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LAMPIRAN

Lampiran 1 Hasil Pengukuran XRD

Ukuran Kristal TiO_2

2θ	Intensitas TiO_2	β_{hkl}	hkl			Metode Scherrer	
			h	k	l	Ukuran kristal (nm)	Ukuran rata-rata kristal (nm)
25,05	7296	0,144	1	0	1	58,98	45,63
37,55	1267	0,192	0	0	4	45,61	
47,78	2619	0,192	2	0	0	47,23	
53,66	1520	0,336	1	0	5	27,65	
54,83	1597	0,192	2	1	1	48,65	

Ukuran Kristal Sampel dengan Suhu Kalsinasi 350℃

2θ	Intensitas pada suhu 350℃	β_{hkl}	hkl			Metode Scherrer	
			h	k	l	Ukuran kristal (nm)	Ukuran rata-rata kristal (nm)
25,21	10527	0,23616	1	0	1	35,98	32,23
37,74	2654	0,23616	0	0	4	37,10	
47,97	3956	0,31488	2	0	0	28,82	
53,88	2228	0,31488	1	0	5	29,54	
55,06	2599	0,31488	2	1	1	29,69	

Ukuran Kristal Sampel dengan Suhu Kalsinasi 450℃

2θ	Intensitas pada suhu 450℃	β_{hkl}	hkl			Metode Scherrer	
			h	k	l	Ukuran kristal (nm)	Ukuran rata-rata kristal (nm)
25,12	9350	0,336	1	0	1	25,28	24,06
37,63	2078	0,384	0	0	4	22,81	
47,99	3310	0,384	2	0	0	23,64	
55,03	2147	0,384	1	0	5	24,35	
53,74	2095	0,384	2	1	1	24,21	

Ukuran Kristal Sampel dengan Suhu Kalsinasi 550℃

2θ	Intensitas pada suhu 550℃	β_{hkl}	hkl			Metode Scherrer	
			h	k	l	Ukuran kristal (nm)	Ukuran rata-rata kristal (nm)
25,11	10629	0,280	1	0	1	24,49	34,76
37,63	2243	0,240	0	0	4	36,50	
47,83	3707	0,336	2	0	0	26,99	
53,69	2335	0,192	1	0	5	48,40	
54,87	2235	0,288	2	1	1	32,44	

Lampiran 2 Hasil Pengukuran Arus dan Tegangan DSSC

P_{in} (cahaya) = 0,038 W/cm^2
A = 4 cm^2

Suhu Kalsinasi 350℃

Resistor (Ω)	Tegangan (V)	Arus (mA)	J (mA/cm^2)
1000	0,00719	0,00719	0,001798
900	0,00631	0,00701	0,001753
800	0,00567	0,00709	0,001773
700	0,00505	0,00721	0,001803
600	0,00442	0,00737	0,001843
500	0,00368	0,00736	0,00184
400	0,003	0,0075	0,001875
300	0,00229	0,00763	0,001908
200	0,00154	0,0077	0,001925
100	0,00072	0,0072	0,0018
50	0,00034	0,0068	0,0017

Suhu Kalsinasi 450℃

Resistor (Ω)	Tegangan (V)	Arus (mA)	J (mA/cm^2)
1000	0,0023	0,0023	0,000575
900	0,00224	0,00249	0,000623
800	0,00214	0,00267	0,000668
700	0,00203	0,0029	0,000725
600	0,00189	0,00315	0,000788
500	0,00174	0,00348	0,00087
400	0,00159	0,00396	0,00099

300	0,00136	0,00453	0,001133
200	0,00105	0,00525	0,001313
100	0,0006	0,006	0,0015
50	0,0003	0,006	0,0015

Suhu Kalsinasi 550℃

Resistor (Ω)	Tegangan (V)	Arus (mA)	J (mA/cm^2)
1000	0,058	0,05821	0,01455
900	0,0488	0,05422	0,01356
800	0,044	0,05521	0,0138
700	0,039	0,05611	0,01403
600	0,033	0,05506	0,01377
500	0,026	0,053	0,01325
400	0,021	0,054	0,0135
300	0,016	0,0548	0,0137
200	0,012	0,06435	0,01609
100	0,005	0,0539	0,01348
50	0,002	0,05	0,01025

