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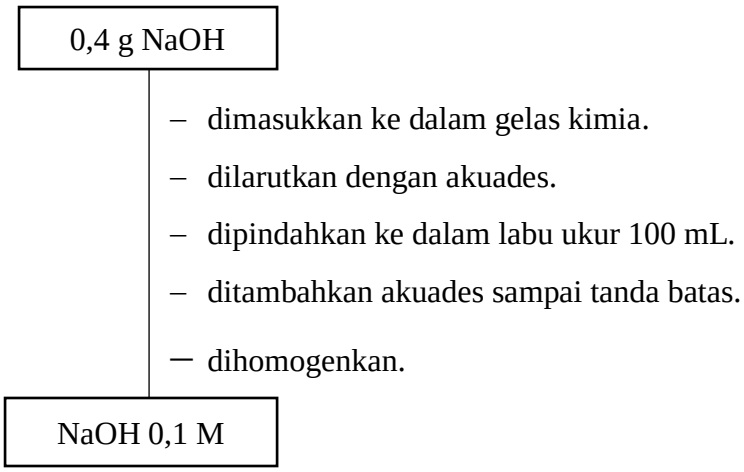
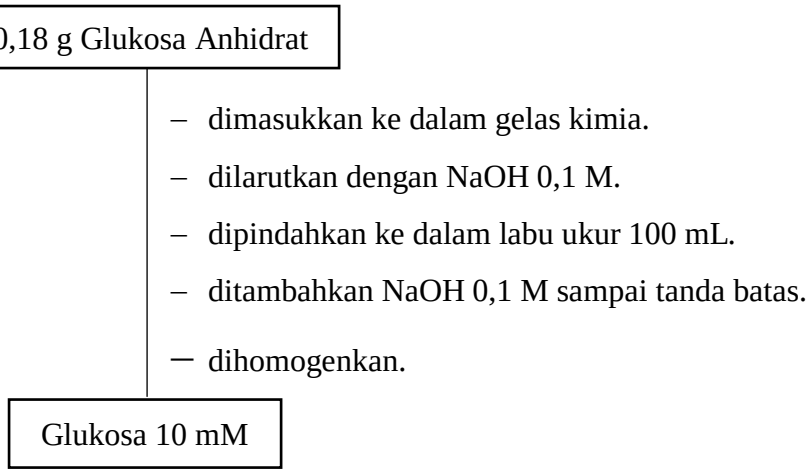
**Lampiran 1.** Bagan Kerja

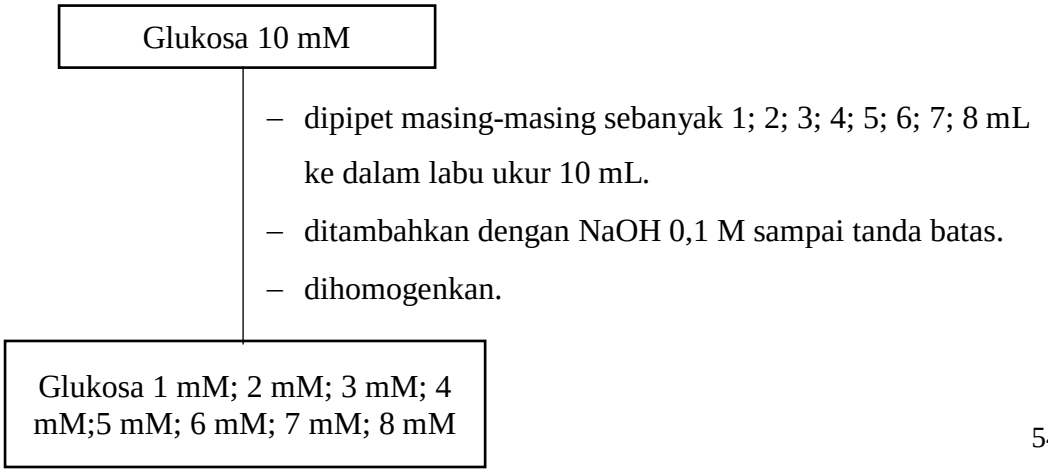
**1. Pembuatan 100 mL NaOH 0,1 M**




**2. Pembuatan Larutan Induk Glukosa**




**3. Pembuatan Larutan Standar Glukosa**



**4. Pembuatan Larutan $HAuCl_4$ 1000 ppm**

1 g Logam Emas

- dimasukkan ke dalam gelas kimia 100 mL
- dilarutkan dengan 8 mL aquaregia
- dipanaskan sampai tidak ada logam yang tersisa
- diencerkan dengan akuabides dalam labu ukur 1000 mL.
- dihomogenkan.

Larutan $HAuCl_4$

**5. Pembuatan Larutan Poli Asam Akrilat (PAA) 1%**

1 g PAA

- dilarutkan dengan akuabides
- dimasukkan ke dalam labu ukur 100 mL
- diencerkan dengan akuabides hingga tanda batas
- dihomogenkan.

Larutan PAA 1%

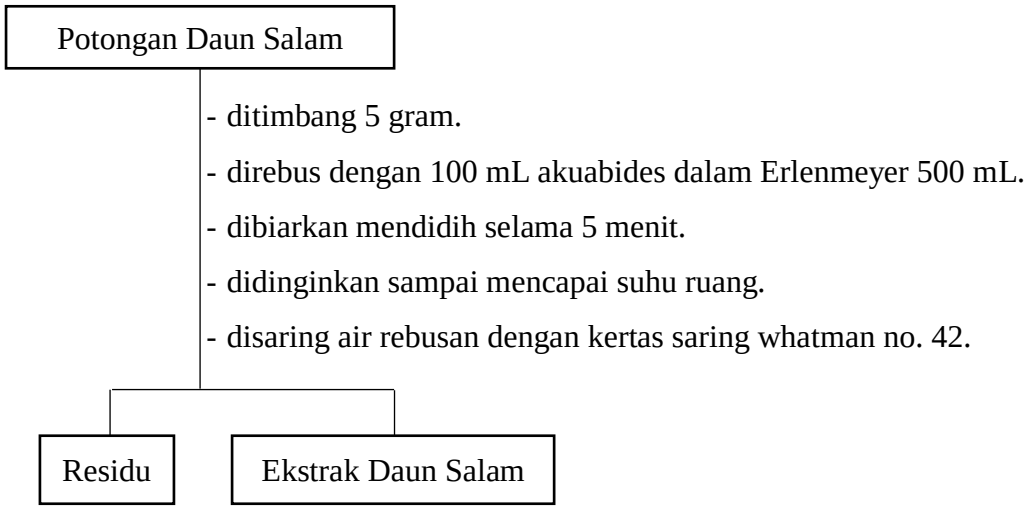
**6. Preparasi Daun Salam**

Daun Salam

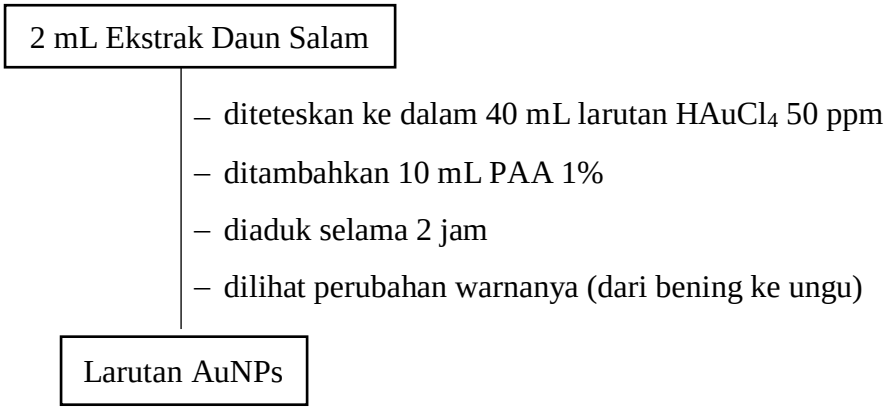
- dikumpulkan.
- dicuci hingga bersih.
- dibilas dengan akuades.
- dikeringkan.
- dipotong hingga halus.
- disimpan dalam gelas kimia bersih.

