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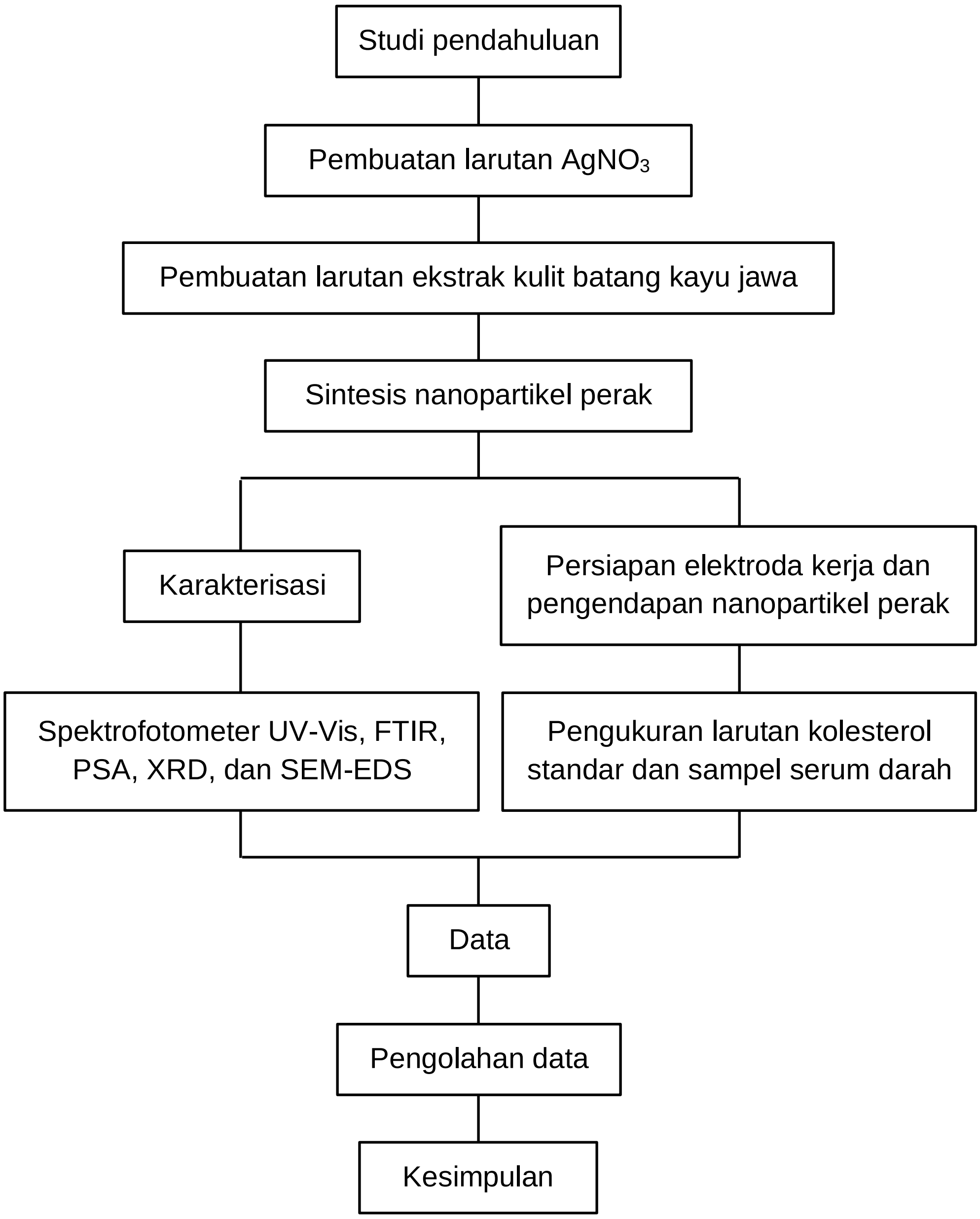
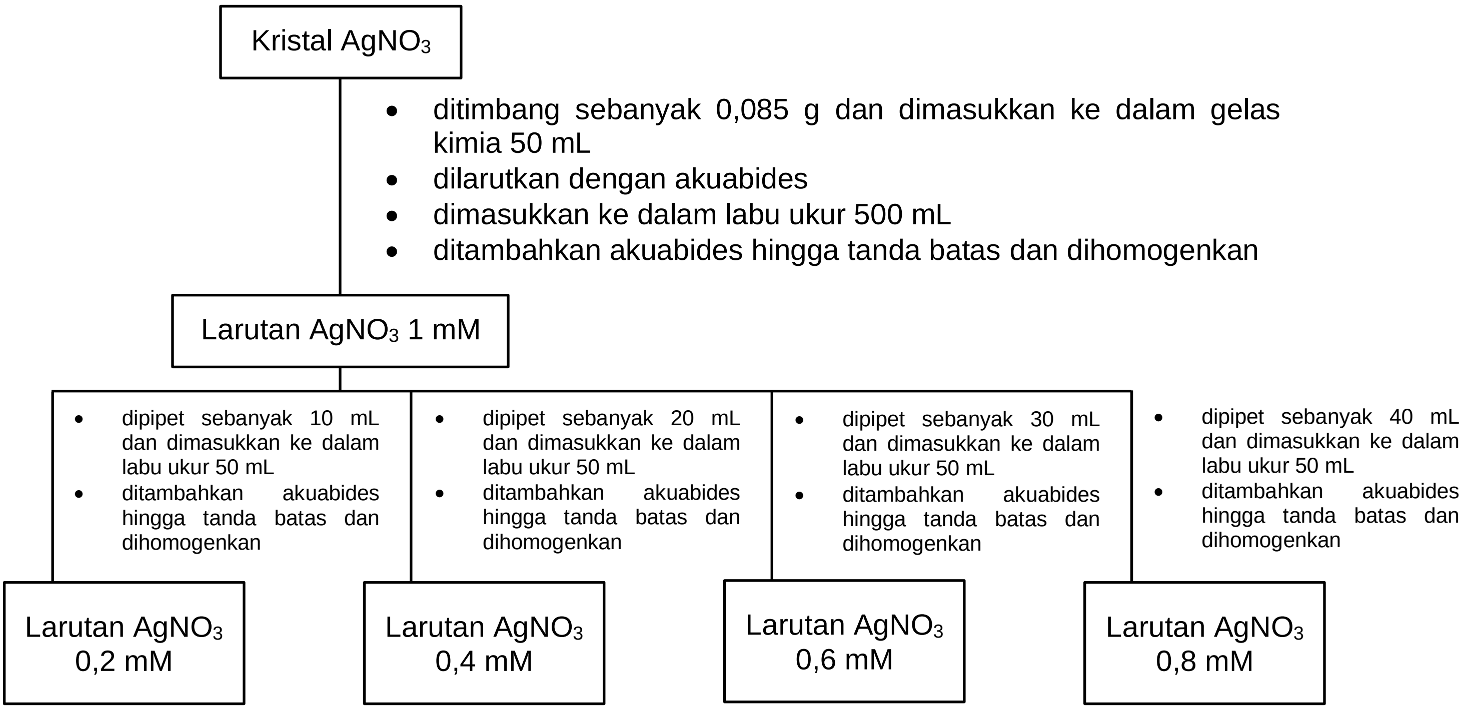
LAMPIRAN