Lampiran 3 Perhitungan Efisiensi DSSC

1. Efisiensi DSSC dengan suhu kalsinasi 350℃

   Diketahui :

   V_{max} = 0,00719 V
   I_{max} = 7,19 x 10^{-6} A
   V_{OC} = 0,00719 V
   I_{SC} = 6,8 x 10^{-6} A
   A = 4 cm^2
   P_{in} = 380 W/cm^2

   Penyelesaian :

   $$J_{SC} = \frac{I_{SC}}{A} = \frac{6{,}8 \times 10^{-6} A}{4\ cm^2} = 1{,}7 \times 10^{-6} A/cm^2$$

   $$J_{max} = \frac{I_{max}}{A} = \frac{7{,}19 \times 10^{-6} A}{4\ cm^2} = 1{,}8 \times 10^{-6} A/cm^2$$

   $$FF = \frac{V_{max} J_{max} v}{V_{OC} J_{SC}} = \frac{(0{,}00719\ V)(1{,}8 \times 10^{-6} A/cm^2)}{(0{,}00719\ V)(1{,}7 \times 10^{-6} A/cm^2)} = 1{,}08$$

   $$\eta = \frac{V_{OC} J_{SC} FF}{P_{in}} \times 100\% = \frac{(0{,}00719\ V)(1{,}7 \times 10^{-6} A/cm^2)(1{,}08)}{(380\ W/cm^2)} \times 100\%$$

   $$= \frac{1{,}3 \times 10^{-8}\ W/cm^2}{380\ W/cm^2} \times 100\% = 3{,}42 \times 10^{-9}\ \%$$

2. Efisiensi DSSC dengan suhu kalsinasi 450℃

   Diketahui :

   V_{max} = 0,00159 V
   I_{max} = 3,975 x 10^{-6} A
   V_{OC} = 0,0023 V
   I_{SC} = 6 x 10^{-6} A
   A = 4 cm^2
   P_{in} = 380 W/cm^2

   Penyelesaian :

   $$J_{SC} = \frac{I_{SC}}{A} = \frac{6 \times 10^{-6} A}{4\ cm^2} = 1{,}5 \times 10^{-6} A/cm^2$$

   $$J_{max} = \frac{I_{max}}{A} = \frac{3{,}975 \times 10^{-6} A}{4\ cm^2} = 0{,}99 \times 10^{-6} A/cm^2$$

   $$FF = \frac{V_{max} J_{max}}{V_{OC} J_{SC}} = \frac{(0{,}00159\ V)(0{,}99 \times 10^{-6} A/cm^2)}{(0{,}0023\ V)(1{,}5 \times 10^{-6} A/cm^2)} = 0{,}46$$

   $$\eta = \frac{V_{OC} J_{SC} FF}{P_{in}} \times 100\% = \frac{(0{,}0023\ V)(1{,}5 \times 10^{-6} A/cm^2)(0{,}46)}{(380\ W/cm^2)} \times 100\%$$

   $$= \frac{0{,}16 \times 10^{-8}\ W/cm^2}{380\ W/cm^2} \times 100\% = 4{,}21 \times 10^{-10}\ \%$$

3. Efisiensi DSSC dengan suhu kalsinasi 550℃

   Diketahui :