Potongan Daun Salam

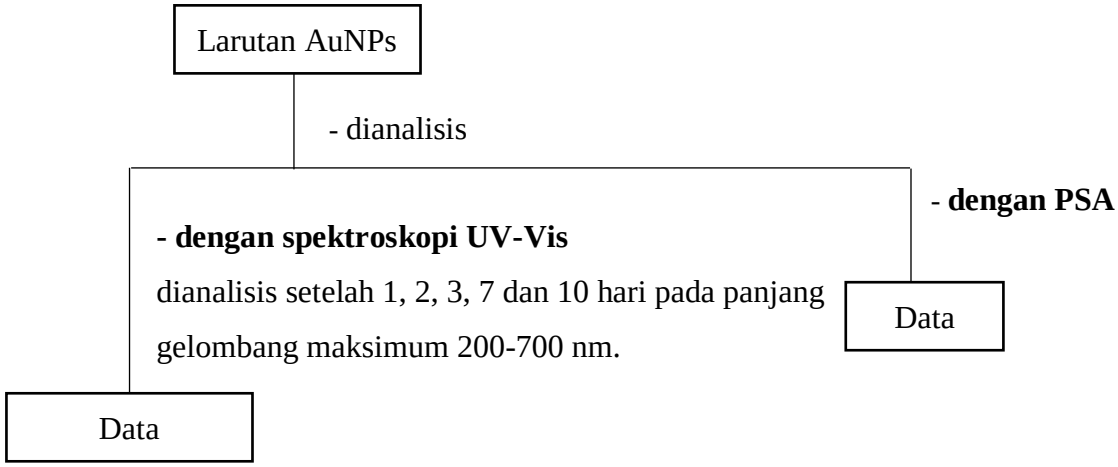
**7. Pembuatan Ekstrak Daun Salam**

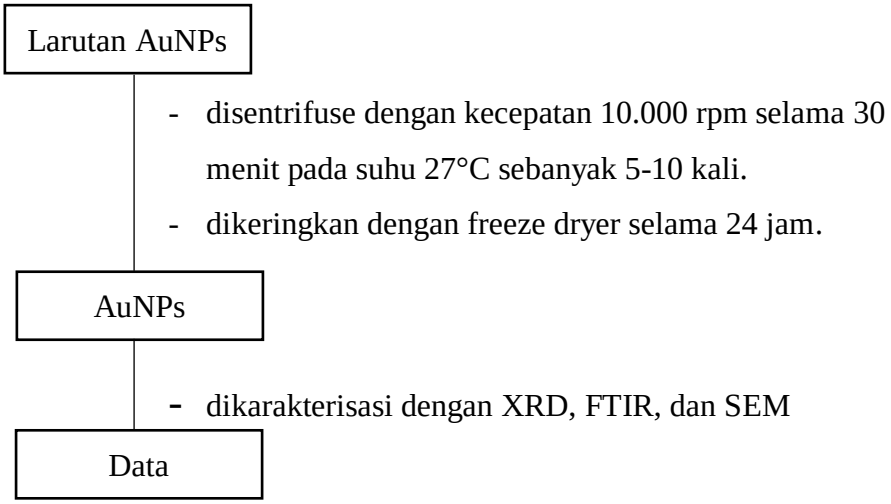



**8. Pembuatan Nanopartikel Emas**

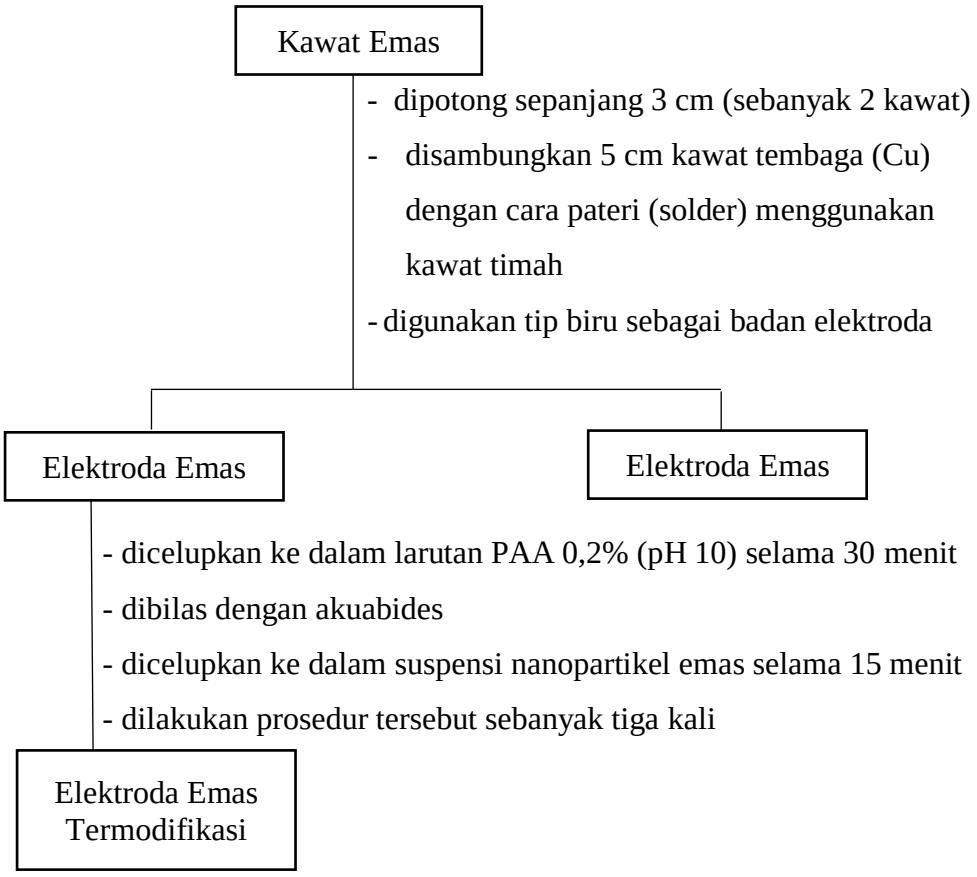



**9. Karakterisasi Nanopartikel Emas**

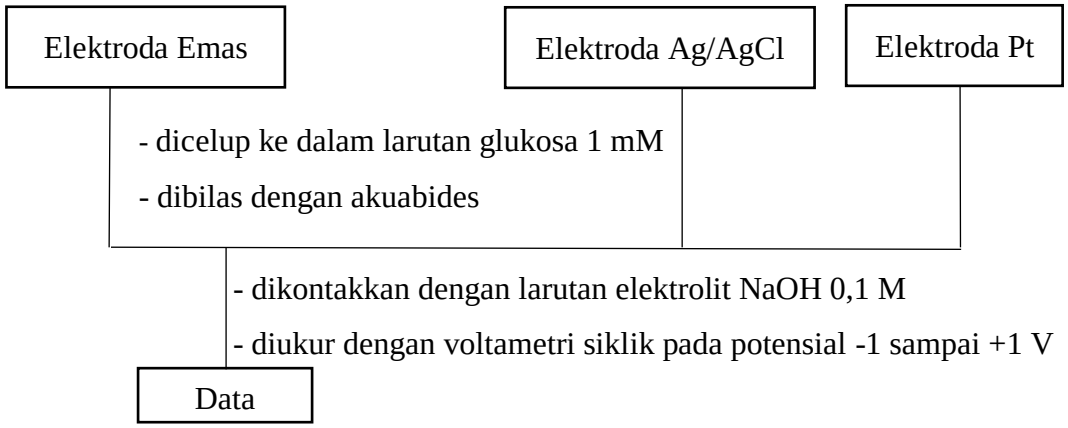





**10. Persiapan Elektroda Emas dan Pengendapan Nanopartikel Emas**



**11. Pengukuran Larutan Standar Glukosa**




- Dilakukan prosedur yang sama dengan mengganti larutan glukosa 1 mM menjadi 2 mM-8 mM.
- Elektroda emas diganti dengan elektroda emas termodifikasi.
- Dihitung limit deteksi dan sensitivitas dari data yang diperoleh.

**Lampiran 2.** Perhitungan Ukuran Nanopartikel

Persamaan Debye-Scherer

$$D = \frac{K\,\lambda}{\beta\,\mathrm{Cos}\,\theta}$$

Keterangan:

D = Ukuran partikel (nm)

K = Faktor bentuk dari kristal (0,98)

λ = Panjang gelombang dari sinar X (1,54178 Å)

ß = Nilai FWHM (rad)

θ = Sudut Bragg/sudut difraksi (2θ/2)

| **2θ (˚)** | **FWHM (˚)** | **D (nm)** |
|---|---|---|
| 37,8442 | 0,2335 | 39,17 |
| 64,4202 | 0,2074 | 49,54 |
| 44.0585 | 0,1812 | 51,50 |
| 77,5016 | 0,3077 | 36,05 |
| Ukuran rata-rata partikel | | 44,06 |

Perhitungan:

2θ = 37,8442

$\theta = \frac{37{,}8431}{2} = 18{,}92155$

Cos θ = 0,9459

β (FWHM) = $\frac{0{,}2335}{180\ \mathrm{rad}} \times 3{,}14\ (= \lambda) =$

= 0,004 rad

$D = k\,\lambda/(\beta\,\mathrm{Cos}\,\theta)$

$= \frac{0{,}98 \times 0{,}154\ \mathrm{nm}}{0{,}004 \times 0{,}9459}$

$= \frac{0{,}15092}{0{,}0038529} = 39{,}17\ \mathrm{nm}$

**Lampiran 3.** Perhitungan Limit Deteksi dan Sensitivitas

1. Limit Deteksi

   $y = 0{,}1037x + 0{,}002$

   $y = -0{,}03x + 0{,}76$

   $0 = 0{,}1337 - 0{,}758$ –

   $0{,}1337 - 0{,}758 = 0$

   $X = \frac{0{,}758}{0{,}1337} = 5{,}6694$ mM

2. Sensitivitas

   $y = 0{,}1037x + 0{,}002$

   $\text{sensitivitas} = \frac{\text{Slope}}{A}$

   $= \frac{0{,}1037}{3{,}14 \times 0{,}4 \times 0{,}4}$

   $= \frac{0{,}1037}{0{,}5024}$

   $= 0{,}2064$ A $mM^{-1}. mm^{-2}$

**Lampiran 4.** Perhitungan Glukosa Dalam Sampel Darah

**Diketahui:**

kuat arus (y) = 0,5382 mA

$y = 0{,}1037x + 0{,}002$

$0{,}5382 = 0{,}1037x + 0{,}002$

$$X = \frac{0{,}5382 + 0{,}002}{0{,}1037}$$

X = 5,2092 mM

Konsentrasi glukosa darah = 5,2092 mM x Mr Glukosa

= 5,2092 mmol/L x 180 mg/mmol

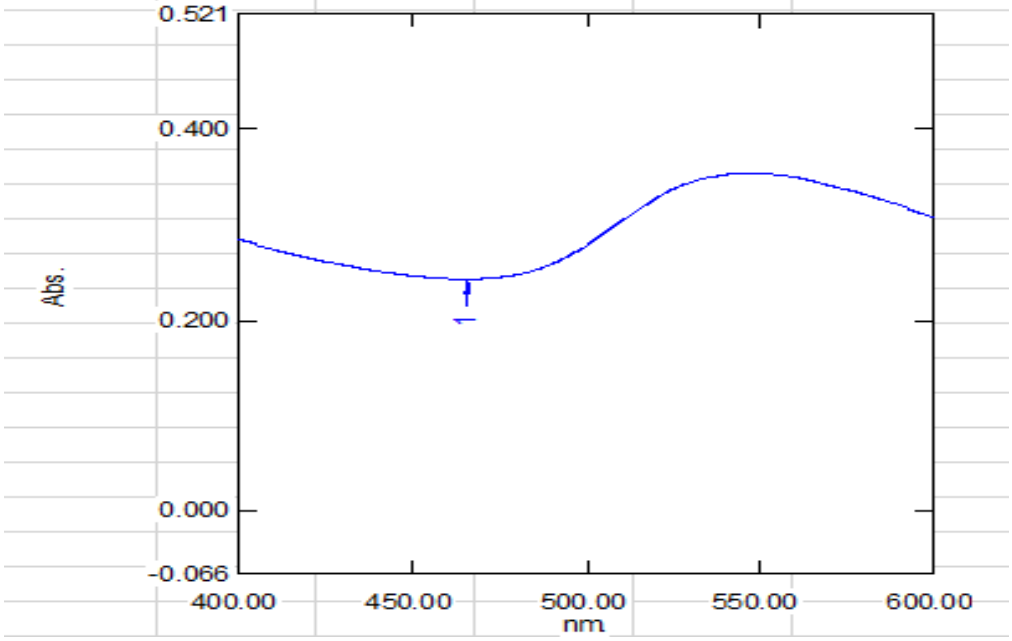
= 937,656 mg/L

= 93,76 mg/dL

**Lampiran 5.** Data Hasil Karakterisasi Nanopartikel Emas Menggunakan Spektrofotometer UV-Vis

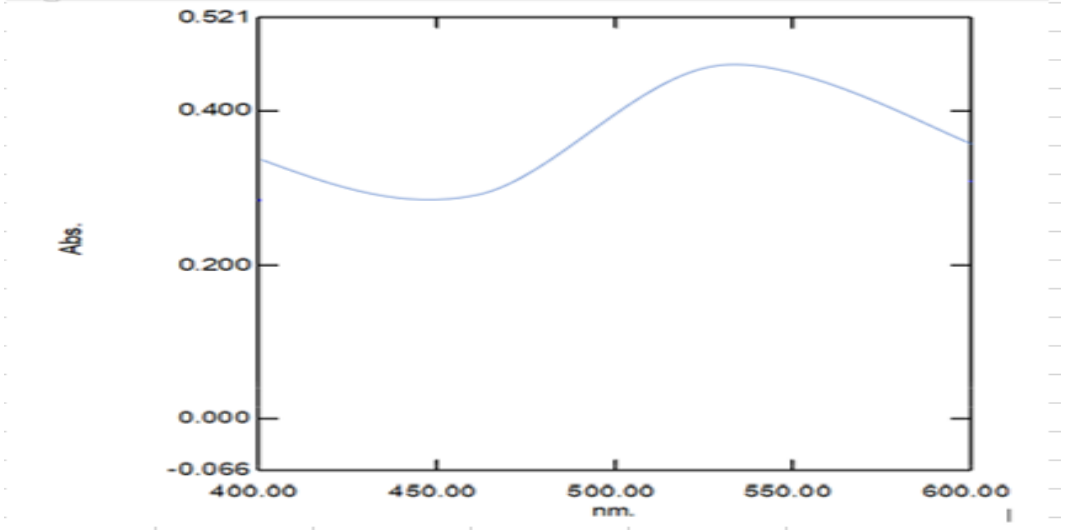
**Hari ke 1**

| No. | P/V | Waveleng | Abs. | Description |
|---|---|---|---|---|
| 1 | | 466,2 | 0,242 | |
| 2 | | 533,8 | 0,468 | |



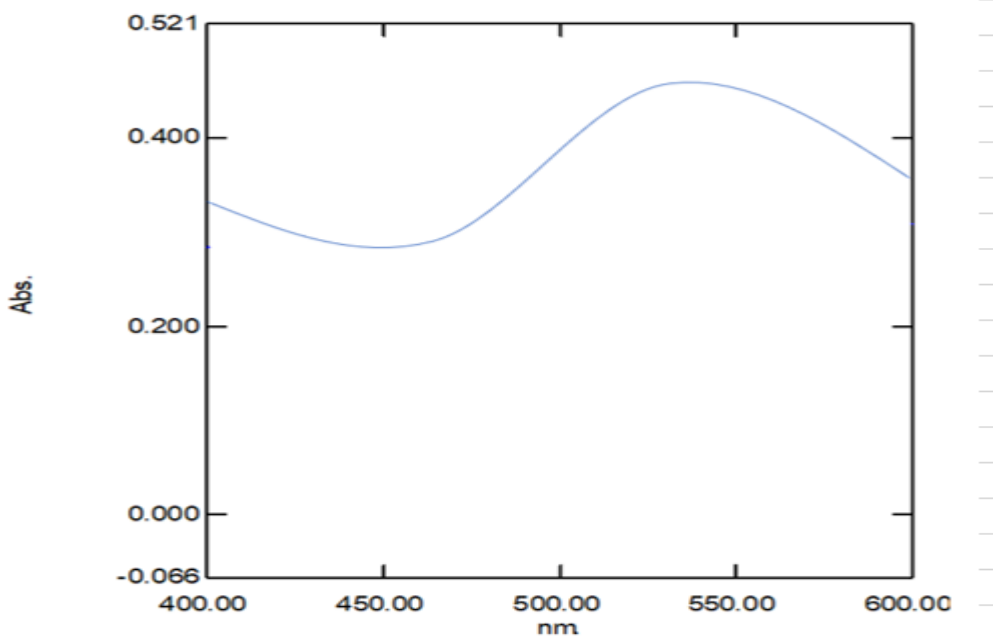

**Hari ke 2**

| No. | P/V | Waveleng | Abs. | Description |
|---|---|---|---|---|
| 1 | | 456,7 | 0,252 | |
| 2 | | 533,85 | 0,456 | |