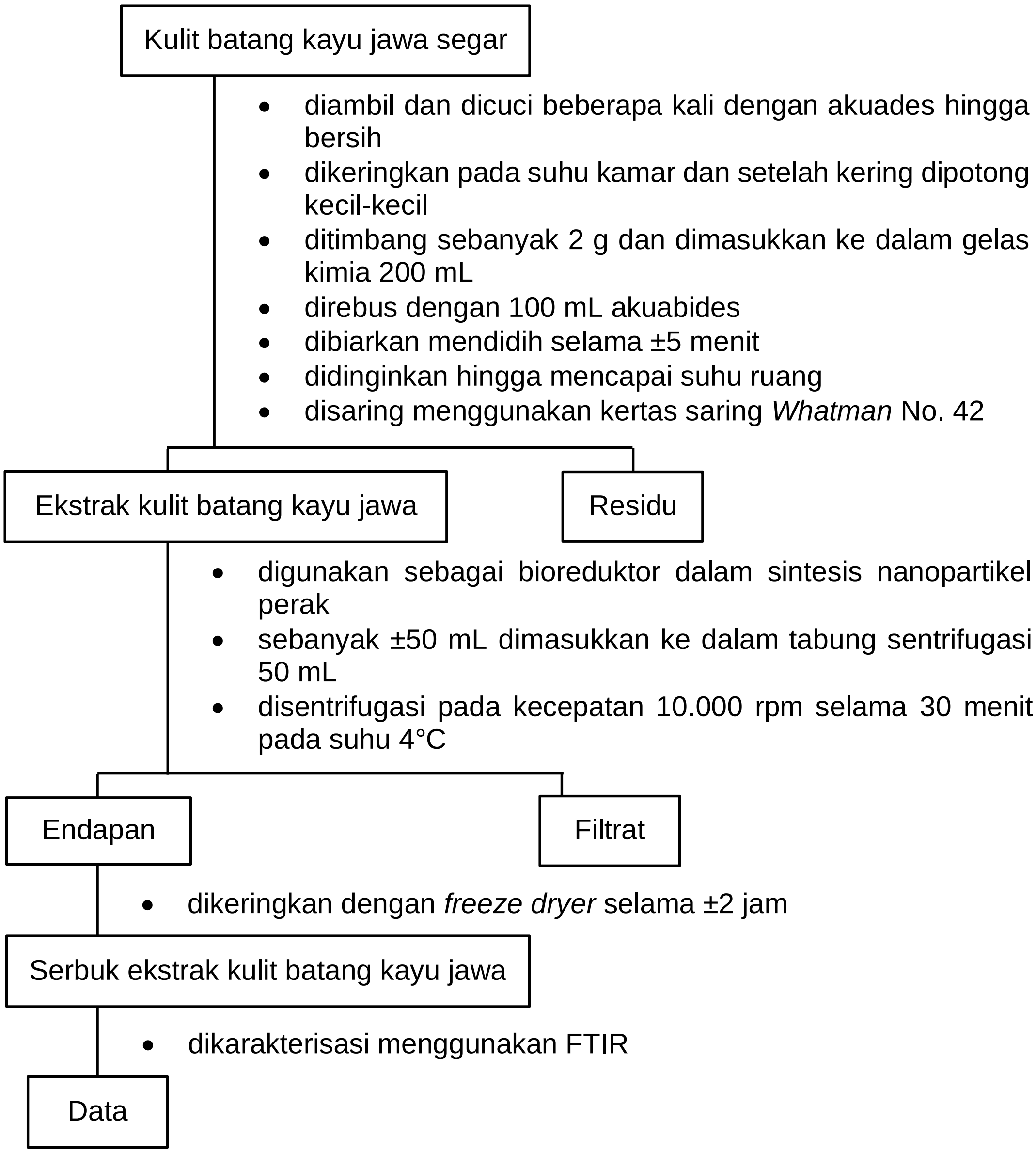
Lampiran 1. Diagram alir penelitian



Lampiran 2. Bagan kerja pembuatan larutan $AgNO_3$



Lampiran 3. Bagan kerja pembuatan larutan ekstrak kulit batang kayu jawa



Lampiran 4. Bagan kerja sintesis dan karakterisasi nanopartikel perak

a. Variasi konsentrasi larutan $AgNO_3$

Larutan $AgNO_3$ 0,2 mM | Larutan $AgNO_3$ 0,4 mM | Larutan $AgNO_3$ 0,6 mM | Larutan $AgNO_3$ 0,8 mM | Larutan $AgNO_3$ 1 mM

- dipipet sebanyak 20 mL dan dimasukkan masing-masing ke dalam gelas kimia 50 mL
- ditambahkan 1 mL ekstrak kulit batang kayu jawa (tetap)
- dikarakterisasi menggunakan spektrofotometer UV-Vis pada selang waktu 2, 24, 48, 72, dan 96 jam

Konsentrasi $AgNO_3$ optimum

b. Variasi volume ekstrak kulit batang kayu jawa

Ekstrak kulit batang kayu jawa 0,5 mL | Ekstrak kulit batang kayu jawa 1 mL | Ekstrak kulit batang kayu jawa 2 mL | Ekstrak kulit batang kayu jawa 4 mL | Ekstrak kulit batang kayu jawa 8 mL

- ditambahkan masing-masing ke dalam gelas kimia yang berisi 20 mL larutan $AgNO_3$ konsentrasi 1 mM (tetap)
- dikarakterisasi menggunakan spektrofotometer UV-Vis pada selang waktu 2, 24, 48, 72, dan 96 jam

