

LAMPIRAN

Lampiran I. Data Nilai Konduktansi Lembaran Katoda Pada Pengukuran Pertama dan Pengukuran Kedua

Tabel I.1 Data Nilai Konduktansi Lembaran Katoda Pengukuran Pertama

Frekuensi (Hz)	G (S)
42	6.87E-03
50	6.88E-03
60	6.89E-03
70	6.88E-03
80	6.88E-03
90	6.89E-03
100	6.91E-03
200	6.93E-03
300	6.93E-03
400	6.95E-03
500	6.96E-03
600	6.97E-03
700	6.98E-03
800	6.99E-03
900	6.99E-03
1000	7.00E-03
2000	7.00E-03
3000	7.01E-03
4000	7.03E-03
5000	7.06E-03
6000	7.08E-03
7000	7.11E-03
8000	7.12E-03
9000	7.13E-03
10000	7.14E-03
20000	7.18E-03
30000	7.21E-03

40000	7.24E-03
50000	7.27E-03
60000	7.29E-03
70000	7.31E-03
80000	7.33E-03
90000	7.36E-03
100000	7.38E-03
200000	7.59E-03
300000	7.81E-03
400000	8.03E-03
500000	8.24E-03
600000	8.44E-03
700000	8.64E-03
800000	8.82E-03
900000	9.00E-03
1000000	9.17E-03

Tabel I.2 Data Nilai Konduktansi Lembaran Katoda Pengukuran Kedua

Frekuensi (Hz)	G (S)
42	7.16E-03
50	7.16E-03
60	7.17E-03
70	7.17E-03
80	7.17E-03
90	7.17E-03
100	7.17E-03
200	7.19E-03
300	7.19E-03
400	7.20E-03
500	7.20E-03
600	7.20E-03

700	7.21E-03
800	7.21E-03
900	7.22E-03
1000	7.22E-03
2000	7.23E-03
3000	7.24E-03
4000	7.25E-03
5000	7.27E-03
6000	7.28E-03
7000	7.28E-03
8000	7.29E-03
9000	7.30E-03
10000	7.31E-03
20000	7.35E-03
30000	7.37E-03
40000	7.40E-03
50000	7.43E-03
60000	7.45E-03
70000	7.47E-03
80000	7.49E-03
90000	7.51E-03
100000	7.54E-03
200000	7.74E-03
300000	7.95E-03
400000	8.16E-03
500000	8.37E-03
600000	8.57E-03
700000	8.76E-03
800000	8.95E-03
900000	9.13E-03
1000000	9.30E-03

Lampiran II. Data Nilai Konduktansi Lembaran Anoda Pada Pengukuran Pertama dan Pengukuran Kedua

Tabel II.1 Data Nilai Konduktansi Lembaran Anoda Pengukuran Pertama

Frekuensi (Hz)	G (S)
42	3.60E-01
50	3.59E-01
60	3.59E-01
70	3.60E-01
80	3.60E-01
90	3.60E-01
100	3.61E-01
200	3.61E-01
300	3.61E-01
400	3.62E-01
500	3.62E-01
600	3.62E-01
700	3.62E-01
800	3.62E-01
900	3.62E-01
1000	3.62E-01
2000	3.62E-01
3000	3.62E-01
4000	3.62E-01
5000	3.62E-01
6000	3.63E-01
7000	3.63E-01
8000	3.63E-01
9000	3.63E-01
10000	3.64E-01
20000	3.63E-01
30000	3.64E-01

40000	3.64E-01
50000	3.63E-01
60000	3.63E-01
70000	3.63E-01
80000	3.63E-01
90000	3.63E-01
100000	3.59E-01
200000	3.54E-01
300000	3.47E-01
400000	3.39E-01
500000	3.29E-01
600000	3.19E-01
700000	3.07E-01
800000	2.96E-01
900000	2.83E-01
1000000	3.60E-01