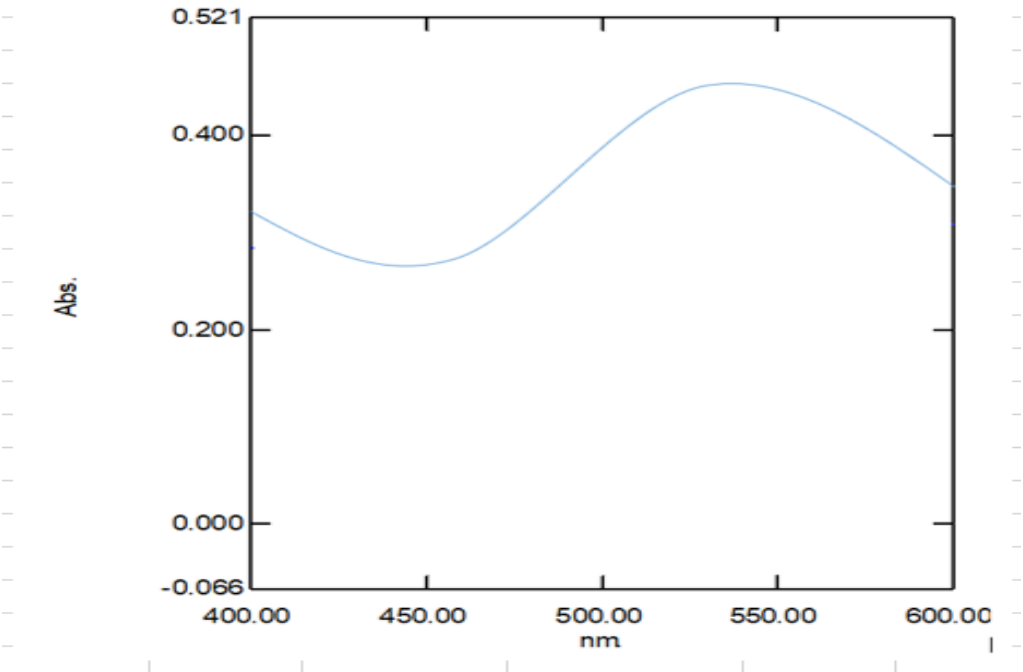
**Hari ke 3**

| No. | P/V | Wavelength n | Abs. | Description |
|---|---|---|---|---|
| 1 | | 534 | 0,441 | |

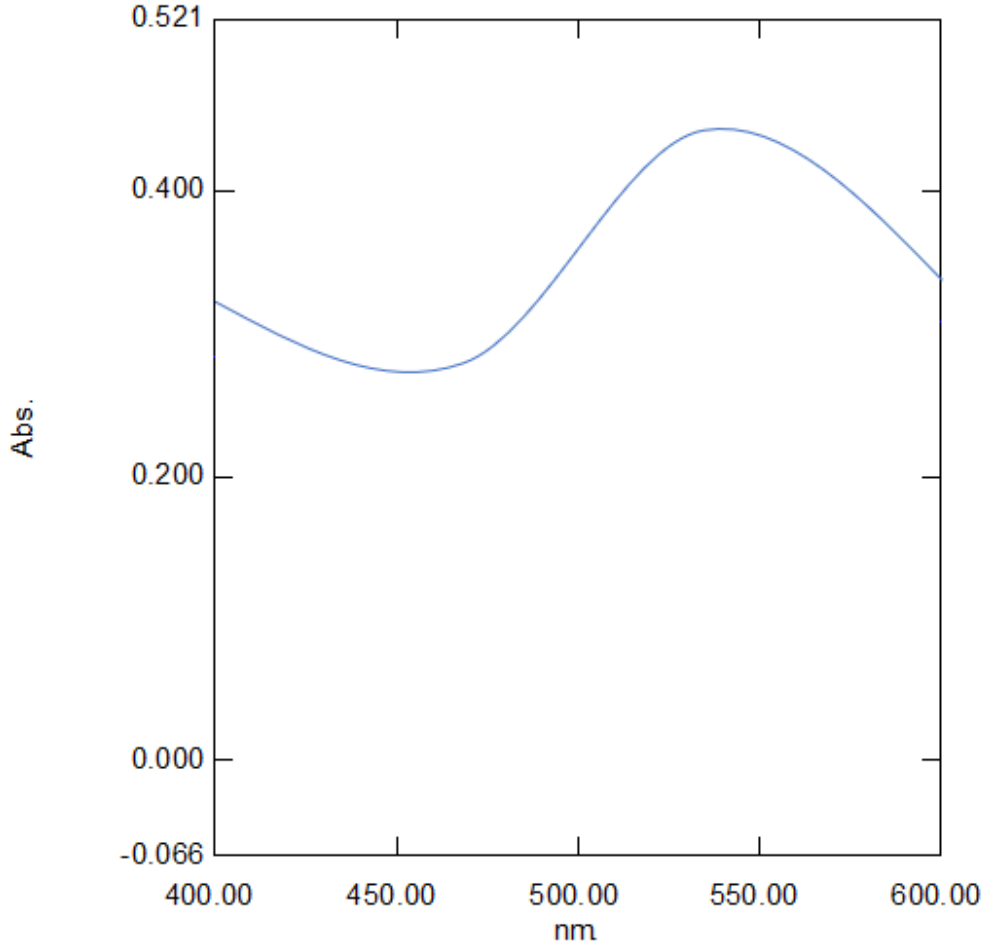



**Hari ke 7**

| No. | P/V | Wavelength n | Abs. | Description |
|---|---|---|---|---|
| 1 | | 540 | 0,432 | |

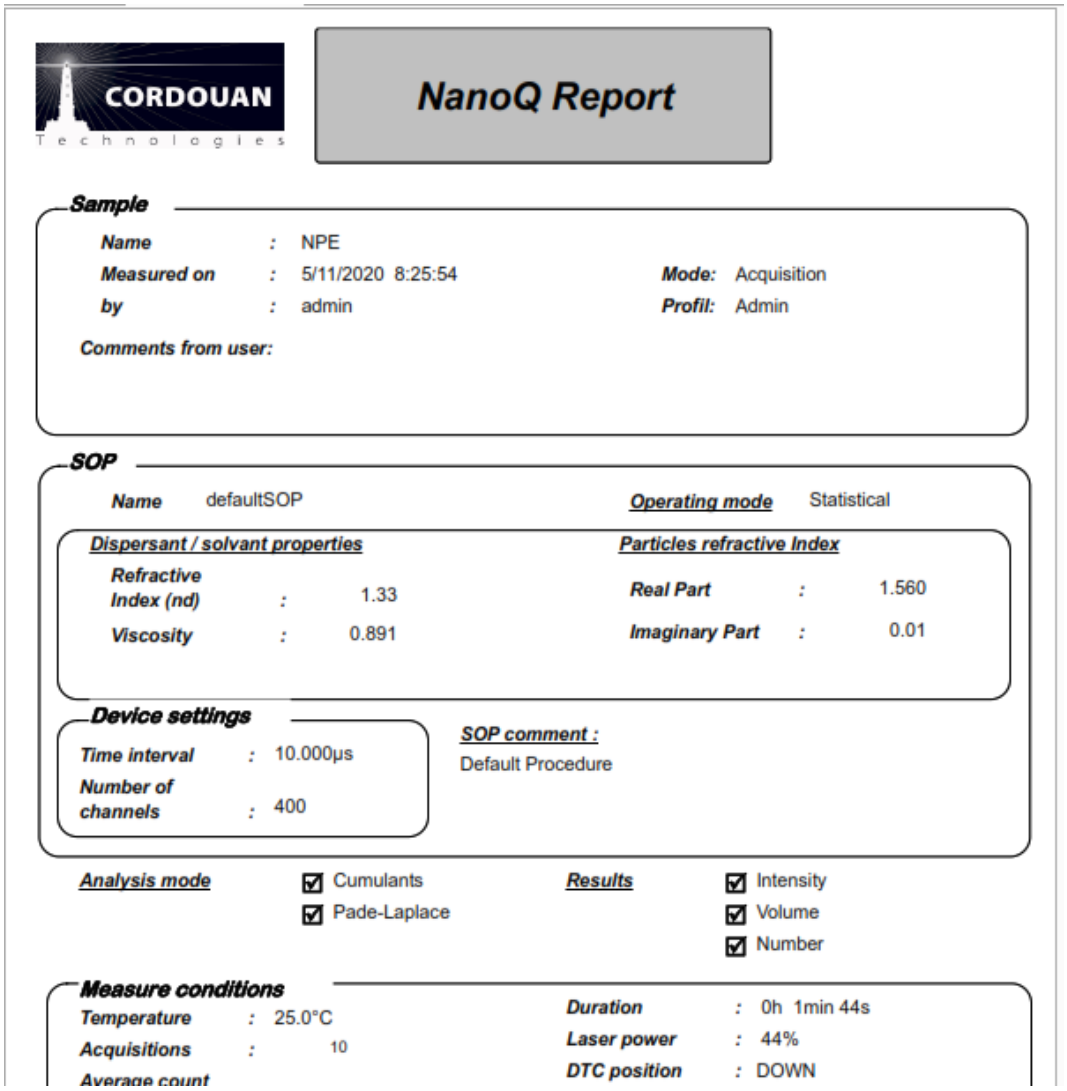


**Hari ke 10**




| | P/V | Waveleng | Abs. | Description | |
|---|---|---|---|---|---|
| 1 | | 466,2 | 0,242 | | |
| 2 | | 543,8 | 0,421 | | |
| | | | | | |
| | | | | | |

**Lampiran 6.** Data Hasil Karakterisasi Nanopartikel Emas Menggunakan PSA



CORDOUAN Technologies

**NanoQ Report**

**Sample**

| | | | | |
|---|---|---|---|---|
| **Name** | : | NPE | | |
| **Measured on** | : | 5/11/2020 8:25:54 | **Mode:** | Acquisition |
| **by** | : | admin | **Profil:** | Admin |

**Comments from user:**

**SOP**

**Name** defaultSOP **Operating mode** Statistical

**Dispersant / solvant properties**

| | | |
|---|---|---|
| **Refractive Index (nd)** | : | 1.33 |
| **Viscosity** | : | 0.891 |

**Particles refractive Index**

| | | |
|---|---|---|
| **Real Part** | : | 1.560 |
| **Imaginary Part** | : | 0.01 |

**Device settings**

| | | |
|---|---|---|
| **Time interval** | : | 10.000µs |
| **Number of channels** | : | 400 |

**SOP comment :**
Default Procedure

**Analysis mode** ☑ Cumulants ☑ Pade-Laplace

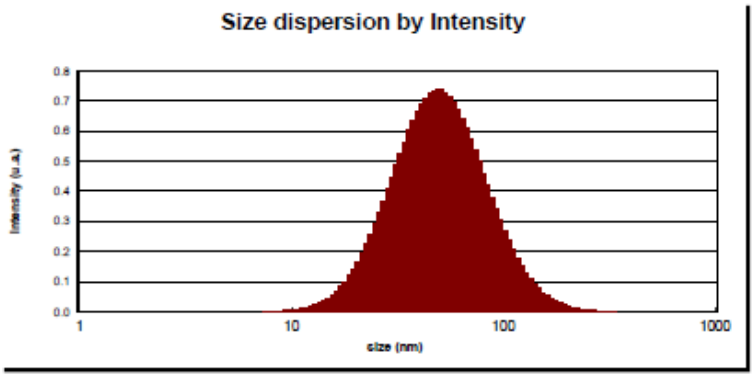
**Results** ☑ Intensity ☑ Volume ☑ Number