Volume ekstrak kulit batang kayu jawa optimum

c. Sintesis nanopartikel perak

Larutan $AgNO_3$ 1 mM | Ekstrak kulit batang kayu jawa

- dicampur dengan perbandingan 20:8 (mL)
- didiamkan 2 jam
- disentrifugasi pada kecepatan 10.000 rpm selama 30 menit pada suhu 4°C

Endapan

- didikeringkan dengan *freeze dryer* selama ±6 jam

Serbuk nanopartikel perak

- dikarakterisasi menggunakan FTIR, XRD, dan SEM-EDS

Data

Filtrat

- dikarakterisasi menggunakan PSA

Data

Lampiran 5. Bagan kerja pembuatan larutan kolesterol standar

Serbuk kolesterol murni

- ditimbang sebanyak 0,2 g dan dimasukkan ke dalam gelas kimia 50 mL
- dilarutkan dengan isopropanol dan diaduk menggunakan *magnetic stirrer* hingga larut sempurna
- dimasukkan ke dalam labu ukur 100 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 2000 ppm

- dipipet sebanyak 2 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 400 ppm

- dipipet sebanyak 3 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 600 ppm

- dipipet sebanyak 4 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 800 ppm

- dipipet sebanyak 5 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 1000 ppm

- dipipet sebanyak 6 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 1200 ppm

- dipipet sebanyak 7 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 1400 ppm

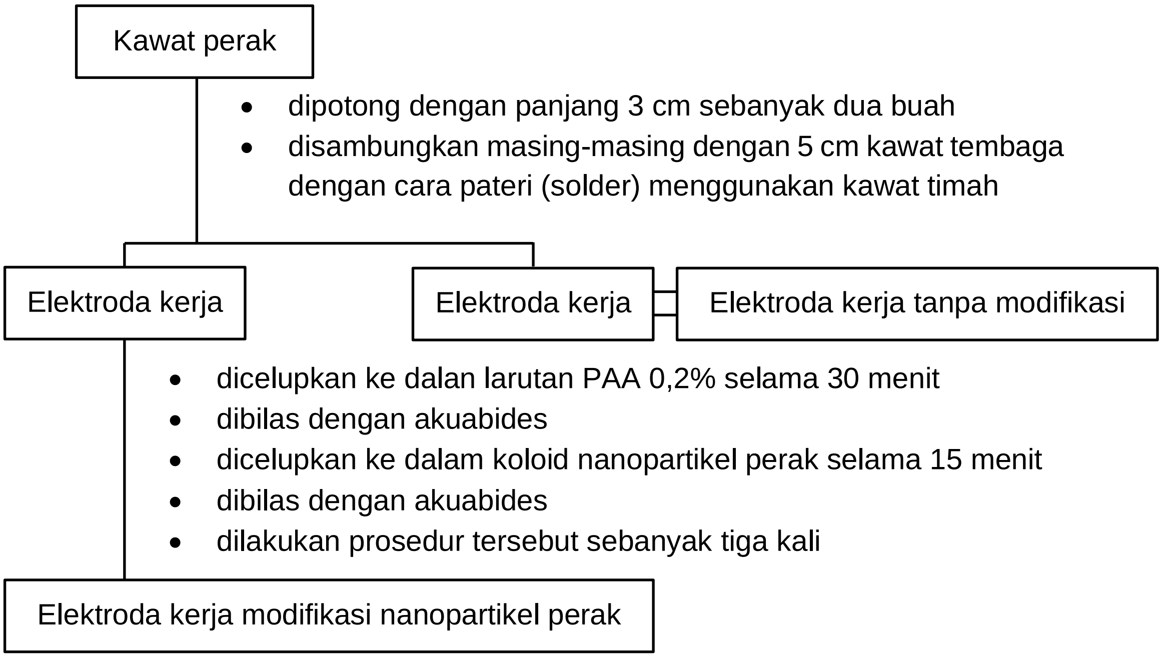
- dipipet sebanyak 8 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 1600 ppm

- dipipet sebanyak 9 mL dan dimasukkan ke dalam labu ukur 10 mL
- ditambahkan isopropanol hingga tanda batas dan dihomogenkan

Larutan kolesterol 1800 ppm

Lampiran 6. Bagan kerja persiapan elektroda kerja dan pengendapan nanopartikel perak



Lampiran 7. Bagan kerja pengukuran larutan kolesterol standar dan sampel serum darah

Elektoda kerja

- dicelupkan ke dalam larutan kolesterol 400 ppm
- dibilas dengan akuabides

Elektoda Ag/AgCl

Elektoda Pt

- dikontakkan dengan larutan elektrolit NaOH 0,1 M
- diukur dengan menggunakan potensiostat metode voltametri pada potensial -1 sampai +1 V

Data

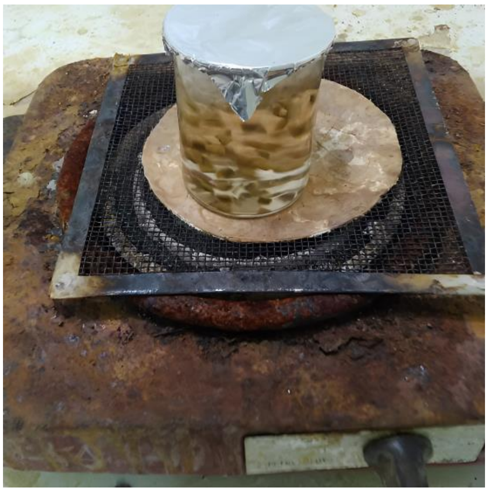
Catatan:

- elektroda kerja yang digunakan adalah elektroda kerja tanpa modifikasi dan elektroda kerja modifikasi nanopartikel perak
- dilakukan prosedur yang sama dengan mengganti larutan kolesterol 400 ppm menjadi 600, 800, 1000, 1200, 1400, 1600, 1800, dan 2000 ppm
- dilakukan uji linearitas, limit deteksi, dan sensitivitas
- dilakukan prosedur yang sama untuk sampel serum darah