Tabel II.2 Data Nilai Konduktansi Lembaran Anoda Pengukuran Kedua

Frekuensi (Hz)	G (S)
42	3.10E-01
50	3.10E-01
60	3.10E-01
70	3.10E-01
80	3.11E-01
90	3.11E-01
100	3.11E-01
200	3.11E-01
300	3.12E-01
400	3.12E-01
500	3.12E-01
600	3.12E-01

700	3.12E-01
800	3.12E-01
900	3.12E-01
1000	3.13E-01
2000	3.12E-01
3000	3.12E-01
4000	3.13E-01
5000	3.13E-01
6000	3.13E-01
7000	3.13E-01
8000	3.13E-01
9000	3.13E-01
10000	3.13E-01
20000	3.13E-01
30000	3.13E-01
40000	3.13E-01
50000	3.13E-01
60000	3.13E-01
70000	3.13E-01
80000	3.12E-01
90000	3.12E-01
100000	3.12E-01
200000	3.09E-01
300000	3.04E-01
400000	2.98E-01
500000	2.90E-01
600000	2.81E-01
700000	2.71E-01
800000	2.61E-01
900000	2.50E-01
1000000	2.38E-01

Lampiran III. Pengujian *Charge-Discharge* Sebanyak 3 Cycles Pada Sampel NMC541 35-40, NMC541 37,5-37,5, Dan NMC541 40-35

Tabel III.1 Data Pengujian *Charge-Discharge* Pada Sampel NMC541 35-40

Cycle	Status	Start Voltage (V)	End Voltage (V)	Capacity (Ah)
1	Rest	3.9741	3.9741	0.0000
1	CC_Chg	4.0246	4.2001	0.0212
1	Rest	4.1427	4.1226	0.0000
1	CC_DChg	4.0662	2.8000	0.1800
2	CC_Chg	3.0059	4.2001	0.1901
2	Rest	4.1524	4.1409	0.0000
2	CC_DChg	4.0931	2.8000	0.1657
3	CC_Chg	3.0078	4.2001	0.1893
3	Rest	4.1539	4.1415	0.0000
3	CC_DChg	4.0956	2.8000	0.1712
3	Rest	2.8934	3.1525	0.0000

Tabel III.2 Data Pengujian *Charge-Discharge* Pada Sampel NMC541 37,5-37,5

Cycle	Status	Start Voltage (V)	End Voltage (V)	Capacity (Ah)
1	Rest	0.2554	0.2557	0.0000
1	CC_Chg	0.2985	4.6000	1.2296
1	Rest	4.5724	4.5458	0.0000
1	CC_DChg	4.5194	2.8000	0.8541
2	CC_Chg	2.9637	4.6000	0.9226
2	Rest	4.5734	4.5303	0.0000
2	CC_DChg	4.5048	2.8000	0.8884
3	CC_Chg	2.9541	4.6000	0.8804
3	Rest	4.5709	4.4968	0.0000
3	CC_DChg	4.4686	2.8000	0.8348

Tabel III.3 Data Pengujian *Charge-Discharge* Pada Sampel NMC541 40-35

Cycle	Status	Start Voltage (V)	End Voltage (V)	Capacity (Ah)
1	Rest	0.0768	0.0768	0.0000
1	CC_Chg	0.1475	4.2001	0.6449
1	Rest	4.1638	4.1486	0.0000
1	CC_DChg	4.1139	2.8000	0.3748
2	CC_Chg	2.9160	4.2001	0.4321
2	Rest	4.1638	4.1493	0.0000
2	CC_DChg	4.1133	2.8000	0.3690
3	CC_Chg	2.9423	4.2001	0.3838
3	Rest	4.1610	4.1480	0.0000
3	CC_DChg	4.1096	2.8000	0.3562
3	Rest	2.8673	3.1200	0.0000