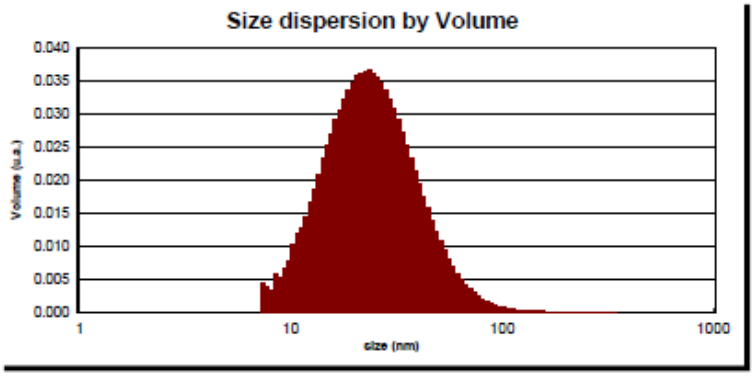
**Measure conditions**

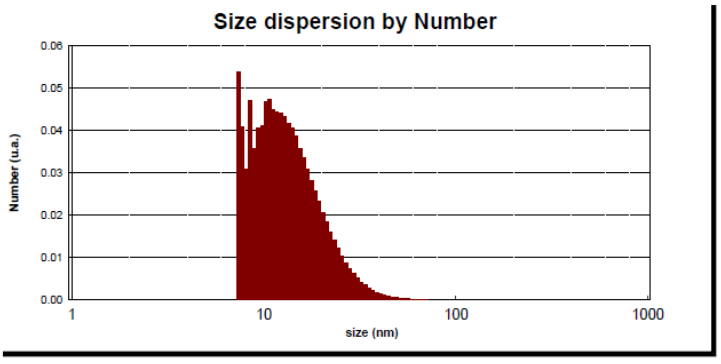
| | | | | |
|---|---|---|---|---|
| **Temperature** | : | 25.0°C | **Duration** | : 0h 1min 44s |
| **Acquisitions** | : | 10 | **Laser power** | : 44% |
| **Average count** | | | **DTC position** | : DOWN |

*Cumulants method*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Zaverage (nm): | 47.54 | |
| Dv10: | 12.31 | Dv50: | 23.45 | Dv90: | 44.68 | PDI: | 0.2720 |
| Dmean Intensity: | 56.42 | Dmean volume: | 26.84 | Dmean number: | 14.01 | | |

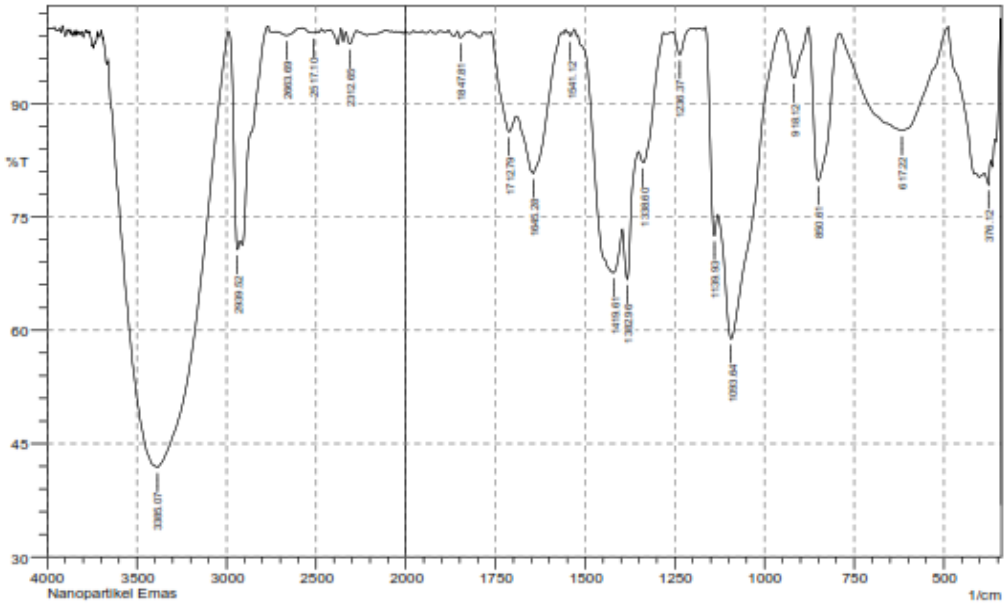


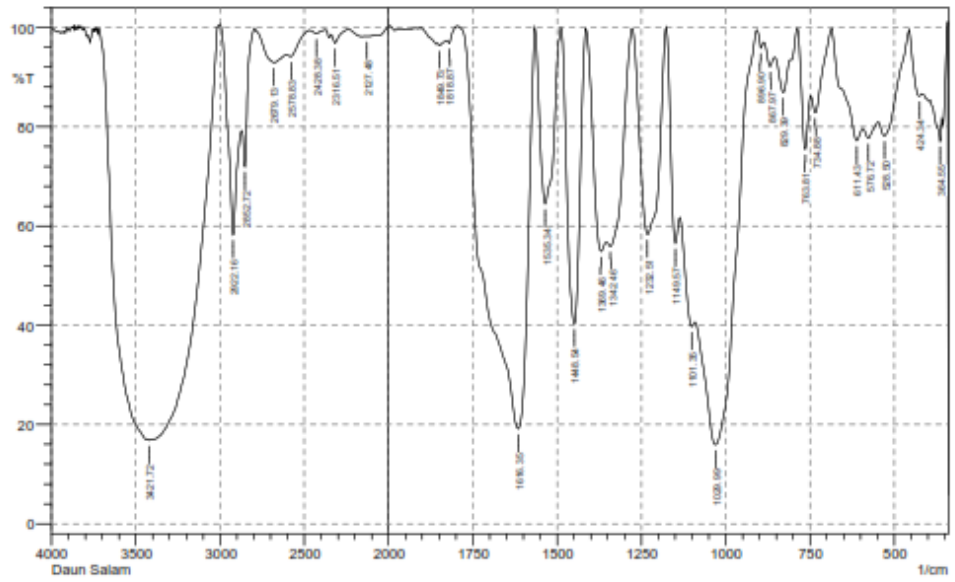
| Size (nm) | Intensity | Number | Volume |
|---|---|---|---|
| 7.42 | 0.00 | 0.05 | 0.00 |
| 7.76 | 0.00 | 0.04 | 0.00 |
| 8.13 | 0.00 | 0.03 | 0.00 |
| 8.51 | 0.00 | 0.05 | 0.01 |
| 8.91 | 0.00 | 0.04 | 0.01 |
| 9.34 | 0.00 | 0.04 | 0.01 |
| 9.77 | 0.00 | 0.04 | 0.01 |
| 10.24 | 0.01 | 0.05 | 0.01 |
| 10.72 | 0.01 | 0.05 | 0.01 |
| 11.22 | 0.01 | 0.04 | 0.01 |
| 11.75 | 0.01 | 0.04 | 0.01 |
| 12.31 | 0.02 | 0.04 | 0.02 |
| 12.89 | 0.02 | 0.04 | 0.02 |
| 13.49 | 0.03 | 0.04 | 0.02 |
| 14.13 | 0.04 | 0.04 | 0.02 |
| 14.80 | 0.05 | 0.04 | 0.03 |
| 15.49 | 0.06 | 0.04 | 0.03 |
| 16.22 | 0.07 | 0.03 | 0.03 |
| 16.99 | 0.08 | 0.03 | 0.03 |
| 17.79 | 0.10 | 0.03 | 0.03 |
| 18.63 | 0.12 | 0.03 | 0.03 |
| 19.50 | 0.14 | 0.02 | 0.03 |
| 20.42 | 0.17 | 0.02 | 0.04 |
| 21.39 | 0.19 | 0.02 | 0.04 |
| 22.39 | 0.22 | 0.02 | 0.04 |
| 23.45 | 0.26 | 0.01 | 0.04 |
| 24.55 | 0.29 | 0.01 | 0.04 |
| 25.71 | 0.33 | 0.01 | 0.04 |
| 26.92 | 0.37 | 0.01 | 0.03 |
| 28.19 | 0.41 | 0.01 | 0.03 |
| 29.52 | 0.45 | 0.01 | 0.03 |
| 30.91 | 0.49 | 0.01 | 0.03 |
| 32.37 | 0.53 | 0.00 | 0.03 |
| 33.89 | 0.57 | 0.00 | 0.03 |
| 35.49 | 0.60 | 0.00 | 0.03 |
| 37.16 | 0.64 | 0.00 | 0.02 |
| 38.91 | 0.67 | 0.00 | 0.02 |
| 40.75 | 0.69 | 0.00 | 0.02 |
| 42.67 | 0.71 | 0.00 | 0.02 |
| 44.68 | 0.73 | 0.00 | 0.02 |
| 46.79 | 0.74 | 0.00 | 0.01 |
| 48.99 | 0.74 | 0.00 | 0.01 |
| 51.30 | 0.74 | 0.00 | 0.01 |
| 53.72 | 0.73 | 0.00 | 0.01 |
| 56.25 | 0.72 | 0.00 | 0.01 |
| 58.90 | 0.70 | 0.00 | 0.01 |
| 61.68 | 0.67 | 0.00 | 0.01 |

**Lampiran 7.** Data Hasil Karakterisasi Ekstrak Daun Salam Menggunakan FTIR




| No. | Peak | Intensity | Corr. Intensity | Base (H) | Base (L) | Area | Corr. Area |
|---|---|---|---|---|---|---|---|
| 1 | 376.12 | 79.317 | 2.491 | 387.69 | 368.4 | 1.605 | 0.105 |
| 2 | 617.22 | 86.432 | 1.171 | 790.61 | 603.72 | 6.113 | 2.031 |
| 3 | 650.61 | 79.616 | 20.063 | 877.61 | 790.61 | 4.563 | 4.459 |
| 4 | 918.12 | 93.396 | 6.616 | 952.64 | 877.61 | 1.004 | 1.012 |
| 5 | 1093.64 | 56.663 | 21.512 | 1130.29 | 952.64 | 20.65 | 9.665 |
| 6 | 1139.93 | 72.56 | 9.627 | 1165 | 1130.29 | 2.905 | 0.775 |
| 7 | 1236.37 | 96.462 | 3.174 | 1253.73 | 1199.72 | 0.346 | 0.269 |
| 8 | 1338.6 | 82.193 | 4.496 | 1352.1 | 1282.66 | 3.711 | 0.92 |
| 9 | 1382.96 | 66.746 | 9.726 | 1396.46 | 1352.1 | 5.61 | 0.902 |
| 10 | 1419.61 | 67.653 | 0.652 | 1423.47 | 1396.46 | 4.256 | 0.151 |
| 11 | 1541.12 | 96.937 | 0.673 | 1546.91 | 1529.55 | 0.05 | 0.025 |
| 12 | 1645.26 | 80.754 | 11.714 | 1691.57 | 1566.13 | 7.221 | 3.722 |
| 13 | 1712.79 | 86.291 | 5.383 | 1762.94 | 1691.57 | 3.026 | 1.037 |
| 14 | 1847.81 | 96.751 | 0.601 | 1855.52 | 1830.45 | 0.099 | 0.046 |
| 15 | 2312.65 | 97.916 | 1.643 | 2335.8 | 2277.93 | 0.329 | 0.222 |
| 16 | 2517.1 | 99.394 | 0.311 | 2576.9 | 2492.03 | 0.147 | 0.074 |
| 17 | 2663.69 | 99.057 | 0.664 | 2709.99 | 2595.12 | 0.307 | 0.19 |
| 18 | 2939.52 | 70.709 | 7.657 | 2957.74 | 2924.09 | 5.259 | 0.659 |
| 19 | 3365.07 | 41.674 | 55.365 | 3660.89 | 2969.66 | 149.67 | 142.711 |