Lampiran 8. Dokumentasi penelitian

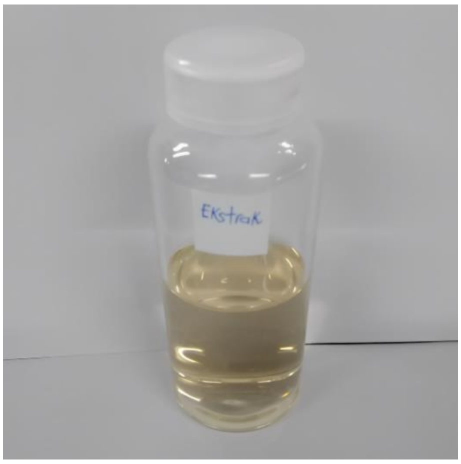

Pohon kayu jawa


Kulit batang kayu jawa

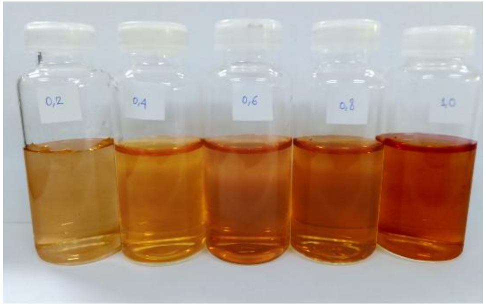

Proses perebusan kulit batang kayu jawa


Penyaringan ekstrak kulit batang kayu jawa

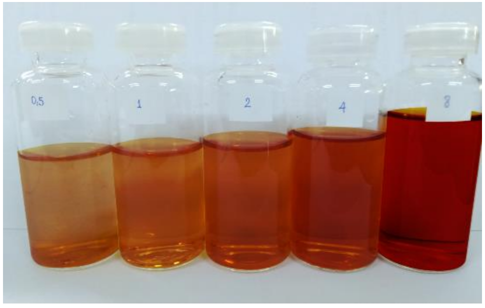
Larutan $AgNO_3$



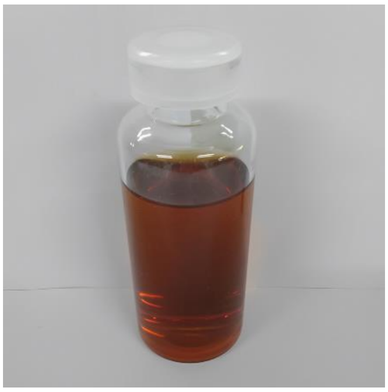
Ekstrak kulit batang kayu jawa



Variasi konsentrasi $AgNO_3$

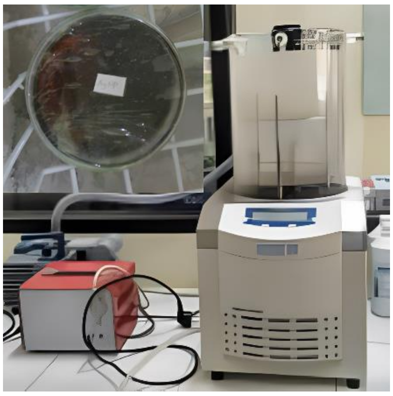


Variasi volume ekstrak kulit batang kayu jawa



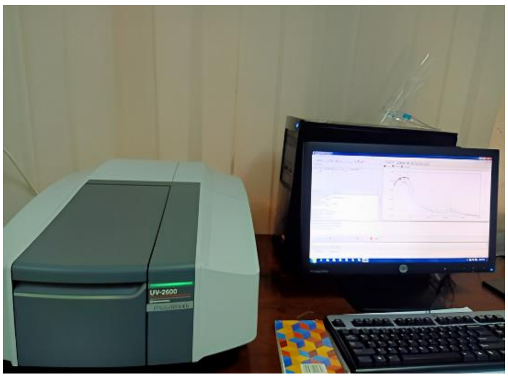
Koloid nanopartikel perak

Proses sentrifugasi



Proses *freeze drying*

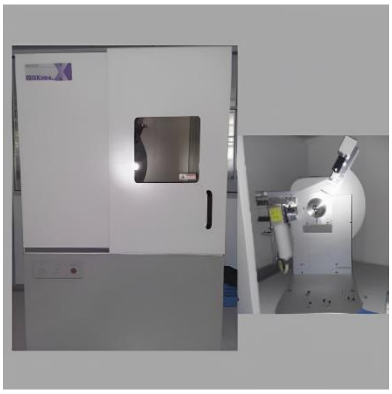
Serbuk nanopartikel perak



Spektrofotometer UV-Vis

FTIR

PSA



XRD

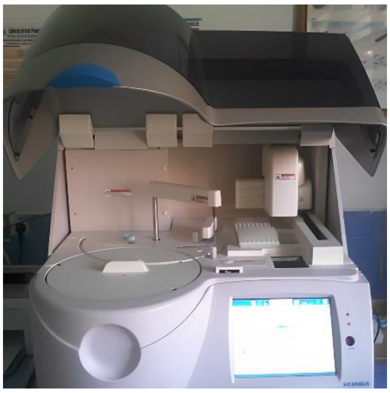
SEM-EDS

Larutan kolesterol standar

Elektroda kerja tanpa modifikasi

Elektroda kerja modifikasi nanopartikel perak

Potensiostat dengan metode voltametri



Automatic clinical chemistry analyzer

Lampiran 9. Hasil karakterisasi menggunakan spektrofotometer UV-Vis

a. Variasi konsentrasi $AgNO_3$

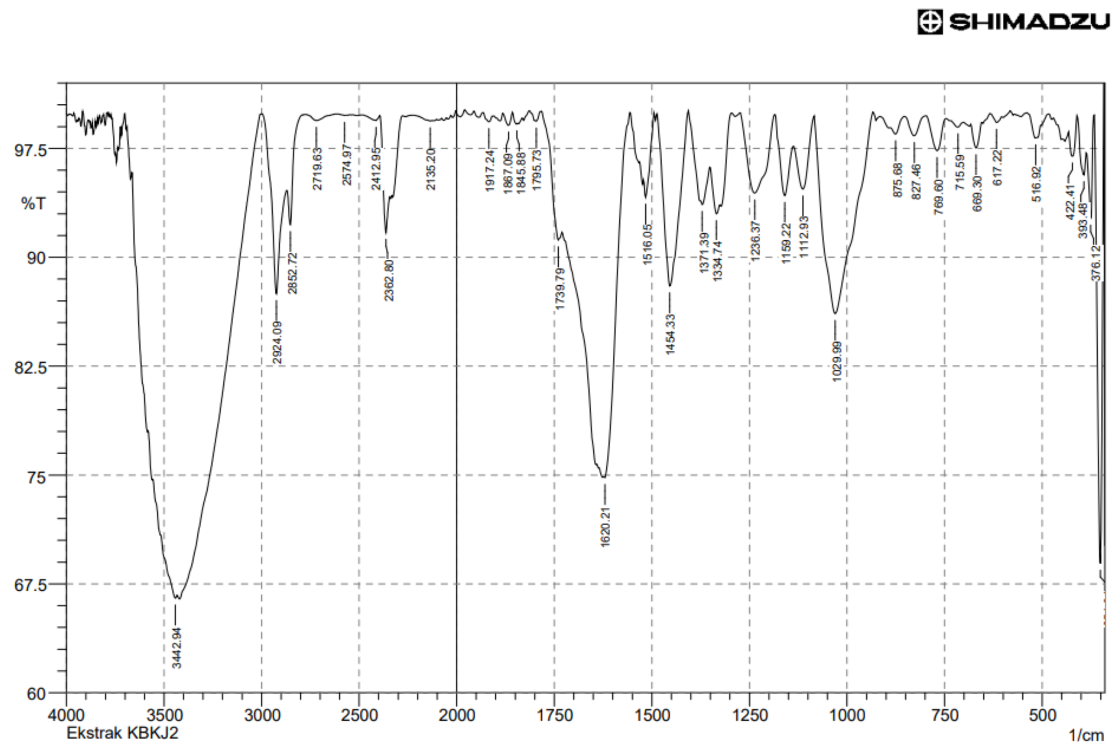