Lampiran IV. Pengujian *Electrochemical Impedance Spectroscopy* Pada Sampel NMC541 35-40, NMC541 37,5-37,5, Dan NMC541 40-35

Tabel IV.1 Data Pengujian *Electrochemical Impedance Spectroscopy* Pada Sampel NMC541 35-40

Frekuensi (Hz)	Z' (Ω)	-Z'' (Ω)
50000	0.625302	-0.1778
35714	0.621669	-0.12377
25510	0.617495	-0.08203
18222	0.61933	-0.05094
13015	0.623362	-0.02784
9296.8	0.630035	-0.01124
6640.6	0.636622	0.000567
4743.3	0.643499	0.008817
3388.1	0.650078	0.014427
2420	0.652782	0.018167
1728.6	0.658993	0.020647
1234.7	0.664763	0.022396
881.94	0.670642	0.023614
629.96	0.676655	0.024547
449.97	0.68234	0.025291
321.41	0.687955	0.025908
229.58	0.693482	0.026512
163.98	0.698793	0.027339
117.13	0.703878	0.028685
83.666	0.708182	0.031085
59.761	0.712168	0.034805
42.687	0.716417	0.040521
30.491	0.721158	0.048674
21.779	0.728556	0.059683
15.556	0.735754	0.075007
11.112	0.744699	0.095371

7.937	0.756985	0.121886
5.6693	0.773525	0.155614
4.0495	0.795429	0.197828
2.8925	0.823475	0.250151
2.0661	0.858881	0.314052
1.4758	0.902781	0.391541
1.0541	0.952976	0.489414
0.75295	1.0079	0.613351
0.53782	1.06531	0.769936
0.38416	1.12834	0.993327
0.2744	1.18681	1.29319
0.196	1.26459	1.70698
0.14	1.34933	2.27843
0.1	1.45224	3.0648

Tabel IV.2 Data Pengujian *Electrochemical Impedance Spectroscopy* Pada Sampel NMC541 37,5-37,5

Frekuensi (Hz)	Z' (Ω)	$-Z''$ (Ω)
50000	0.837682	-0.21576
35714	0.828276	-0.15164
25510	0.824564	-0.10076
18222	0.823302	-0.06175
13015	0.826998	-0.03231
9296.8	0.835174	-0.011
6640.6	0.843934	0.004197
4743.3	0.852932	0.014538
3388.1	0.861401	0.021569
2420	0.866469	0.02579
1728.6	0.874455	0.02847
1234.7	0.882421	0.02997
881.94	0.889063	0.030675

629.96	0.896165	0.030785
449.97	0.902944	0.030592
321.41	0.909278	0.030197
229.58	0.91514	0.029911
163.98	0.920475	0.030064
117.13	0.925012	0.031083
83.666	0.929002	0.0336
59.761	0.932662	0.037945
42.687	0.936656	0.044845
30.491	0.941087	0.054906
21.779	0.948299	0.068367
15.556	0.956001	0.087139
11.112	0.96595	0.112049
7.937	0.979826	0.144513
5.6693	0.999377	0.185956
4.0495	1.02662	0.237706
2.8925	1.06305	0.300623
2.0661	1.11036	0.376005
1.4758	1.17041	0.465168
1.0541	1.23851	0.573934
0.75295	1.31541	0.70248
0.53782	1.39572	0.868626
0.38416	1.46815	1.09913
0.2744	1.56051	1.4004
0.196	1.63886	1.82305
0.14	1.73316	2.41606
0.1	1.85185	3.23793