**Lampiran 8.** Data Hasil Karakterisasi Nanopartikel Emas Menggunakan FTIR




| No. | Peak | Intensity | Corr. Intensity | Base (H) | Base (L) | Area | Corr. Area |
|---|---|---|---|---|---|---|---|
| 1 | 364.55 | 77.124 | 5.0559 | 393.46 | 356.76 | 3.1636 | 0.4096 |
| 2 | 424.34 | 86.2156 | 2.453 | 455.2 | 416.55 | 1.7226 | 0.4642 |
| 3 | 526.5 | 76.1703 | 6.6727 | 547.78 | 457.13 | 6.0377 | 1.6195 |
| 4 | 576.72 | 77.6666 | 2.3693 | 592.15 | 549.71 | 4.335 | 0.2616 |
| 5 | 611.43 | 77.1696 | 6.2948 | 664.73 | 594.06 | 6.6132 | 1.9917 |
| 6 | 734.66 | 82.8093 | 5.9266 | 746.45 | 666.66 | 2.6634 | 0.7702 |
| 7 | 763.61 | 75.4627 | 16.1524 | 786.96 | 746.36 | 2.8641 | 1.5631 |
| 8 | 829.39 | 86.8973 | 6.7733 | 854.47 | 810.1 | 1.964 | 0.7291 |
| 9 | 867.97 | 92.1566 | 3.0633 | 887.26 | 854.47 | 0.8822 | 0.2227 |
| 10 | 896.9 | 95.8943 | 2.3429 | 906.54 | 887.26 | 0.2326 | 0.063 |
| 11 | 1029.99 | 15.9216 | 44.0677 | 1069.76 | 906.47 | 74.5626 | 39.4563 |
| 12 | 1101.35 | 39.7336 | 5.4634 | 1136.07 | 1091.71 | 14.7006 | 1.236 |
| 13 | 1149.57 | 56.5214 | 16.5546 | 1176.56 | 1136 | 6.0801 | 1.8696 |
| 14 | 1232.51 | 58.3043 | 41.4161 | 1276.66 | 1176.51 | 13.7661 | 13.6654 |
| 15 | 1342.46 | 55.8673 | 6.4776 | 1352.1 | 1276.61 | 11.5677 | 2.605 |
| 16 | 1369.46 | 54.6769 | 12.9062 | 1413.62 | 1354.03 | 10.1573 | 2.6055 |
| 17 | 1446.54 | 40.3146 | 59.3993 | 1457.12 | 1415.75 | 14.3631 | 14.2927 |
| 18 | 1535.34 | 64.4705 | 34.9994 | 1564.27 | 1469.05 | 6.0541 | 7.91 |
| 19 | 1616.35 | 19.1264 | 80.7601 | 1764.15 | 1566.2 | 77.372 | 77.2566 |
| 20 | 1816.87 | 96.8519 | 1.5061 | 1826.52 | 1801.51 | 0.2129 | 0.0655 |
| 21 | 1849.73 | 96.3527 | 0.5194 | 1853.59 | 1826.52 | 0.3512 | 0.027 |
| 22 | 2127.46 | 96.2196 | 0.0113 | 2140.99 | 2121.7 | 0.1494 | 0.0003 |
| 23 | 2316.51 | 96.833 | 1.9547 | 2339.65 | 2237.43 | 0.6966 | 0.2971 |
| 24 | 2426.36 | 96.7639 | 0.6916 | 2466.86 | 2376.3 | 0.3402 | 0.1224 |
| 25 | 2576.63 | 94.152 | 1.376 | 2607.76 | 2470.51 | 2.069 | 0.2962 |
| 26 | 2679.13 | 92.915 | 3.5627 | 2794.85 | 2609.69 | 4.1013 | 1.7169 |
| 27 | 2852.72 | 72.0151 | 12.0136 | 2870.06 | 2796.76 | 4.3204 | 1.1334 |
| 28 | 2922.16 | 58.2791 | 29.366 | 2999.31 | 2872.01 | 14.6002 | 5.2521 |
| 29 | 3421.72 | 16.6044 | 0.2261 | 3431.36 | 3406.22 | 17.8656 | 0.067 |

**Lampiran 9.** Data Hasil Karakterisasi Nanopartikel Emas dengan XRD

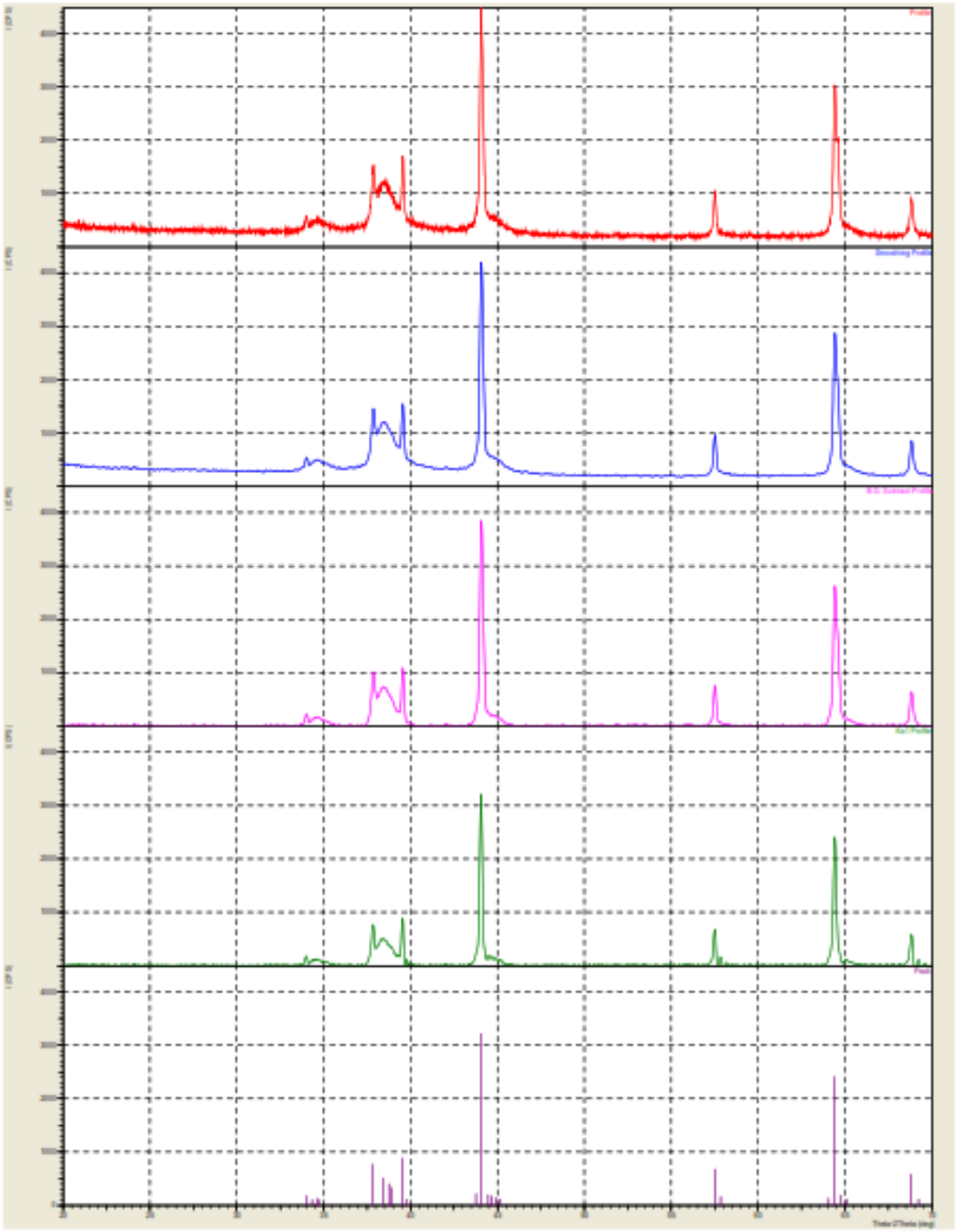
Group : Standard
Data : Au#NN

# Strongest 3 peaks

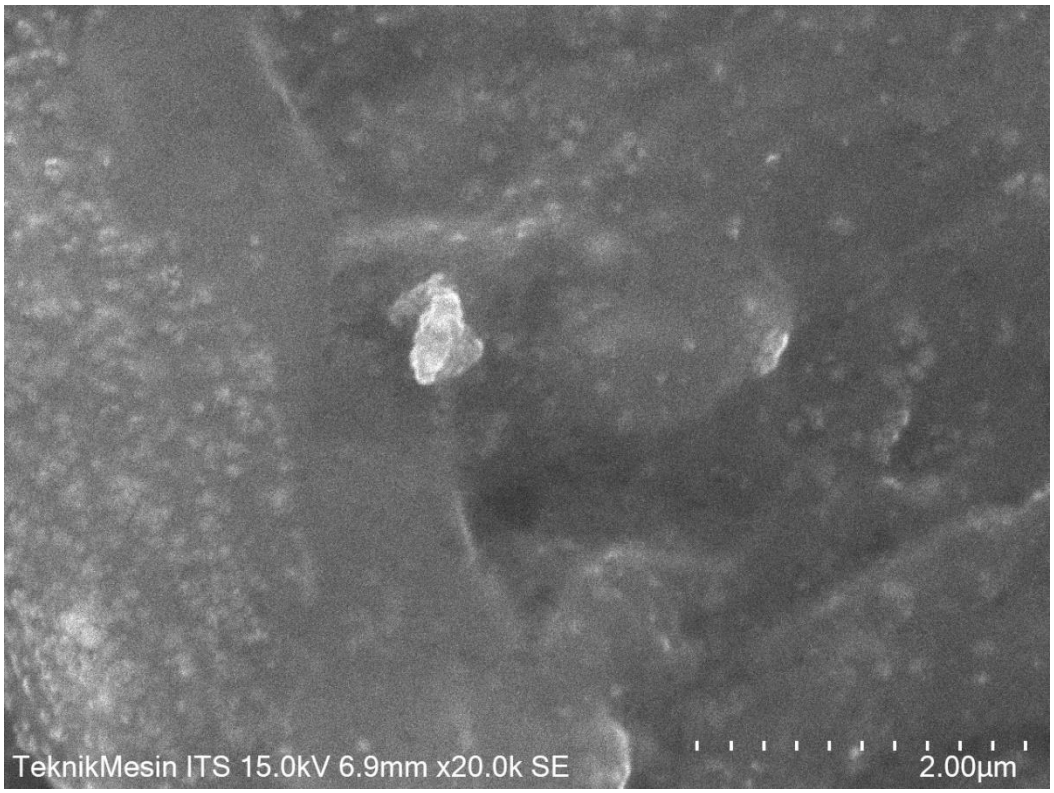
| no. | peak no. | 2Theta (deg) | d (A) | I/I1 | FWHM (deg) | Intensity (Counts) | Integrated Int (Counts) |
|---|---|---|---|---|---|---|---|
| 1 | 12 | 44.0585 | 2.05370 | 100 | 0.18120 | 1927 | 19794 |
| 2 | 20 | 64.4202 | 1.44515 | 75 | 0.20740 | 1445 | 16055 |
| 3 | 9 | 39.5387 | 2.27741 | 28 | 0.15570 | 530 | 5249 |