   V_{max} = 0,058 V
   I_{max} = 58 x 10^{-6} A

V_{OC} = 0,05821 V
I_{SC} = 50 x 10^{-6} A
A = 4 cm^2
P_{in} = 380 W/cm^2

Penyelesaian :

$$J_{SC} = \frac{I_{SC}}{A} = \frac{50 \times 10^{-6} A}{4\ cm^2} = 12{,}5 \times 10^{-6} A/cm^2$$

$$J_{max} = \frac{I_{max}}{A} = \frac{58 \times 10^{-6} A}{4\ cm^2} = 14{,}5 \times 10^{-6} A/cm^2$$

$$FF = \frac{V_{max} J_{max}}{V_{OC} J_{SC}} = \frac{(0{,}058\ V)(14{,}\times 10^{-6} A/cm^2)}{(0{,}05821\ V)(12{,}5 \times 10^{-6} A/cm^2)} = 1{,}16$$

$$\eta = \frac{V_{OC} J_{SC} FF}{P_{in}} \times 100\% = \frac{(0{,}05821\ V)(12{,}5 \times 10^{-6} A/cm^2)(1{,}16)}{(380\ W/cm^2)} \times 100\%$$

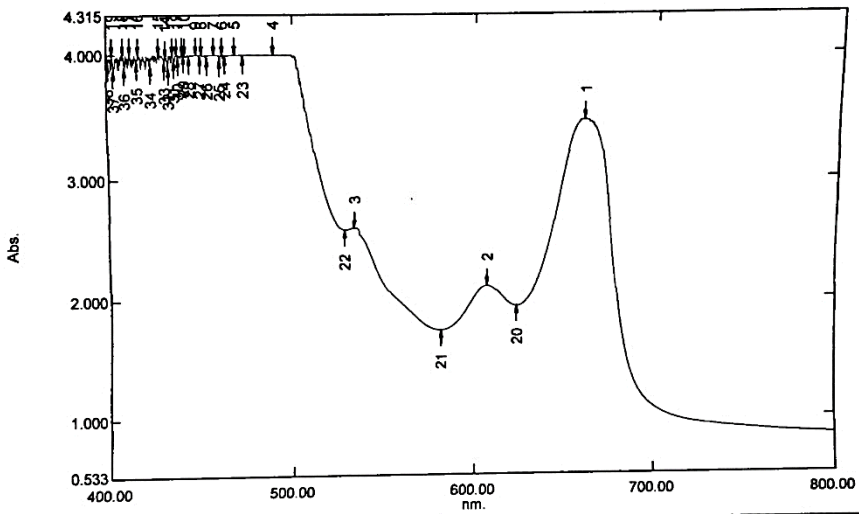
$$= \frac{85 \times 10^{-8}\ W/cm^2}{380\ W/cm^2} \times 100\% = 2{,}24 \times 10^{-7}\ \%$$

Lampiran 4 Hasil Uji Spektrofotometer UV-Vis

Spectrum Peak Pick Report

06/22/2023 02:08:55 PM

Data Set: spektrum_Daun Pepaya - RawData



[Measurement Properties]
Wavelength Range (nm.): 400.00 to 800.00
Scan Speed: Fast
Sampling Interval: 0.2
Auto Sampling Interval: Disabled
Scan Mode: Single

[Instrument Properties]
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0 nm
Light Source Change Wavelength: 340.0 nm
S/R Exchange: Normal

[Attachment Properties]
Attachment: None

[Operation]
Threshold: 0.0010000
Points: 4
InterPolate: Disabled
Average: Disabled

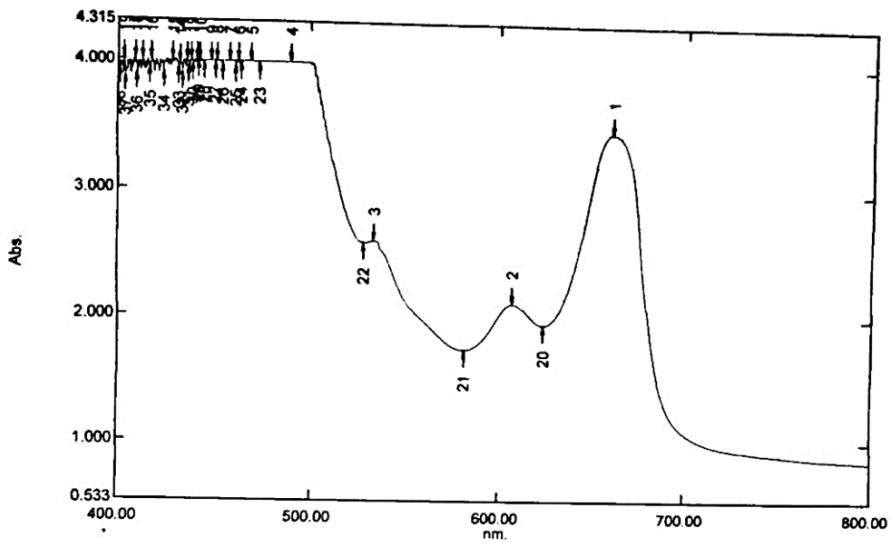
[Sample Preparation Properties]
Weight:
Volume:
Dilution:
Path Length:
Additional Information:

No.	P/V	Wavelength	Abs.	Description
1	●	660.40	3.481	
2	●	607.40	2.121	
3	●	533.40	2.608	
4	●	489.80	4.000	
5	●	468.80	4.000	
6	●	462.20	4.000	
7	●	457.60	4.000	
8	●	451.00	4.000	
9	●	448.00	4.000	
10	●	442.40	4.000	
11	●	440.40	4.000	
12	●	438.00	4.000	
13	●	435.60	4.000	
14	●	432.00	3.984	
15	●	428.00	4.000	
16	●	417.40	4.000	
17	●	412.60	4.000	
18	●	409.00	4.000	
19	●	403.00	4.000	
20	◐	623.60	1.949	
21	◐	581.20	1.750	
22	◐	528.00	2.587	
23	◐	473.00	3.991	
24	◐	464.00	3.990	

Spectrum Peak Pick Report

08/22/2023 02:08:55 PM

Data Set: spektrum_Daun Pepaya - RawData



[Measurement Properties]
Wavelength Range (nm.): 400.00 to 800.00
Scan Speed: Fast
Sampling Interval: 0.2
Auto Sampling Interval: Disabled
Scan Mode: Single

[Instrument Properties]
Instrument Type: UV-1800 Series
Measuring Mode: Absorbance
Slit Width: 1.0 nm
Light Source Change Wavelength: 340.0 nm
S/R Exchange: Normal

[Attachment Properties]
Attachment: None

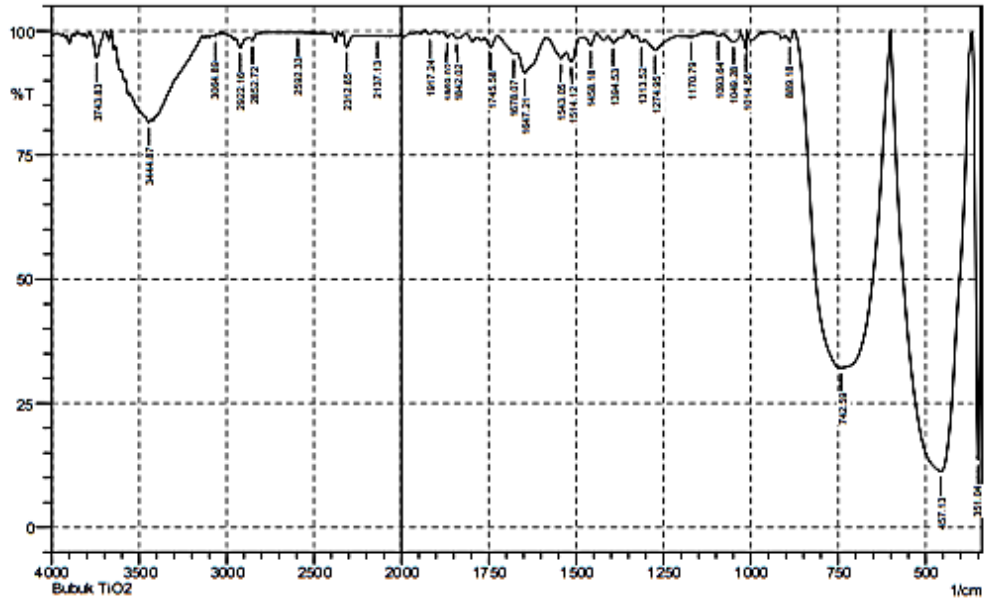
[Operation]
Threshold: 0.0010000
Points: 4
InterPolate: Disabled
Average: Disabled