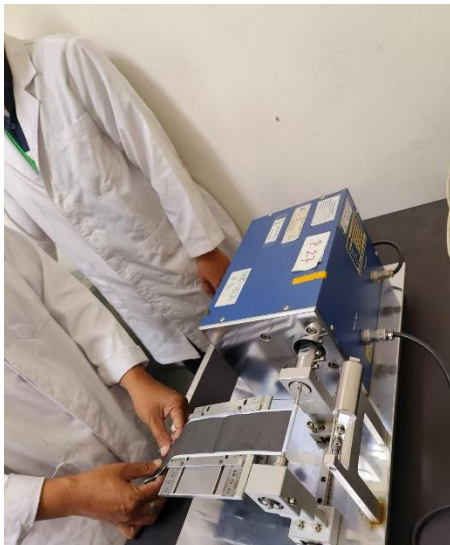
Tabel IV.3 Data Pengujian *Electrochemical Impedance Spectroscopy* Pada Sampel NMC541 40-35

Frekuensi (Hz)	Z' (Ω)	$-Z''$ (Ω)
50000	0.522292	-0.17836
35714	0.513169	-0.13321
25510	0.503699	-0.0982
18222	0.498801	-0.07213
13015	0.495206	-0.05254
9296.8	0.492763	-0.03825
6640.6	0.491805	-0.02741
4743.3	0.491438	-0.01968
3388.1	0.495887	-0.01397
2420	0.492457	-0.00994
1728.6	0.492349	-0.00703
1234.7	0.492284	-0.0049
881.94	0.492518	-0.00334
629.96	0.49284	-0.00223
449.97	0.4942	-0.00152
321.41	0.497108	-0.00109
229.58	0.500754	-0.00084
163.98	0.503297	-0.00066
117.13	0.505477	-0.00046
83.666	0.506416	-0.00022
59.761	0.50674	-8.00E-05
42.687	0.506741	8.53E-05
30.491	0.506729	0.000226
21.779	0.511673	-0.0001
15.556	0.510111	-7.23E-05
11.112	0.510133	-5.67E-05
7.937	0.510045	-3.37E-05
5.6693	0.510101	-1.82E-05

4.0495	0.510141	-1.36E-05
2.8925	0.5123	1.10E-05
2.0661	0.511977	3.09E-05
1.4758	0.511873	-1.78E-05
1.0541	0.511866	-3.56E-05
0.75295	0.511606	-1.76E-05
0.53782	0.511201	3.98E-06
0.38416	0.511886	-2.11E-05
0.2744	0.513293	-8.11E-06
0.196	0.513464	-4.35E-06
0.14	0.513428	0.000128
0.1	0.512982	1.94E-05

Kegiatan Pengujian

Proses membuat gulungan baterai:



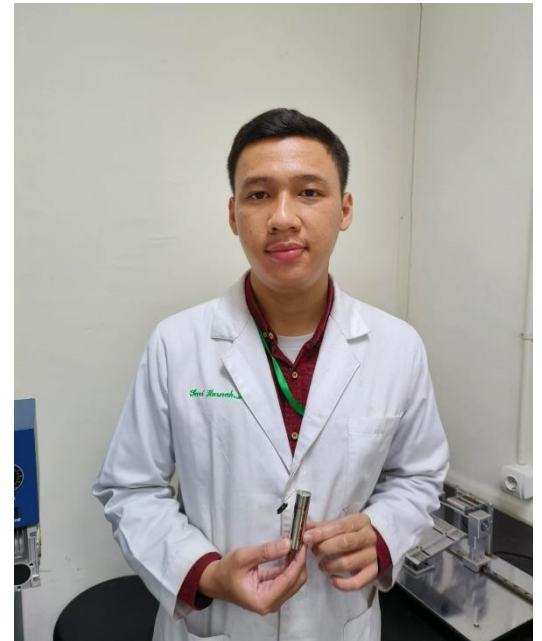
Gambar A.1 Proses membuat gulungan baterai menggunakan *winding machine*

Alat dan Bahan yang digunakan



Gambar A.2 Alat dan Bahan yang disiapkan untuk merakit baterai silinder

Baterai yang berhasil dirakit



Gambar A.3 Baterai Silinder dengan Katoda $\text{LiNi}_{0,5}\text{Mn}_{0,4}\text{Co}_{0,1}\text{O}_2$