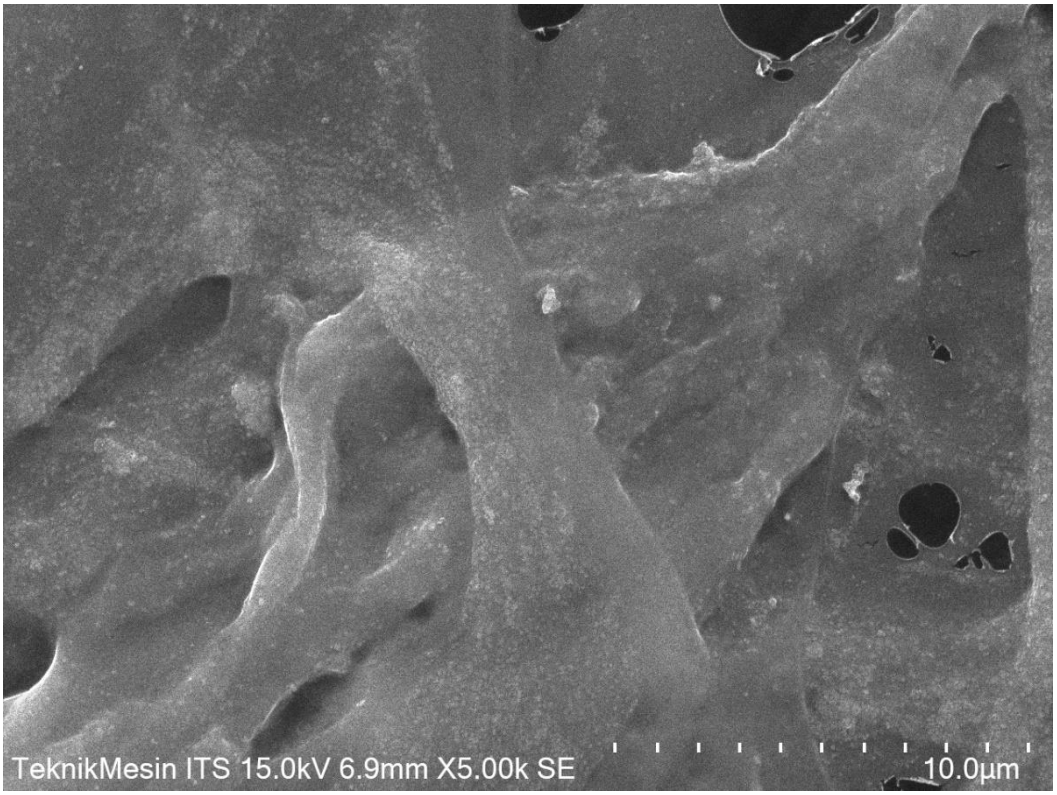
# Peak Data List

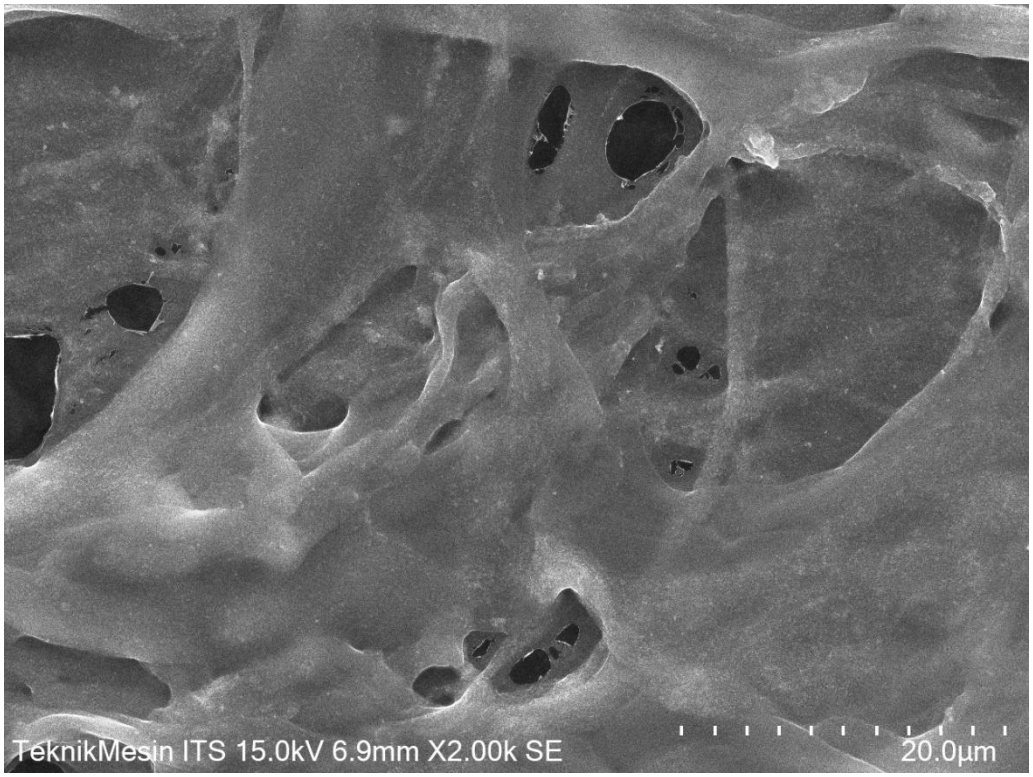
| peak no. | 2Theta (deg) | d (A) | I/I1 | FWHM (deg) | Intensity (Counts) | Integrated Int (Counts) |
|---|---|---|---|---|---|---|
| 1 | 33.9933 | 2.63516 | 5 | 0.17100 | 105 | 1097 |
| 2 | 34.3400 | 2.60935 | 3 | 0.28500 | 60 | 1369 |
| 3 | 34.6200 | 2.58888 | 4 | 0.00000 | 75 | 0 |
| 4 | 34.7800 | 2.57734 | 3 | 1.02660 | 58 | 2301 |
| 5 | 37.8442 | 2.37540 | 24 | 0.23350 | 459 | 11045 |
| 6 | 38.4000 | 2.34229 | 16 | 0.00000 | 302 | 0 |
| 7 | 38.7600 | 2.32136 | 12 | 0.00000 | 238 | 0 |
| 8 | 38.9400 | 2.31104 | 10 | 0.00000 | 194 | 0 |
| 9 | 39.5387 | 2.27741 | 28 | 0.15570 | 530 | 5249 |
| 10 | 39.8020 | 2.26295 | 3 | 0.07600 | 65 | 365 |
| 11 | 43.7600 | 2.06701 | 7 | 0.16580 | 129 | 2423 |
| 12 | 44.0585 | 2.05370 | 100 | 0.18120 | 1927 | 19794 |
| 13 | 44.4800 | 2.03521 | 6 | 0.00000 | 117 | 0 |
| 14 | 44.7000 | 2.02570 | 5 | 0.00000 | 102 | 0 |
| 15 | 44.9400 | 2.01544 | 4 | 0.00000 | 85 | 0 |
| 16 | 45.1800 | 2.00529 | 4 | 0.21600 | 69 | 1476 |
| 17 | 57.5019 | 1.60144 | 21 | 0.16790 | 405 | 3875 |
| 18 | 57.8519 | 1.59259 | 5 | 0.11410 | 96 | 592 |
| 19 | 64.0600 | 1.45240 | 4 | 0.14280 | 77 | 1200 |
| 20 | 64.4202 | 1.44515 | 75 | 0.20740 | 1445 | 16055 |
| 21 | 64.7200 | 1.43917 | 6 | 0.13780 | 111 | 1522 |
| 22 | 65.1547 | 1.43062 | 3 | 0.54060 | 66 | 2162 |
| 23 | 68.8248 | 1.36301 | 18 | 0.19670 | 347 | 3880 |
| 24 | 69.2349 | 1.35594 | 3 | 0.12320 | 65 | 398 |

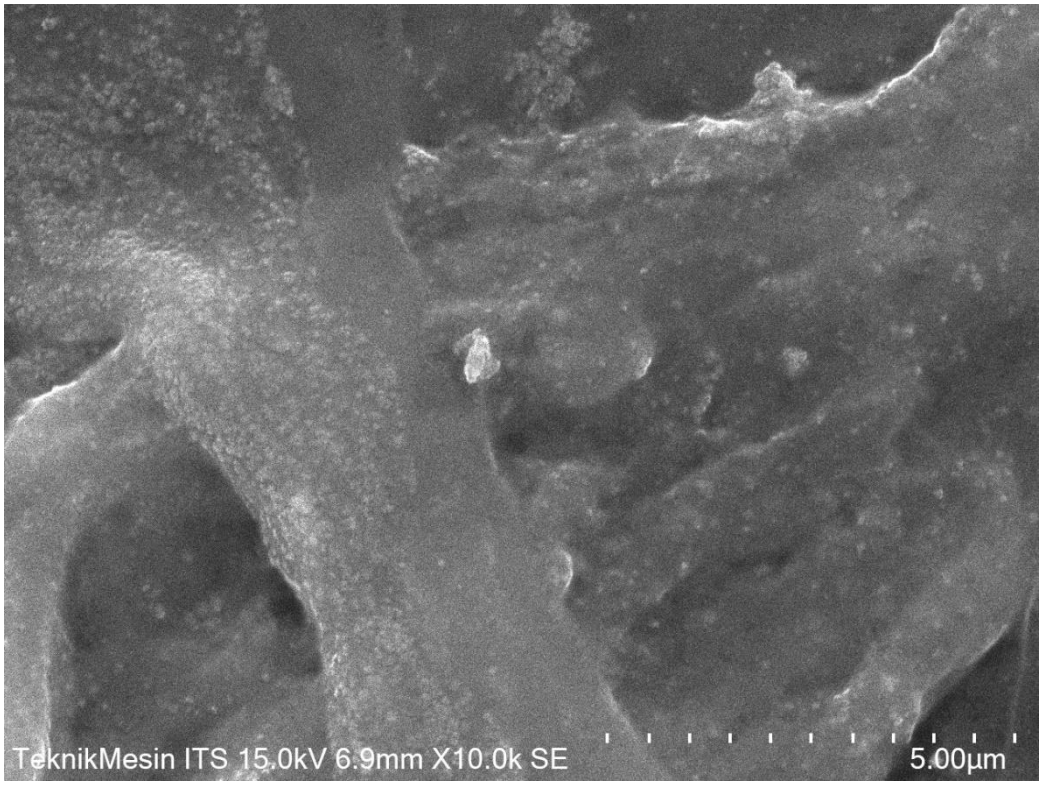


**Lampiran 10.** Data Hasil Karakterisasi Nanopartikel Emas dengan SEM



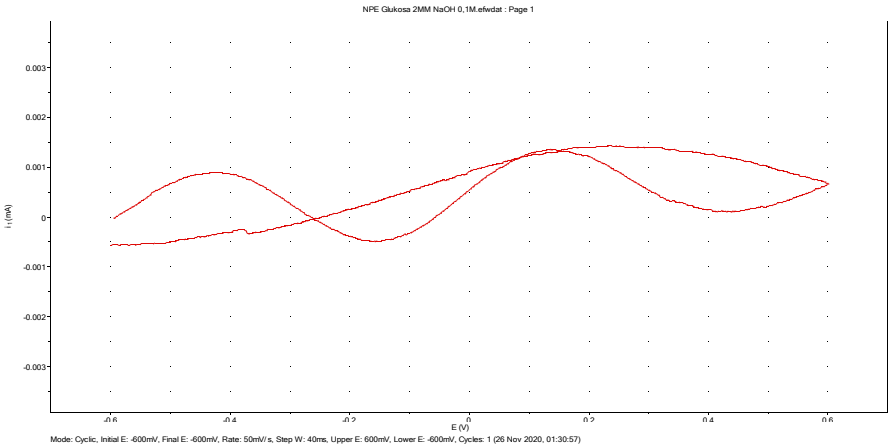




TeknikMesin ITS 15.0kV 6.9mm X2.00k SE
20.0µm

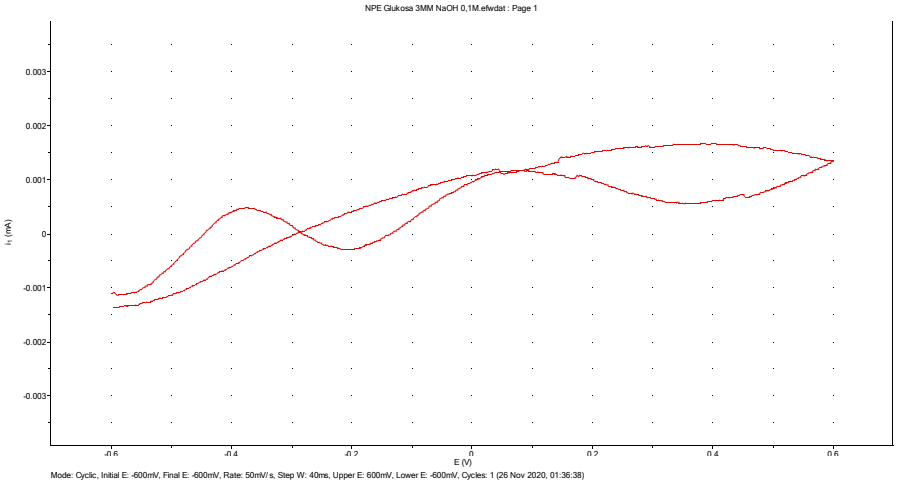

TeknikMesin ITS 15.0kV 6.9mm X10.0k SE
5.00µm

**Lampiran 10.** Data Hasil Analisis dengan Potensiostat

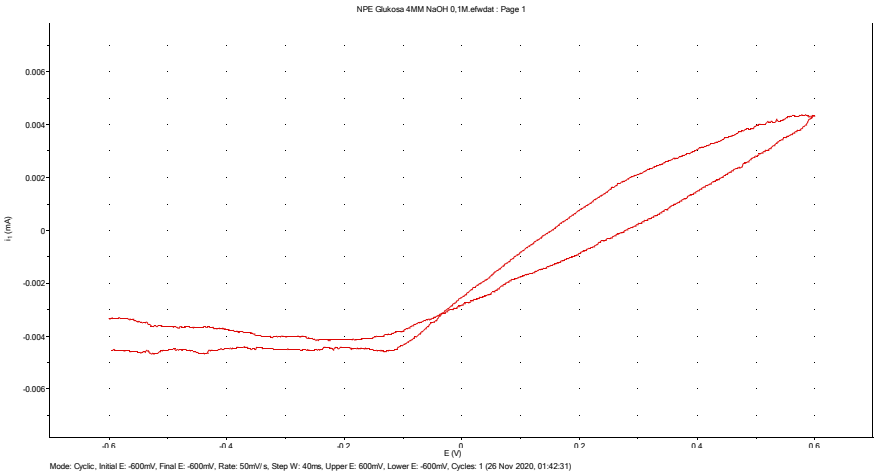
1. NPE (Nanopartikel Emas Termodifikasi) 1 mM