[Sample Preparation Properties]
Weight:
Volume:
Dilution
Path Length:
Additional Information:

No.	P/V	Wavelength	Abs.	Description
25	▼	461.00	3.969	
26	▼	453.80	3.979	
27	▼	450.20	3.991	
28	▼	444.40	3.993	
29	▼	441.20	3.999	
30	▼	438.60	3.984	
31	▼	436.40	3.960	
32	▼	433.00	3.903	
33	▼	431.00	3.943	
34	▼	423.40	3.913	
35	▼	416.20	3.941	
36	▼	409.80	3.897	
37	▼	403.80	3.880	
38	▼	400.80	3.937	

Lampiran 5 Hasil Uji FTIR

SHIMADZU



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	351.04	13.662	73.597	364.55	343.33	8.469	7.338
2	457.13	11.317	88.207	599.86	372.26	121.326	120.989
3	742.59	32.147	67.292	875.68	601.79	85.328	84.63
4	889.18	97.869	1.637	900.76	877.61	0.129	0.08
5	1014.56	96.585	3.326	1029.99	1012.63	0.127	0.119
6	1049.28	97.842	1.822	1080.14	1029.99	0.333	0.246
7	1093.64	99.036	0.41	1114.86	1080.14	0.106	0.027
8	1170.79	98.817	0.391	1193.94	1132.21	0.241	0.053
9	1274.95	96.127	2.267	1301.95	1209.37	0.962	0.383
10	1313.52	97.767	0.786	1328.95	1301.95	0.205	0.042
11	1394.53	97.616	1.614	1408.04	1352.1	0.341	0.229
12	1458.18	97.121	2.111	1477.47	1440.83	0.292	0.165
13	1514.12	93.772	2.92	1529.55	1485.19	0.796	0.239
14	1543.05	94.428	1.876	1587.42	1529.55	0.931	0.186
15	1647.21	91.536	4.752	1666.5	1587.42	2.002	0.985
16	1678.07	95.346	0.826	1724.36	1668.43	0.759	0.097
17	1745.58	96.75	2.004	1762.94	1724.36	0.365	0.16
18	1842.02	98.481	0.962	1855.52	1813.09	0.199	0.1
19	1869.02	98.707	0.915	1882.52	1855.52	0.092	0.047
20	1917.24	99.347	0.629	1930.74	1903.74	0.041	0.038
21	2137.13	98.962	0.028	2152.56	2125.56	0.12	0.002
22	2312.65	96.804	2.691	2337.72	2268.29	0.542	0.361
23	2592.33	99.68	0.023	2632.83	2576.9	0.074	0.003
24	2852.72	98.013	0.906	2872.01	2789.07	0.345	0.054
25	2922.16	96.632	1.883	2951.09	2872.01	0.751	0.25
26	3064.89	98.854	0.436	3082.25	3062.96	0.084	0.017
27	3444.87	81.622	1.074	3554.81	3431.36	9.439	0.51
28	3743.83	94.618	5.271	3786.27	3693.68	0.938	0.898