Waktu (jam)	**0,2 mM**		**0,4 mM**		**0,6 mM**		**0,8 mM**		**1 mM**	
	nm	**abs**	**nm**	**abs**	**nm**	**abs**	**nm**	**abs**	**nm**	**abs**
2	431,50	0,113	431,50	0,177	431,50	0,208	431,50	0,224	429,00	0,306
24	444,50	0,264	439,00	0,357	432,50	0,375	434,50	0,427	430,00	0,521
48	447,00	0,325	434,50	0,424	435,50	0,439	435,50	0,505	431,00	0,623
72	448,50	0,375	441,50	0,480	433,50	0,493	438,50	0,567	431,50	0,690
96	454,00	0,411	441,50	0,523	432,50	0,539	438,00	0,620	431,00	0,767

b. Variasi volume ekstrak kulit batang kayu jawa

Waktu (jam)	**0,5 mL**		**1 mL**		**2 mL**		**4 mL**		**8 mL**	
	nm	**abs**	**nm**	**abs**	**nm**	**abs**	**nm**	**abs**	**nm**	**abs**
2	437,00	0,215	437,00	0,282	438,00	0,450	438,00	0,597	438,00	0,781
24	429,00	0,506	425,50	0,675	432,50	1,093	435,50	1,611	438,50	2,171
48	424,50	0,678	427,00	0,896	430,50	1,491	436,00	2,234	438,00	2,945
72	430,00	0,788	430,00	1,056	430,00	1,755	437,50	2,636	438,50	3,435
96	424,00	0,852	426,50	1,144	433,00	1,894	439,00	2,842	439,00	3,656

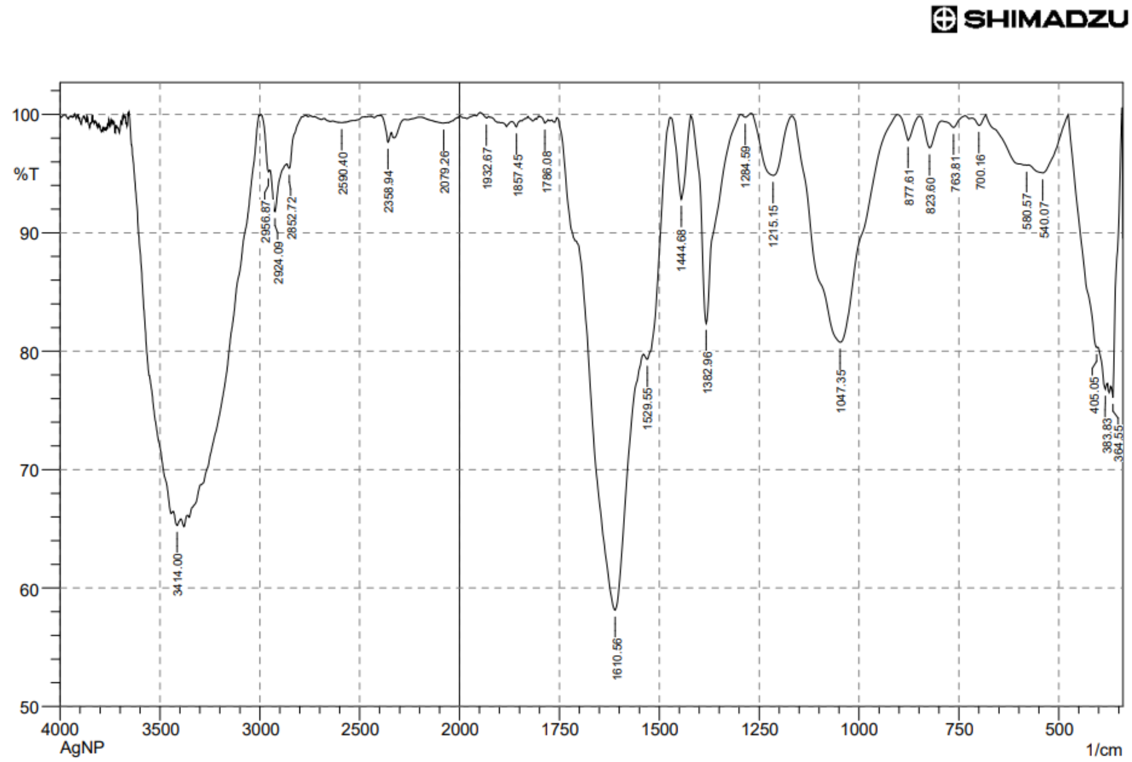
Lampiran 10. Hasil karakterisasi menggunakan FTIR