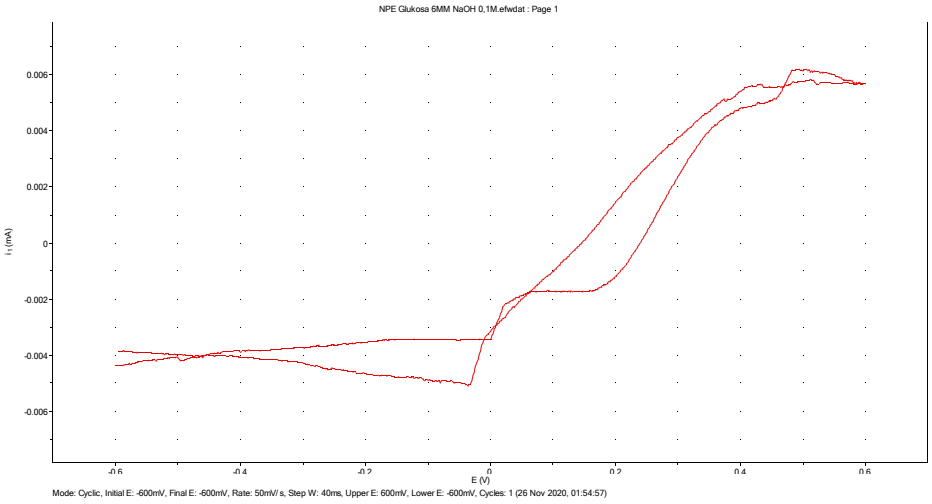

2. NPE 2 mM




3. NPE 3 mM

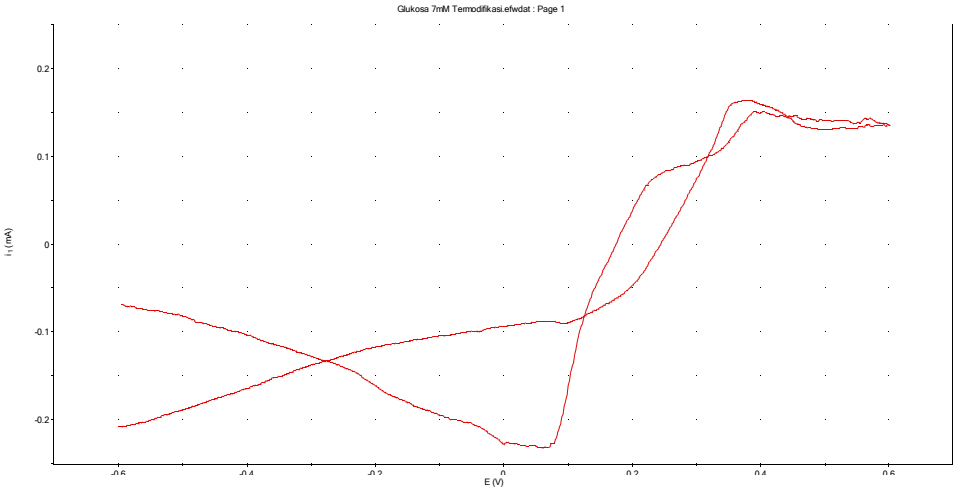


4. NPE 4 mM



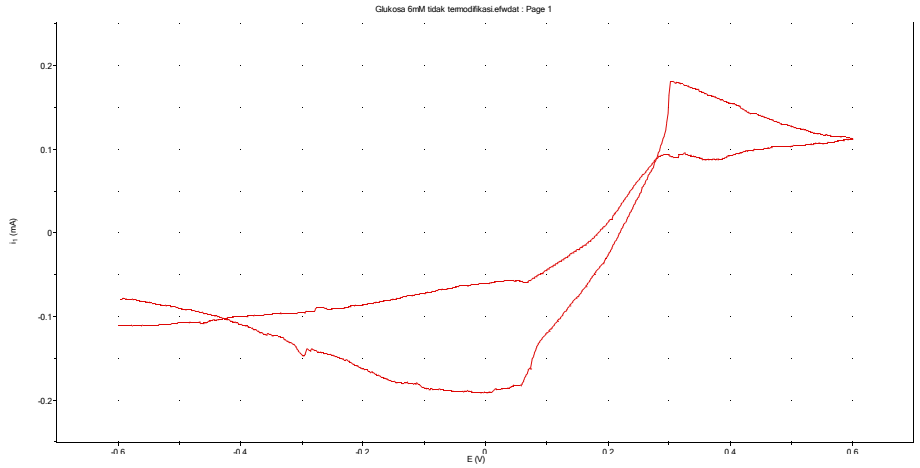

Mode: Cyclic, Initial E: -600mV, Final E: -600mV, Rate: 50mV/ s, Step W: 40ms, Upper E: 600mV, Lower E: -600mV, Cycles: 1 (26 Nov 2020, 01:54:57)

5. NPE 5 mM



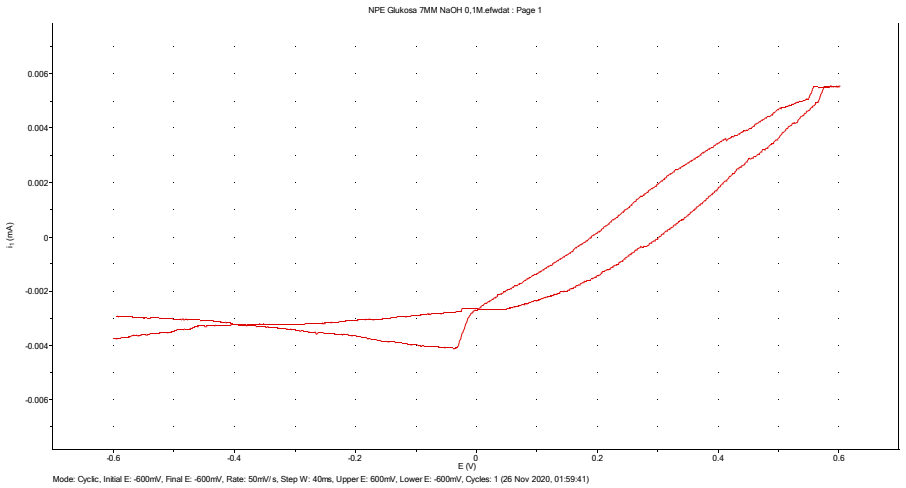

Mode: Cyclic, Initial E: -600mV, Final E: -600mV, Rate: 50mV/ s, Step W: 40ms, Upper E: 600mV, Lower E: -600mV, Cycles: 1 (15 Dec 2020, 23:06:33)
Glukosa7mM Termodifikasi

6. NPE 6 mM

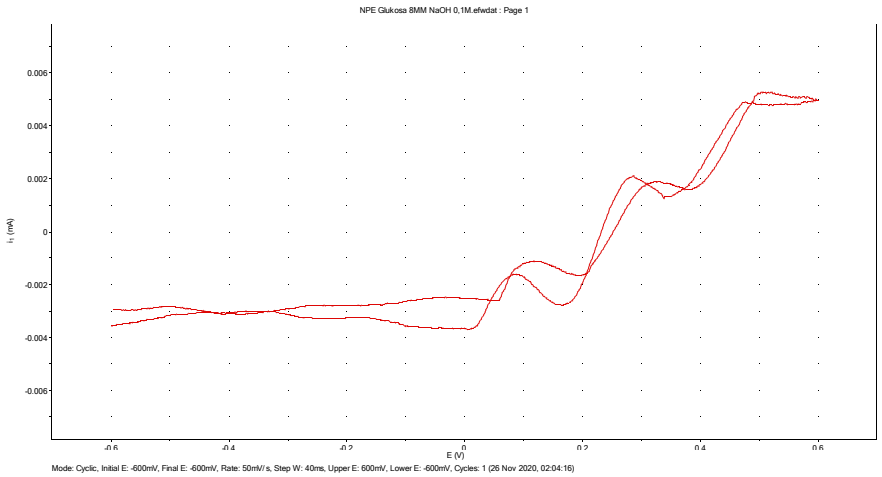



Mode: Cyclic, Initial E: -600mV, Final E: -600mV, Rate: 50mV/ s, Step W: 40ms, Upper E: 600mV, Lower E: -600mV, Cycles: 1 (15 Dec 2020, 22:56:34)
Glukosa 6mM tidak termodifikasi

