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LAMPIRAN

Lampiran 1. Dokumentasi Penelitian

Bubuk daun alpukat

Aktivasi dengan KOH

Pengeringan sampel

Penggerusan sampel

Pengayakan sampel

Pencetakan sampel

Lampiran 2. Perhitungan Densitas Eletroda Sel Superkapasitor

$$\rho = \frac{4\mathrm{m}}{\pi \mathrm{d}^2 \mathrm{t}}$$

1. **Densitas sebelum karbonisasi**

   a. Untuk suhu 500℃

   $$\rho_1 = \frac{4\mathrm{m}}{\pi \mathrm{d}^2 \mathrm{t}}$$

   $$\rho_2 = \frac{4(0{,}73)}{(3{,}14)(2{,}03)^2(0{,}24)}$$

   $$\rho_2 = 0{,}940 \text{ g/cm}^3$$

   b. Untuk suhu 600℃

   $$\rho_2 = \frac{4m}{\pi \mathrm{d}^2 \mathrm{t}}$$

   $$\rho_2 = \frac{4(0{,}74)}{(3{,}14)(2{,}03)^2(0{,}24)}$$

   $$\rho_2 = 0{,}953 \text{ g/cm}^3$$

   c. Untuk suhu 700℃

   $$\rho_3 = \frac{4m}{\pi \mathrm{d}^2 \mathrm{t}}$$

   $$\rho_2 = \frac{4(0{,}74)}{(3{,}14)(2{,}03)^2(0{,}24)}$$

   $$\rho_2 = 0{,}953 \text{ g/cm}^3$$

2. **Densitas sesudah karbonisasi**

   a. Untuk suhu 500℃

   $$\rho_1' = \frac{4m}{\pi \mathrm{d}^2 \mathrm{t}}$$

   $$\rho_1' = \frac{4(0{,}17)}{(3{,}14)(1{,}28)^2(0{,}16)}$$

   $$\rho_1' = 0{,}826 \text{ g/cm3}$$

   b. Untuk suhu 600℃

   $$\rho_2' = \frac{4m}{\pi \mathrm{d}^2 \mathrm{t}}$$

   $$\rho_2' = \frac{4(0{,}16)}{(3{,}14)(1{,}26)^2(0{,}16)}$$

$\rho_2' = 0{,}802$ g/cm^3

c. Untuk suhu 700℃

$$\rho_3' = \frac{4m}{\pi d^2 t}$$

$$\rho_3' = \frac{4(0{,}12)}{(3{,}14)(1{,}13)^2(0{,}15)}$$

$\rho_3' = 0{,}798$ g/cm^3

Lampiran 3. Perhitungan Kapasitansi Spesifik

$$C_{sp} = \frac{I_c - I_d}{S.m}$$

1. Untuk suhu 500℃

   Diketahui:

   I_c = 0.000323 A/cm^2 S = 0,001 V/s

   I_d= −0.00018 A/cm^2 m = 0,0125 g

   $$C_{sp} = \frac{I_c - I_d}{S.m}$$

   $$C_{sp} = \frac{0.000323 - (-0.00018)}{(0{,}001)(0{,}0125)}$$

   $$C_{sp} = \ 40 \text{ F/g}$$

2. Untuk suhu 600℃

   Diketahui:

   I_c = 0.000821 A/cm^2 S = 0,001 V/s

   I_d= −0.00042 A/cm^2 m = 0,0140 g

   $$C_{sp} = \frac{I_c - I_d}{S.m}$$

   $$C_{sp} = \frac{0.000821 - (-0.00042)}{(0{,}001)(0{,}0140)}$$

   $$C_{sp} = \ 89 \text{ F/g}$$

3. Untuk suhu 700℃

   Diketahui:

   I_c = 0.000821 A/cm^2 S = 0,001 V/s

   I_d= −0.00042 A/cm^2 m = 0,0140 g

   $$C_{sp} = \frac{I_c - I_d}{S.m}$$

   $$C_{sp} = \frac{0.001222 - (-0.00074)}{(0{,}001)(0{,}0145)}$$

   $$C_{sp} = \ 135 \text{ F/g}$$

Lampiran 4. Data TG-DTG

Time min	Temp. Cel	TG ug	DTG ug/min
0	26.38718	-2.29425	28.69821
0.008333	26.39153	-2.5243	28.54138
0.016667	26.38885	-2.76456	28.25958
0.025	26.38897	-3.00478	28.14871
0.033333	26.40088	-3.23301	28.02127
0.041667	26.42203	-3.46149	27.84586
0.05	26.44007	-3.70161	27.81189
0.058333	26.44144	-3.92963	27.6611
0.066667	26.43822	-4.15826	27.6611
0.075	26.42798	-4.38699	27.65936
0.083333	26.41649	-4.61474	27.63702
0.091667	26.40731	-4.84196	27.49594
0.1	26.40267	-5.06966	27.51425
0.108333	26.40481	-5.30987	27.66422
0.116667	26.42697	-5.53796	27.66605
0.125	26.43286	-5.76458	27.80832
0.133333	26.42774	-5.99294	27.80209
0.141667	26.41488	-6.22248	27.94189
0.15	26.39874	-6.46361	27.93723
0.158333	26.38766	-6.6925	28.0892
0.166667	26.3876	-6.9321	28.12994
0.175	26.39891	-7.1588	28.11804
0.183333	26.4057	-7.39815	28.22552
0.191667	26.40314	-7.63797	28.061
0.2	26.38438	-7.87872	28.17041
0.208333	26.36794	-8.10874	27.99435
0.216667	26.37592	-8.33611	27.995
0.225	26.41023	-8.57461	27.86224
0.233333	26.45127	-8.80202	27.88458
0.241667	26.48271	-9.04003	27.73343
0.25	26.50307	-9.26496	27.53687
0.258333	26.51039	-9.49171	27.23904
0.266667	26.51105	-9.72	26.94388
0.275	26.54034	-9.96169	26.93436
0.283333	26.59426	-10.1898	26.79565
0.291667	26.653	-10.4035	26.83145
0.3	26.68674	-10.606	26.55762
0.308333	26.69013	-10.8199	26.52924
0.316667	26.70167	-11.0466	26.173

Lampiran 5. Data FTIR

No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	372.26	97.462	2.151	408.91	354.9	0.331	0.256
2	424.34	97.789	1.428	441.7	408.91	0.229	0.111
3	457.13	98.25	0.722	484.13	441.7	0.232	0.076
4	516.92	96.023	3.893	547.78	484.13	0.581	0.557
5	596	98.801	1.063	640.37	547.78	0.3	0.247
6	667.37	98.393	1.276	684.73	640.37	0.191	0.13
7	704.02	98.239	1.498	738.74	684.73	0.25	0.199
8	783.1	94.948	4.243	802.39	738.74	0.568	0.403
9	825.53	96.344	2.86	866.04	802.39	0.54	0.355
10	889.18	99.408	0.508	910.4	866.04	0.066	0.049
11	1037.7	75.061	2.859	1049.28	929.69	6.836	0.5
12	1056.99	75.55	1.568	1143.79	1051.2	6.82	1.089
13	1163.08	96.747	3.471	1182.36	1145.72	0.273	0.308
14	1253.73	94.988	4.753	1298.09	1192.01	1.358	1.241
15	1319.31	94.14	5.753	1344.38	1300.02	0.554	0.535
16	1388.75	92.789	2.471	1406.11	1346.31	1.29	0.42
17	1450.47	87.917	9.031	1485.19	1408.04	2.722	1.526
18	1521.84	86.829	12.97	1577.77	1487.12	3.179	3.108
19	1651.07	69.005	31.031	1718.58	1579.7	12.789	12.812
20	1737.86	96.999	2.781	1757.15	1718.58	0.284	0.247
21	1797.66	99.609	0.189	1807.3	1778.37	0.03	0.011
22	1840.09	98.207	1.241	1861.31	1811.16	0.23	0.117
23	2137.13	99.562	0.161	2245.14	2073.48	0.256	0.064
24	2310.72	98.873	1.059	2335.8	2245.14	0.214	0.174
25	2501.67	99.767	0.034	2526.75	2465.03	0.058	0.005
26	2601.97	99.751	0.062	2659.84	2542.18	0.114	0.018
27	2723.49	99.668	0.199	2756.28	2659.84	0.099	0.04
28	2852.72	89.266	4.857	2875.86	2758.21	1.802	0.441
29	2924.09	82.621	12.86	2997.38	2877.79	5.069	3.04
30	3414	68.655	1.738	3658.96	3398.57	29.361	5.826

Comment;

S-APT

Date/Time; 10/14/2022 9:21:29 AM

No. of Scans;

