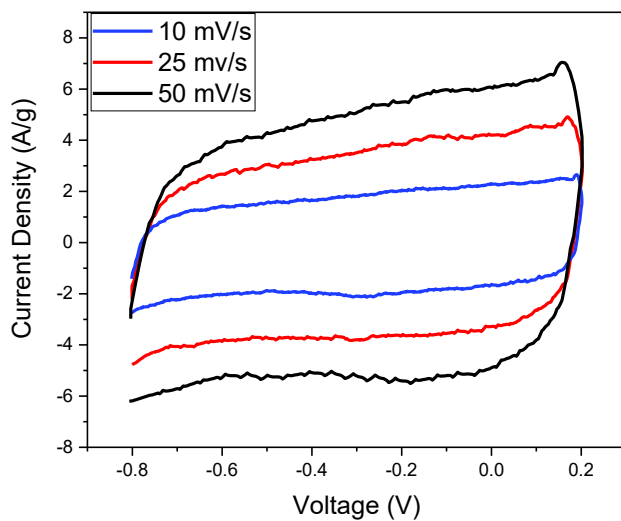


Figure S13 CV of Carbonized and Activated 1:2 Matrimid/MOP-18 (2-electrode)

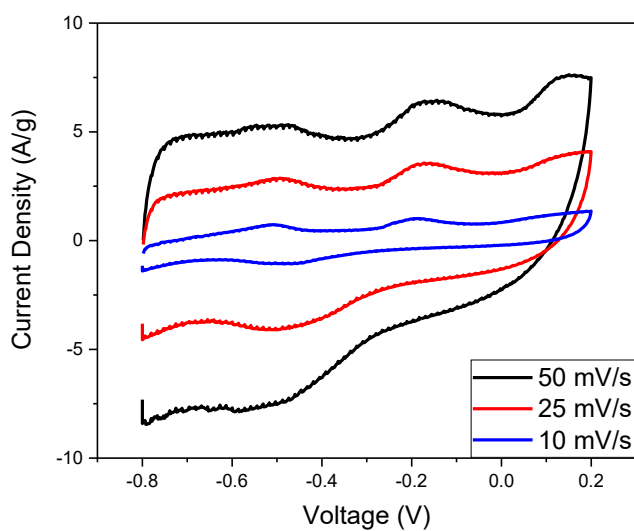


Figure S14 CV of Carbonized and Activated 1:2 Matrimid/MOP-18 (against Ag/AgCl reference electrode)

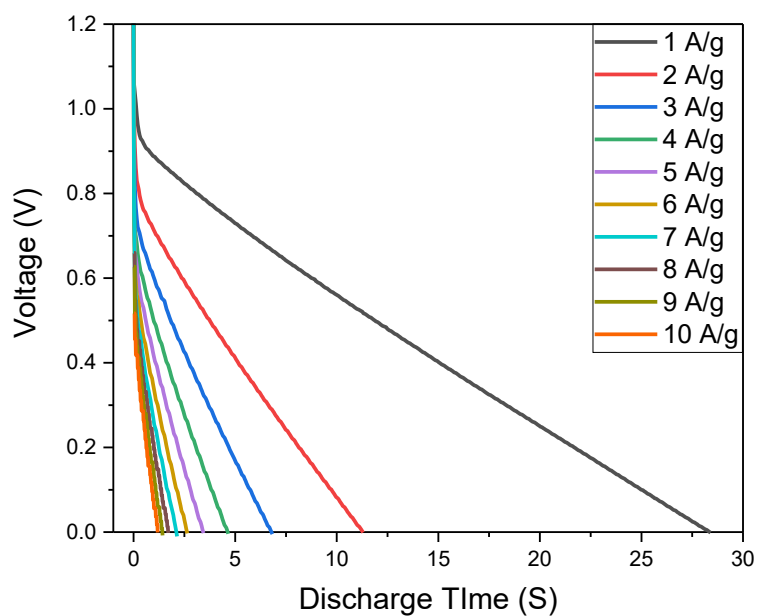


Figure 15 GCD of Carbonized and Activated 1:2 Matrimid/MOP-18

Table 4 Electrochemical performance of carbonized and activated 1:2 Matrimid/MOP-18

Current Density (A/g)	Discharge Time (S)	Specific Capacitance (F/g)	Energy Density (Wh/kg)	Power Density (W/kg)
1	28.4	108.2	5.4	600
2	11.3	75.4	3.8	1200
3	6.8	68.1	3.4	1800
4	4.7	62.5	3.1	2400
5	3.5	57.5	2.9	3000
6	2.6	52.8	2.6	3600
7	2.1	49.6	2.5	4200
8	1.7	45.8	2.3	4800
9	1.4	42.2	2.1	5400
10	1.2	39.6	2.0	6000