a. Spektrum FTIR ekstrak kulit batang kayu jawa



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	351.04	68.898	28.54	366.48	343.33	2.078	1.861
2	376.12	92.68	5.93	387.69	366.48	0.382	0.241
3	393.48	95.665	2.158	410.84	387.69	0.294	0.138
4	422.41	96.955	2.188	432.05	410.84	0.211	0.136
5	516.92	98.209	0.18	540.07	514.99	0.094	-0.004
6	617.22	99.278	0.501	634.58	603.72	0.06	0.032
7	669.3	97.535	1.689	682.8	655.8	0.212	0.12
8	715.59	98.967	0.374	734.88	702.09	0.12	0.027
9	769.6	97.346	2.297	798.53	746.45	0.336	0.257
10	827.46	98.376	1.346	852.54	798.53	0.212	0.147
11	875.68	98.492	0.719	889.18	852.54	0.158	0.048
12	1029.99	86.109	13.713	1083.99	933.55	5.43	5.341
13	1112.93	94.702	3.914	1138	1083.99	0.805	0.495
14	1159.22	94.241	4.409	1184.29	1138	0.734	0.478
15	1236.37	94.419	5.471	1273.02	1186.22	1.354	1.308
16	1334.74	92.997	1.546	1352.1	1325.1	0.712	0.099
17	1371.39	93.631	3.964	1406.11	1352.1	1.023	0.564
18	1454.33	88.028	11.869	1487.12	1408.04	2.352	2.32
19	1516.05	94.131	2.191	1521.84	1494.83	0.445	0.161
20	1620.21	74.813	1.504	1624.06	1556.55	4.01	0.284
21	1739.79	91.182	2.082	1782.23	1730.15	1.131	0.182
22	1795.73	99.372	0.685	1813.09	1786.08	0.037	0.044
23	1845.88	99.173	0.167	1857.45	1843.95	0.034	0.011
24	1867.09	99.088	0.876	1882.52	1857.45	0.059	0.054
25	1917.24	99.327	0.506	1932.67	1905.67	0.05	0.032
26	2135.2	99.391	0.043	2150.63	2125.56	0.064	0.003
27	2362.8	91.705	4.604	2393.66	2343.51	1.2	0.497
28	2412.95	99.428	0.337	2492.03	2393.66	0.16	0.065
29	2574.97	99.772	0.028	2607.76	2565.33	0.035	0.002
30	2719.63	99.426	0.423	2777.5	2619.33	0.227	0.126
31	2852.72	92.23	3.521	2870.08	2791	1.087	0.279
32	2924.09	87.482	9.315	2997.38	2872.01	3.533	1.973
33	3442.94	66.516	0.576	3516.23	3435.22	13.501	0.292

b. Spektrum FTIR nanopartikel perak



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	364.55	76.104	4.225	368.4	343.33	1.529	0.162
2	383.83	76.783	1.034	401.19	379.98	2.266	0.051
3	405.05	80.298	0.573	476.42	403.12	3.858	0.375
4	540.07	95.06	2.157	574.79	478.35	1.495	0.571
5	580.57	95.716	0.235	682.8	574.79	1.303	0.267
6	700.16	99.083	0.727	715.59	682.8	0.081	0.055
7	763.81	98.909	0.76	792.74	734.88	0.16	0.077
8	823.6	97.186	2.49	848.68	792.74	0.357	0.273
9	877.61	97.807	2.116	902.69	848.68	0.224	0.205
10	1047.35	80.752	19.164	1166.93	904.61	11.77	11.68
11	1215.15	94.849	5.116	1269.16	1168.86	1.304	1.291
12	1284.59	99.754	0.291	1296.16	1271.09	0.011	0.016
13	1382.96	82.349	17.531	1419.61	1298.09	3.519	3.472
14	1444.68	92.845	6.99	1473.62	1421.54	0.8	0.761
15	1529.55	79.307	3.387	1539.2	1473.62	3.918	0.809
16	1610.56	58.143	25.56	1707	1541.12	24.9	12.59
17	1786.08	99.264	0.387	1797.66	1778.37	0.04	0.013
18	1857.45	98.938	0.504	1869.02	1847.81	0.071	0.019
19	1932.67	99.701	0.216	1948.1	1926.89	0.009	0.009
20	2079.26	99.26	0.024	2083.12	2063.83	0.06	0.001
21	2358.94	97.651	1.279	2395.59	2341.58	0.282	0.09
22	2590.4	99.305	0.009	2592.33	2573.04	0.057	0
23	2852.72	95.442	0.991	2864.29	2789.07	0.707	-0.023
24	2924.09	91.784	3.677	2949.16	2866.22	2.152	0.518
25	2956.87	95.155	0.967	2993.52	2949.16	0.487	0.024
26	3414	65.292	0.841	3433.29	3396.64	6.693	0.111

Lampiran 11. Hasil karakterisasi menggunakan PSA

HORIBA Scientific

HORIBA SZ-100 for Windows [Z Type] Ver2.00

SZ-100

033.C.PSA.VIII.2022.nsz

Measurement Results

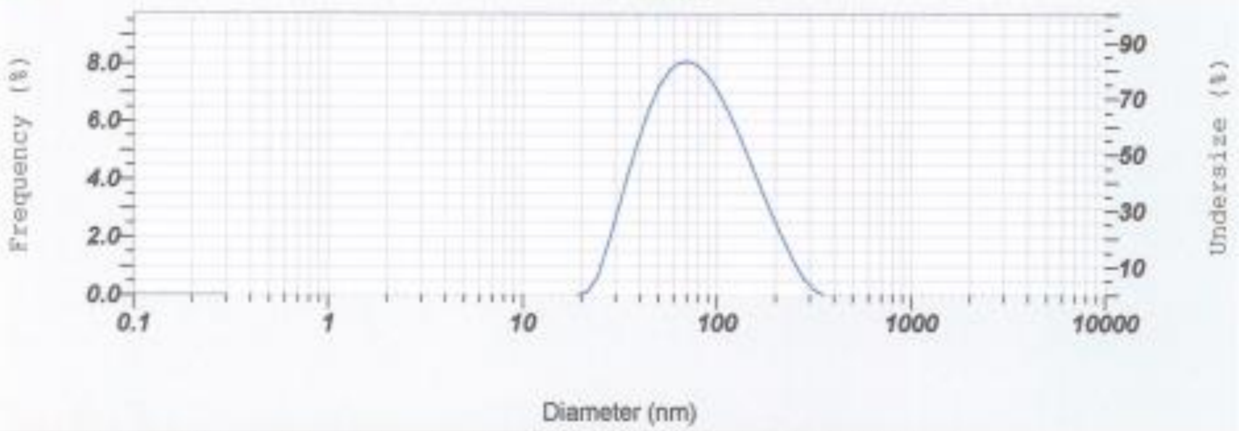
Date	: Saturday, August 20, 2022 2:37:19 PM
Measurement Type	: Particle Size
Sample Name	: NPP
Scattering Angle	: 90
Temperature of the Holder	: 24.8 °C
Dispersion Medium Viscosity	: 0.899 mPa·s
Transmission Intensity before Meas.	: 28018
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 1231 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	83.6 nm	48.1 nm	68.5 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	83.6 nm	48.1 nm	68.5 nm