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561.285456 99.532221
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565.143088 99.448165
567.071904 99.408682
```

Lampiran 6. Data XRD

*** Basic Data Process ***

Group : Standard
Data : syarif#S#APT

Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated (Counts)
1	122	64.4219	1.44511	100	0.20250	200	2260
2	80	44.0729	2.05306	85	0.19040	170	1940
3	60	37.8483	2.37515	16	0.20330	31	334

Peak Data List

peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated (Counts)
1	15.3725	5.75932	4	0.04500	7	24
2	16.2140	5.46226	8	0.09200	15	119
3	16.6775	5.31148	4	0.03500	7	18
4	16.9566	5.22468	6	0.12670	12	89
5	17.2625	5.13278	8	0.19500	15	152
6	17.6657	5.01653	5	0.13140	10	63
7	18.0066	4.92232	3	0.05330	6	24
8	18.3350	4.83489	8	0.17000	15	164
9	18.6820	4.74586	5	0.15600	10	111
10	19.0270	4.66058	6	0.16600	12	95
11	19.2500	4.60709	4	0.06000	8	94
12	19.4400	4.56248	5	0.00000	10	0
13	19.6657	4.51063	7	0.10860	14	144
14	19.9100	4.45583	5	0.08000	9	69
15	20.0600	4.42285	3	0.00000	6	0
16	20.3400	4.36259	10	0.12000	19	232
17	20.5400	4.32056	5	0.00000	9	0
18	20.8483	4.25736	8	0.12330	16	170
19	21.0582	4.21540	7	0.14640	13	118
20	21.4049	4.14790	13	0.18130	25	237
21	21.6700	4.09775	9	0.18000	17	154
22	21.9391	4.04809	7	0.19170	14	139
23	22.1660	4.00716	10	0.08800	19	93
24	22.4539	3.95643	10	0.13790	19	144
25	22.9783	3.86731	5	0.09000	10	71
26	23.3900	3.80016	5	0.06000	9	50
27	23.6100	3.76525	7	0.10000	13	131
28	24.3000	3.65987	13	0.23200	26	353
29	24.4800	3.63337	11	0.27200	22	266
30	26.0200	3.42171	4	0.06000	7	42
31	26.2566	3.39141	7	0.20670	14	155
32	26.4475	3.36737	4	0.05500	7	24
33	27.1231	3.28500	10	0.08040	19	104
34	27.5660	3.23322	7	0.10800	14	93
35	28.2560	3.15582	6	0.08800	11	61
36	28.6200	3.11650	3	0.06000	6	28
37	28.7325	3.10455	4	0.07500	8	32
38	29.1510	3.06093	4	0.08200	8	39
39	29.3650	3.03911	5	0.09000	10	39
40	29.6200	3.01352	5	0.05600	10	38
41	29.9166	2.98432	9	0.27330	17	241
42	30.2550	2.95170	7	0.13000	14	93
43	30.6633	2.91332	5	0.08670	9	66
44	31.5066	2.83724	4	0.05330	7	42
45	31.6750	2.82254	4	0.05000	7	41
46	32.0180	2.79308	4	0.07600	8	32
47	32.1966	2.77800	4	0.04670	7	55
48	33.3425	2.68510	5	0.07500	10	36
49	33.5750	2.66703	5	0.11000	9	51

Lampiran 7. Data CV

S : 1 mV/s	t (ms)	Umax : 1000 mV	
No.		U (mV)	I (A)
1	0	0	-0.00015
2	1000	1	-0.00023
3	2000	2	-0.00018
4	3000	3	-0.00013
5	4000	4	-0.00009
6	5000	5	-4.7E-05
7	6000	6	-8E-06
8	7000	7	0.00003
9	8000	8	0.000061
10	9000	9	0.000094
11	10000	10	0.000166
12	11000	11	0.000145
13	12000	12	0.000172
14	13000	13	0.000196
15	14000	14	0.000217
16	15000	15	0.000239
17	16000	16	0.0003
18	17000	17	0.000271
19	18000	18	0.000292
20	19000	19	0.00031
21	20000	20	0.000322
22	21000	21	0.000377
23	22000	22	0.000387
24	23000	23	0.000437
25	24000	24	0.000398
26	25000	25	0.000411
27	26000	26	0.00042
28	27000	27	0.000469
29	28000	28	0.00043
30	29000	29	0.000439
31	30000	30	0.000448
32	31000	31	0.000456
33	32000	32	0.000461
34	33000	33	0.000509
35	34000	34	0.00047
36	35000	35	0.000436
37	36000	36	0.000487
38	37000	37	0.000531
39	38000	38	0.00049