Comment;
Bubuk TiO2

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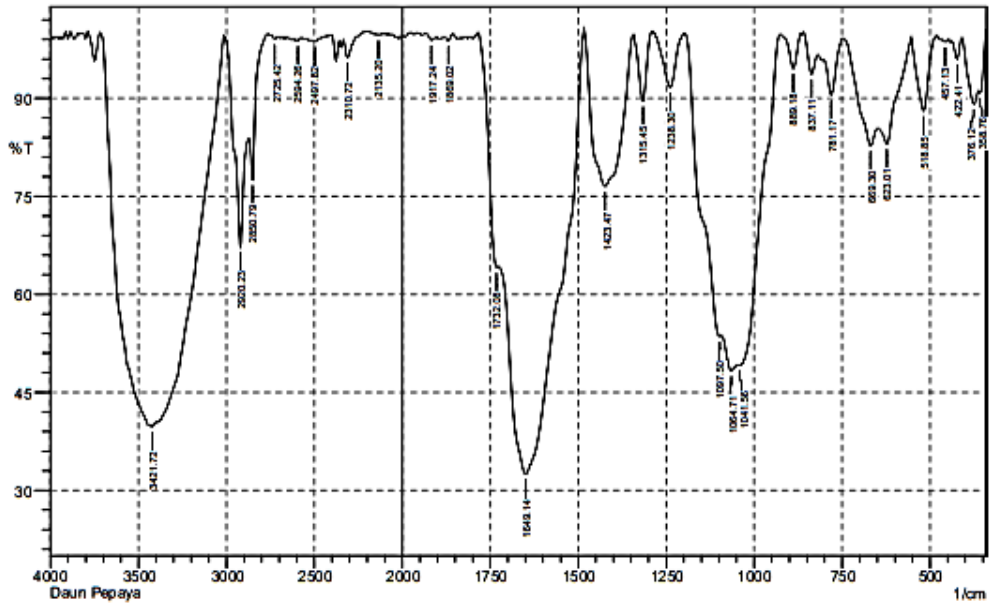
No. of Scans;
Resolution;
Apodization;

SHIMADZU



Daun Pepaya

No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	358.76	90.877	1.942	362.62	341.4	0.598	0.19
2	376.12	89.133	4.015	408.91	364.55	1.525	0.506
3	422.41	96.074	2.936	439.77	408.91	0.321	0.184
4	457.13	98.656	0.533	482.2	447.49	0.153	0.048
5	518.85	88.084	11.283	553.57	482.2	1.966	1.773
6	623.01	83.047	5.991	648.08	555.5	4.529	1.185
7	669.3	82.738	5.347	748.38	650.01	4.697	1.15
8	781.17	90.536	6.632	802.39	750.31	1.282	0.714
9	837.11	93.734	4.37	860.25	819.75	0.684	0.389
10	889.18	94.576	5.298	925.83	866.04	0.608	0.569
11	1041.56	49.158	0.833	1043.49	925.83	18.464	1.316
12	1064.71	48.338	2.686	1091.71	1045.42	13.996	0.561
13	1097.5	53.61	1.772	1197.79	1093.64	15.12	1.081
14	1238.3	91.654	8.395	1288.45	1199.72	1.471	1.496
15	1315.45	89.598	10.383	1342.46	1290.38	1.157	1.153
16	1423.47	76.561	23.626	1483.26	1344.38	10.392	10.465
17	1649.14	32.516	43.214	1726.29	1485.19	69.467	46.563
18	1732.08	64.159	3.65	1784.15	1726.29	5.503	-0.055
19	1869.02	98.796	0.79	1880.6	1855.52	0.08	0.037
20	1917.24	98.925	0.653	1934.6	1903.74	0.091	0.04
21	2135.2	99.711	0.284	2204.64	2104.34	0.034	0.062
22	2310.72	96.272	2.865	2333.87	2204.64	0.738	0.495
23	2497.82	98.739	0.202	2511.32	2412.95	0.353	0.019
24	2594.26	98.843	0.306	2623.19	2573.04	0.226	0.037
25	2725.42	99.038	0.468	2762.06	2708.06	0.143	0.045
26	2850.79	77.557	9.132	2870.08	2763.99	3.886	0.832
27	2920.23	67.332	21.771	3014.74	2872.01	11.521	5.885
28	3421.72	39.787	2.334	3437.15	3016.67	100.375	16.494