Cumulant Operations

Z-Average	: 59.0 nm
PI	: 0.285



No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation	No.	Diameter	Frequency	Cumulation
1	0.34	0.000	0.000	22	4.40	0.000	0.000	43	57.09	7.742	36.124	64	740.89	0.000	100.000
2	0.38	0.000	0.000	23	4.97	0.000	0.000	44	64.50	8.027	44.151	65	837.07	0.000	100.000
3	0.43	0.000	0.000	24	5.61	0.000	0.000	45	72.87	8.049	52.200	66	945.74	0.000	100.000
4	0.49	0.000	0.000	25	6.34	0.000	0.000	46	82.33	7.830	60.030	67	1068.52	0.000	100.000
5	0.55	0.000	0.000	26	7.17	0.000	0.000	47	93.02	7.401	67.431	68	1207.24	0.000	100.000
6	0.62	0.000	0.000	27	8.10	0.000	0.000	48	105.10	6.802	74.232	69	1363.97	0.000	100.000
7	0.70	0.000	0.000	28	9.15	0.000	0.000	49	118.74	6.074	80.307	70	1541.04	0.000	100.000
8	0.80	0.000	0.000	29	10.34	0.000	0.000	50	134.16	5.261	85.568	71	1741.10	0.000	100.000
9	0.90	0.000	0.000	30	11.68	0.000	0.000	51	151.57	4.402	89.970	72	1967.14	0.000	100.000
10	1.02	0.000	0.000	31	13.20	0.000	0.000	52	171.28	3.533	93.503	73	2222.51	0.000	100.000
11	1.15	0.000	0.000	32	14.91	0.000	0.000	53	193.48	2.686	96.190	74	2511.05	0.000	100.000
12	1.30	0.000	0.000	33	16.84	0.000	0.000	54	218.60	1.889	98.079	75	2837.04	0.000	100.000
13	1.47	0.000	0.000	34	19.03	0.000	0.000	55	246.98	1.174	99.253	76	3205.35	0.000	100.000
14	1.66	0.000	0.000	35	21.50	0.102	0.102	56	279.04	0.579	99.832	77	3621.48	0.000	100.000
15	1.87	0.000	0.000	36	24.29	0.640	0.742	57	315.27	0.168	100.000	78	4091.63	0.000	100.000
16	2.11	0.000	0.000	37	27.45	1.655	2.397	58	356.20	0.000	100.000	79	4622.81	0.000	100.000
17	2.39	0.000	0.000	38	31.01	2.890	5.287	59	402.44	0.000	100.000	80	5222.98	0.000	100.000
18	2.70	0.000	0.000	39	35.03	4.164	9.451	60	454.69	0.000	100.000	81	5901.02	0.000	100.000
19	3.05	0.000	0.000	40	39.58	5.356	14.806	61	513.71	0.000	100.000	82	6667.10	0.000	100.000
20	3.45	0.000	0.000	41	44.72	6.384	21.191	62	580.41	0.000	100.000	83	7532.65	0.000	100.000
21	3.89	0.000	0.000	42	50.53	7.191	28.382	63	655.76	0.000	100.000	84	8510.56	0.000	100.000

Lampiran 12. Hasil karakterisasi menggunakan XRD

*** Basic Data Process ***

Group : Standard
Data : AgNP#5p#profWahid

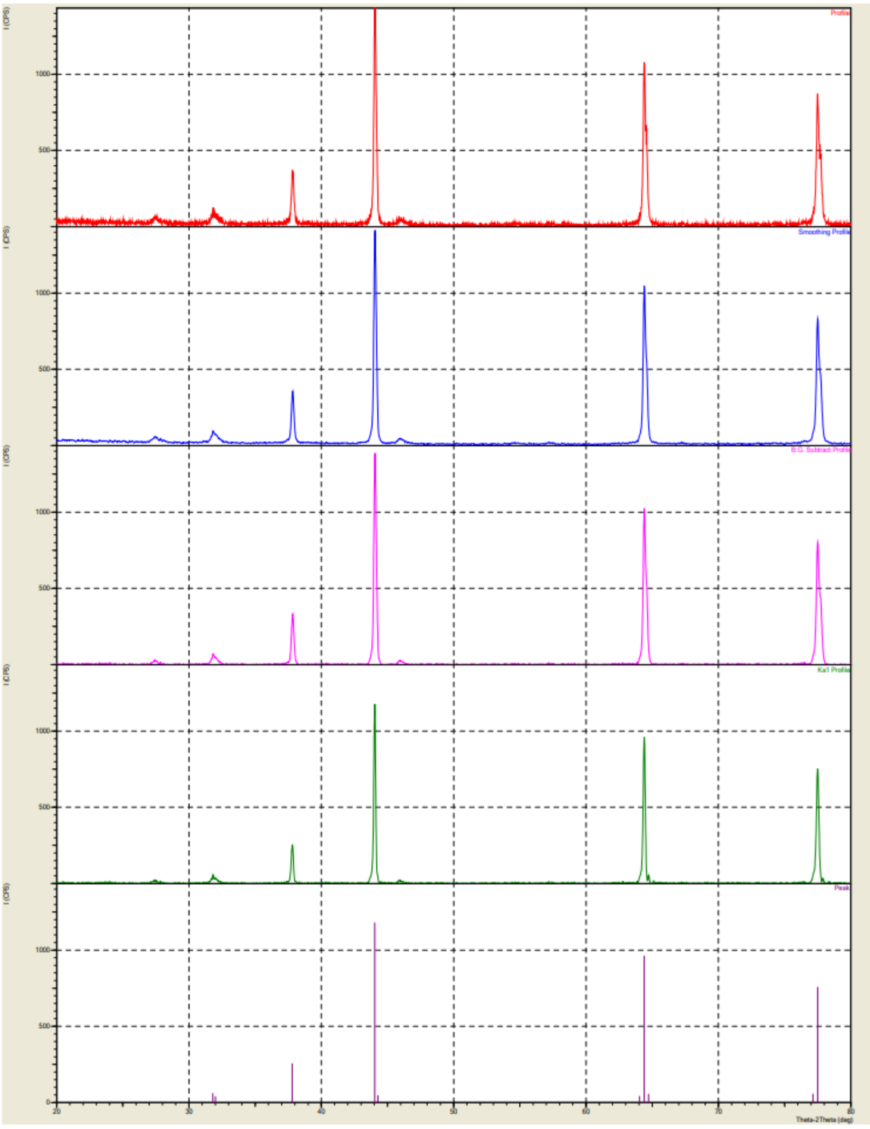
Strongest 3 peaks

no.	peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	4	44.0352	2.05473	100	0.16890	707	6680
2	7	64.3957	1.44564	81	0.18460	576	5652
3	10	77.4976	1.23069	64	0.22130	453	5608

Peak Data List

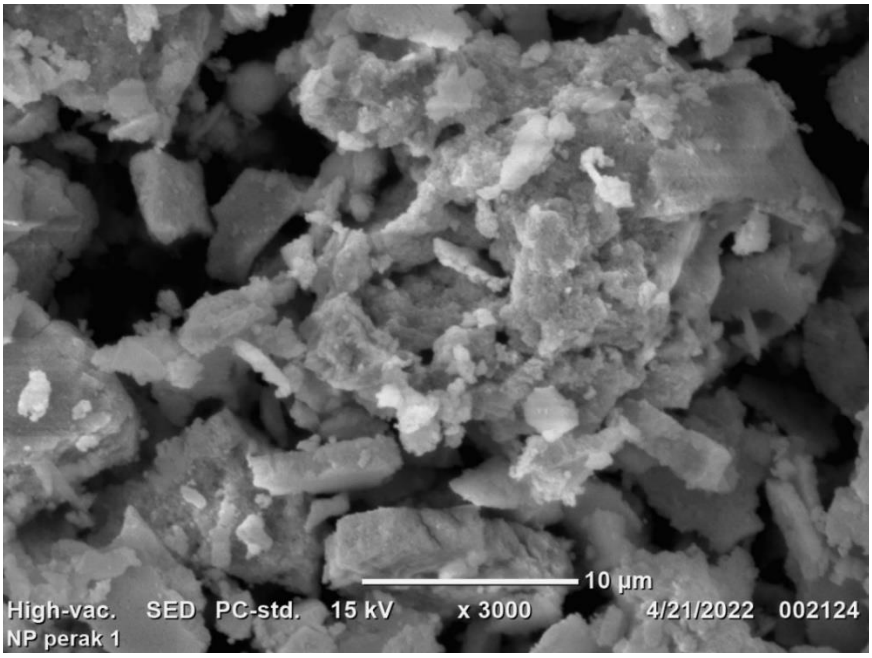
peak no.	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	31.8100	2.81087	5	0.18000	34	318
2	32.0000	2.79461	3	0.38000	22	399
3	37.8071	2.37764	21	0.19150	152	1729
4	44.0352	2.05473	100	0.16890	707	6680
5	44.2800	2.04394	4	0.06220	26	211
6	64.0400	1.45281	3	0.12000	23	388
7	64.3957	1.44564	81	0.18460	576	5652
8	64.7221	1.43913	5	0.14920	32	288
9	77.1400	1.23550	5	0.12000	32	435
10	77.4976	1.23069	64	0.22130	453	5608

< Group: Standard Data: AgNP#5p#profWahid >

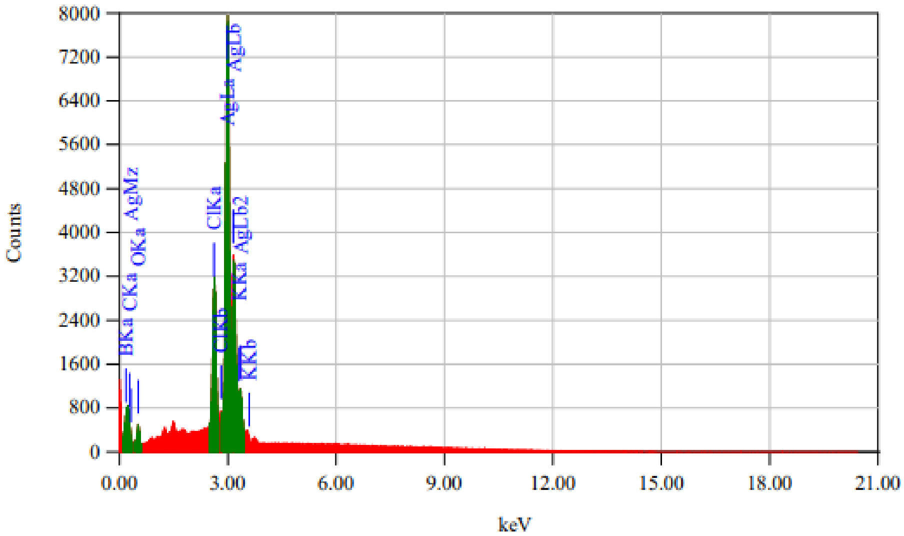


Lampiran 13. Hasil karakterisasi menggunakan SEM-EDS

a. Morfologi SEM nanopartikel perak



b. Spektrum EDS nanpartikel perak




```
Acquisition Parameter
Instrument     : JCM-6000PLUS
Acc. Voltage : 15.0 kV
Probe Current: 1.00000 nA
PHA mode       : T3
Real Time      : 51.92 sec
Live Time      : 50.00 sec
Dead Time      : 3 %
Counting Rate: 7620 cps
Energy Range :  0 - 20 keV
```

Thin Film Standardless Standardless Quantitative Analysis
Fitting Coefficient : 0.0580

Element	(keV)	Mass%	Counts	Sigma	Atom%	Compound	Mass%	Cation	K
B K	0.183	3.34	669.02	0.03	21.49				4.1072
C K	0.277	0.58	684.80	0.02	3.37				0.6997
O K	0.525	0.61	1863.19	0.02	2.67				0.2707
Cl K	2.621	7.96	21807.60	0.08	15.61				0.3002
K K	3.312	0.38	903.35	0.05	0.68				0.3485
Ag L* (Ref.)	2.984	87.12	71647.44	0.39	56.17				1.0000
Total		100.00			100.00				