Comment;
Daun Pepaya

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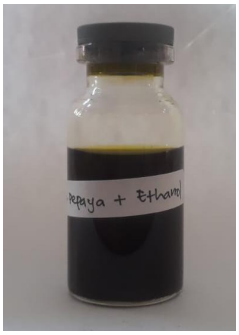
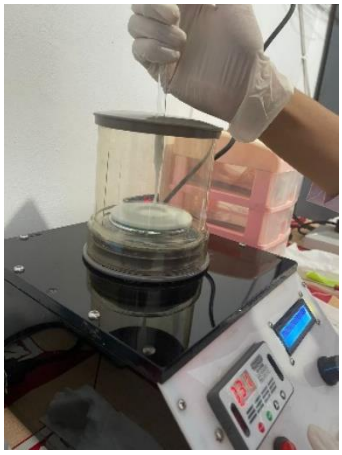
Resolution;
Apodization;

Lampiran 6 Dokumentasi Penelitian

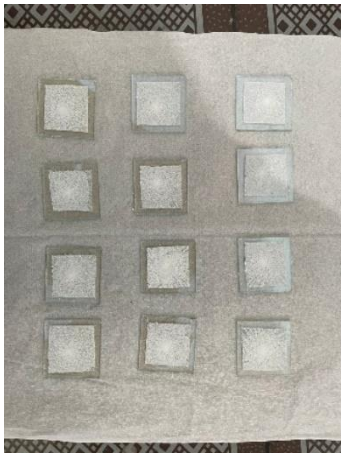
Sampel daun pepaya yang sudah dikeringkan



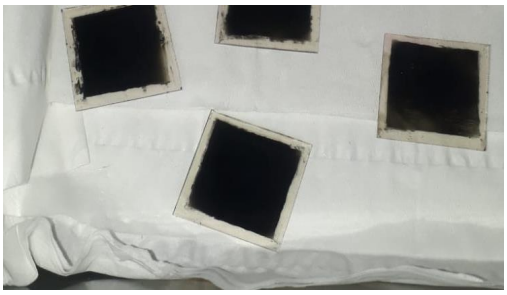
Larutan *dye* daun pepaya



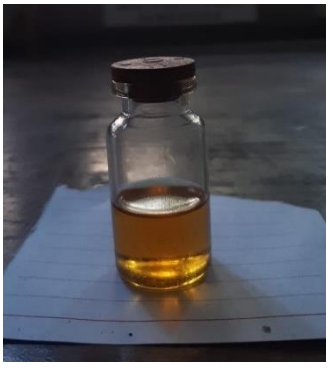
Proses deposisi pasta TiO_2



Elektroda kerja

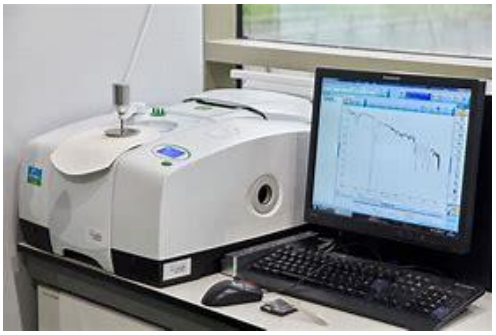


Elektroda lawan

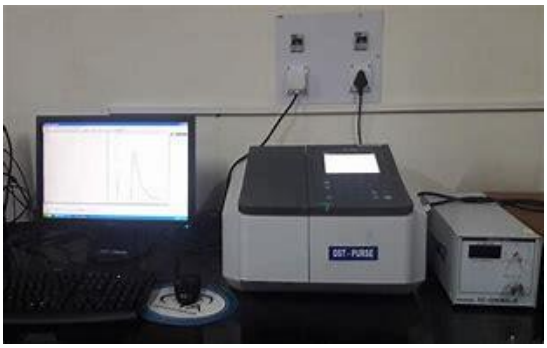


Larutan elektrolit

Prototipe DSSC



Pengujian UV-Vis



Pengujian FTIR

Pengujian XRD

Pengujian arus-tegangan dengan Solar Simulator