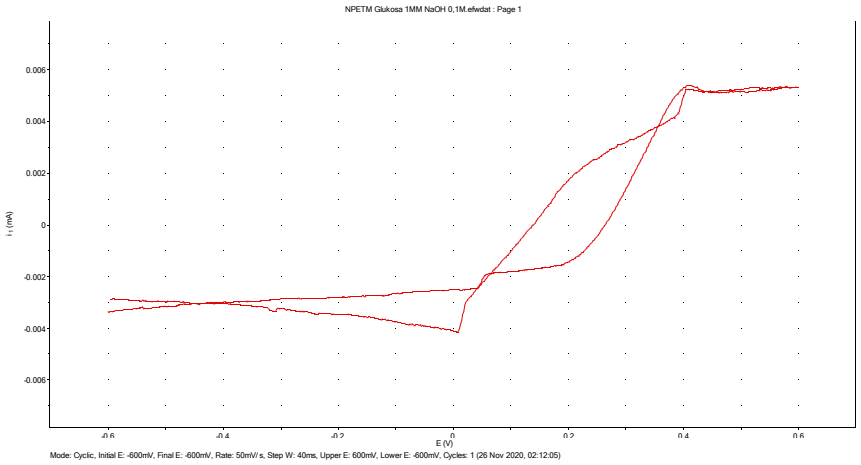
7. NPE 7 mM



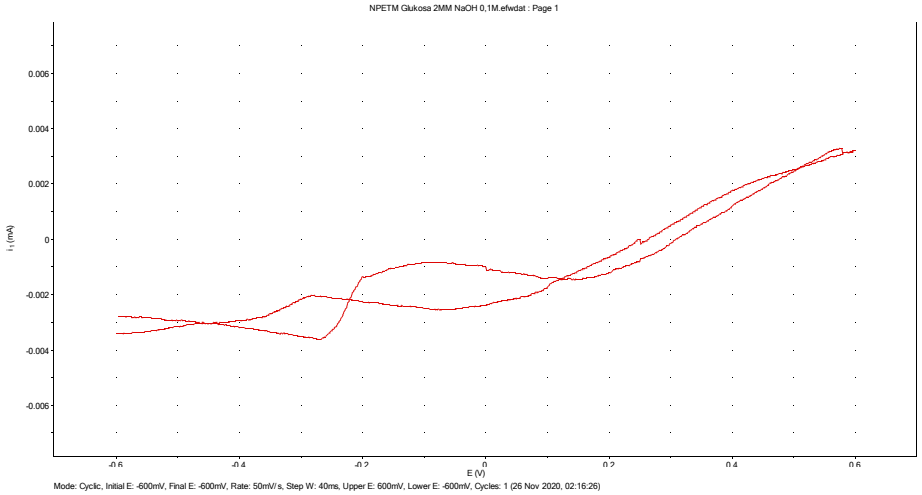

8. NPE 8 mM



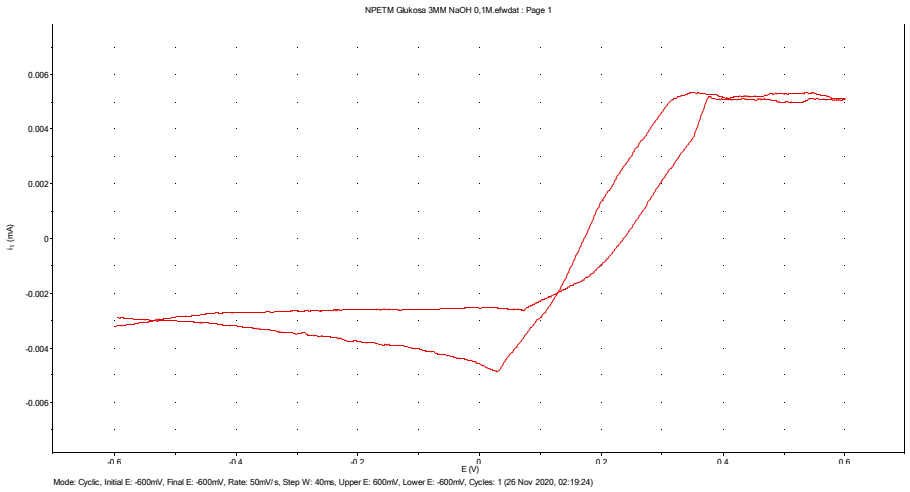

9. NPETM (Nanopartikel Emas Tanpa Modifikasi) 1mM



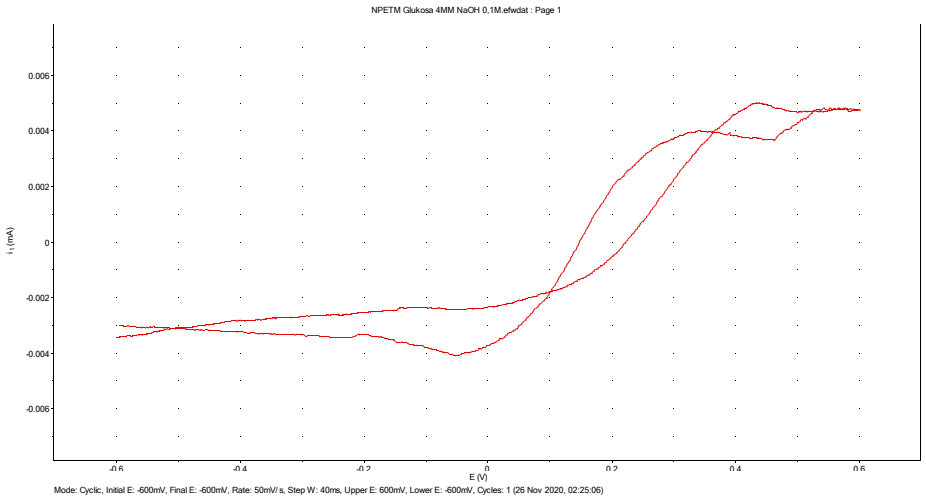
10. NPETM 2mM



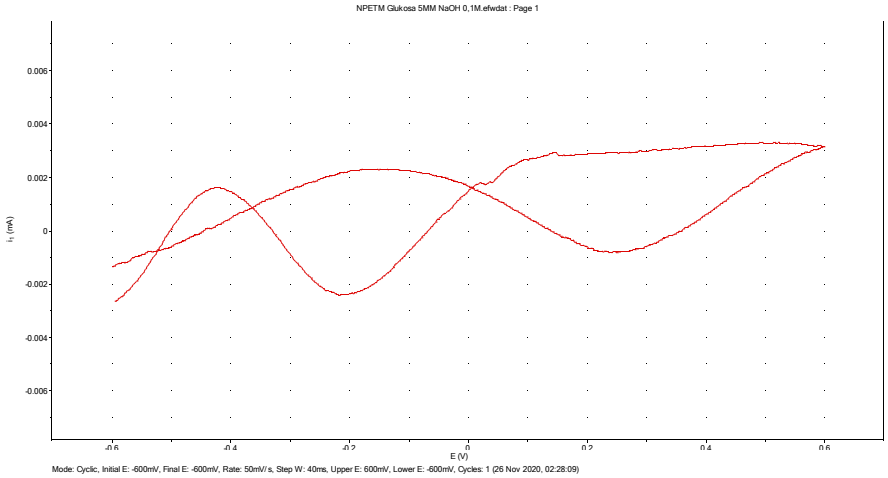

11. NPETM 3mM



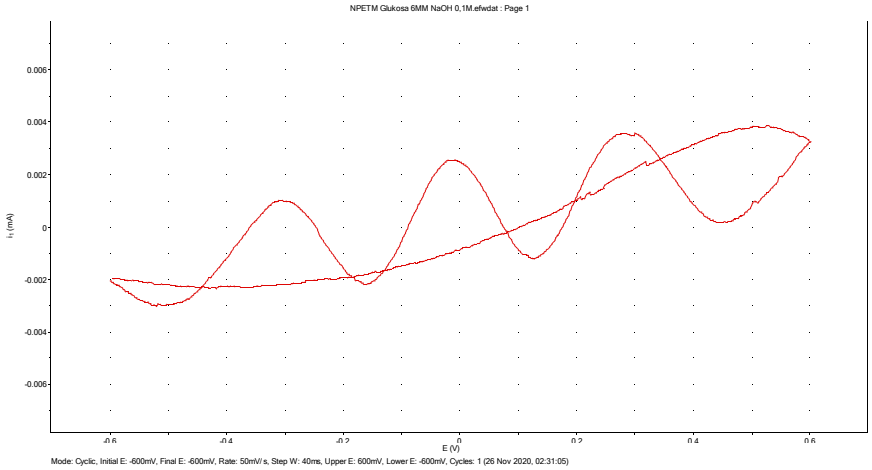

12. NPETM 4 mM



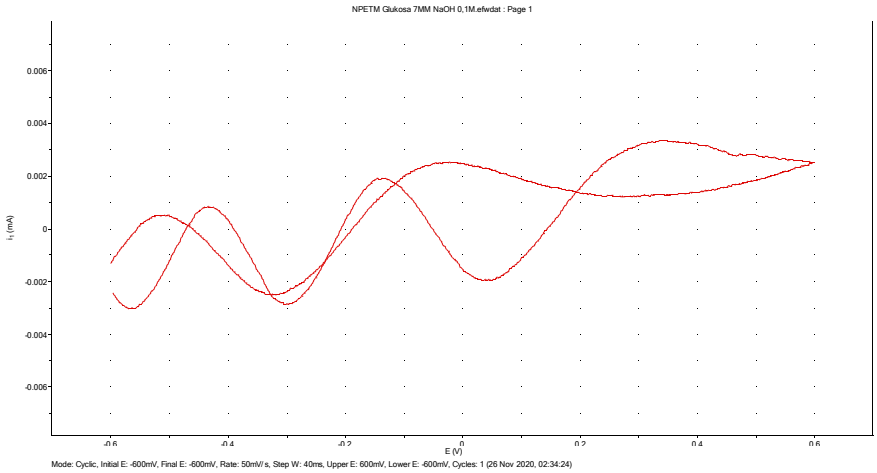
## 13. NPETM 5 mM



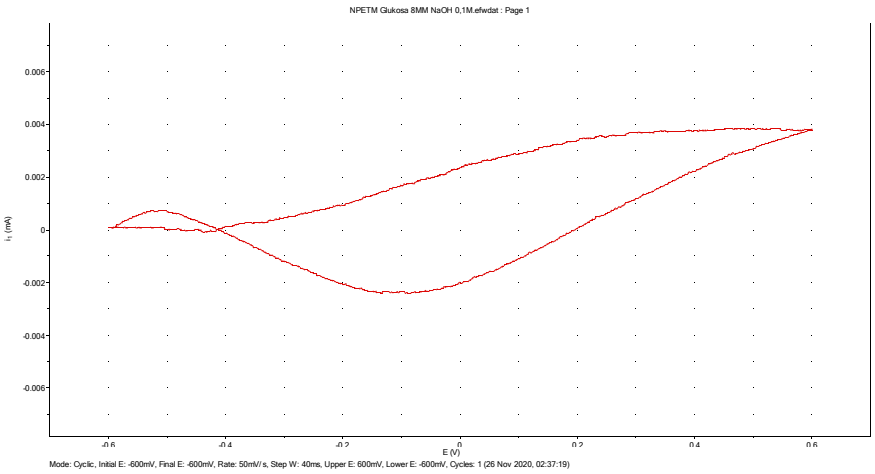

## 14. NPETM 6 mM




## 15. NPETM 7 mM



16. NPETM 8 mM

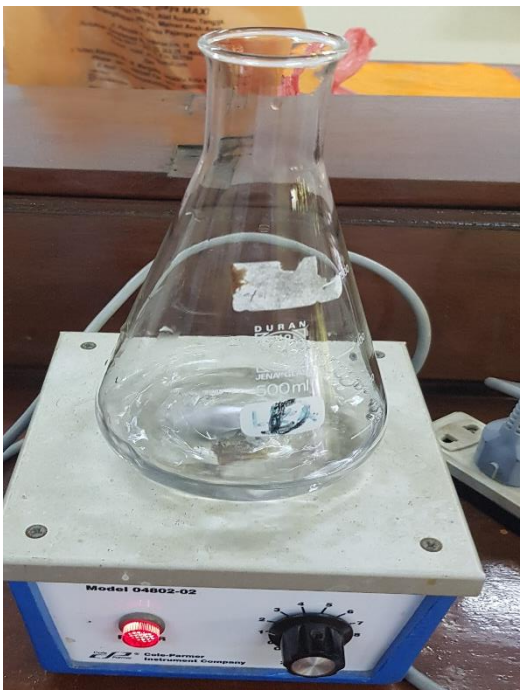

NPETM Glukosa 8MM NaOH 0,1M.efwdat : Page 1
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
i_t (mA)
E (V)
Mode: Cyclic, Initial E: -600mV, Final E: -600mV, Rate: 50mV/ s, Step W: 40ms, Upper E: 600mV, Lower E: -600mV, Cycles: 1 (26 Nov 2020, 02:37:19)

**Lampiran 12.** Dokumentasi Kegiatan Penelitian

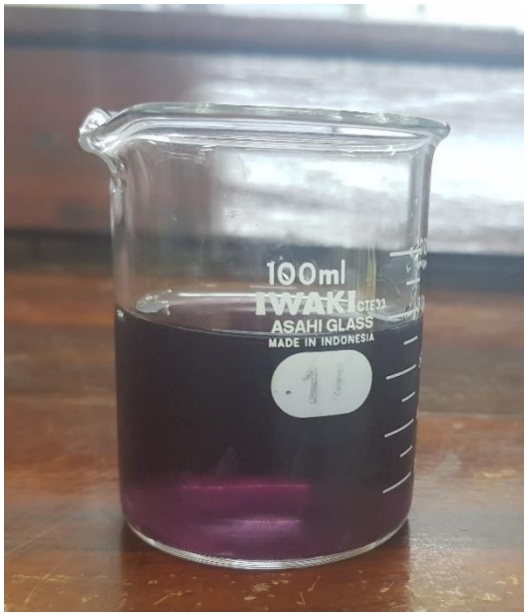
Pelarutan Logam Emas

Penyaringan Ekstrak Daun Salam

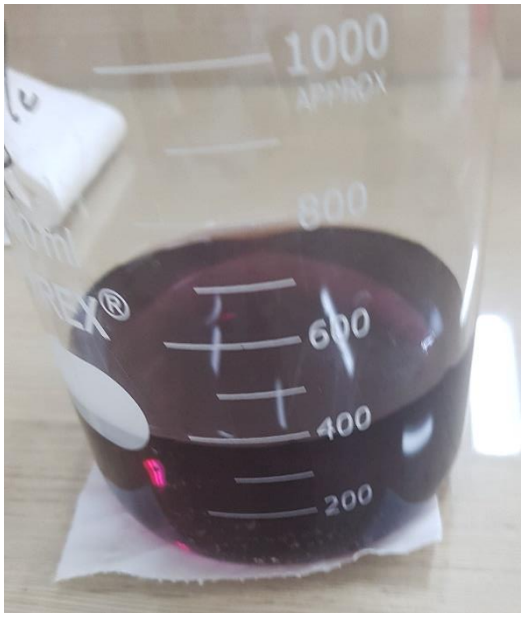

Proses Perebusan Daun Salam




Proses Sintesis Nanopartikel Emas




Hasil Sintesis Nanopartikel Emas
Hari ke 1




Hasil Sintesis Nanopartikel Emas
Hari ke 3

Hasil Sintesis Nanopartikel Emas
Hari ke 7

Hasil Sintesis Nanopartikel Emas Hari ke 10

Nanopartikel Emas Hasil Freeze Drayer

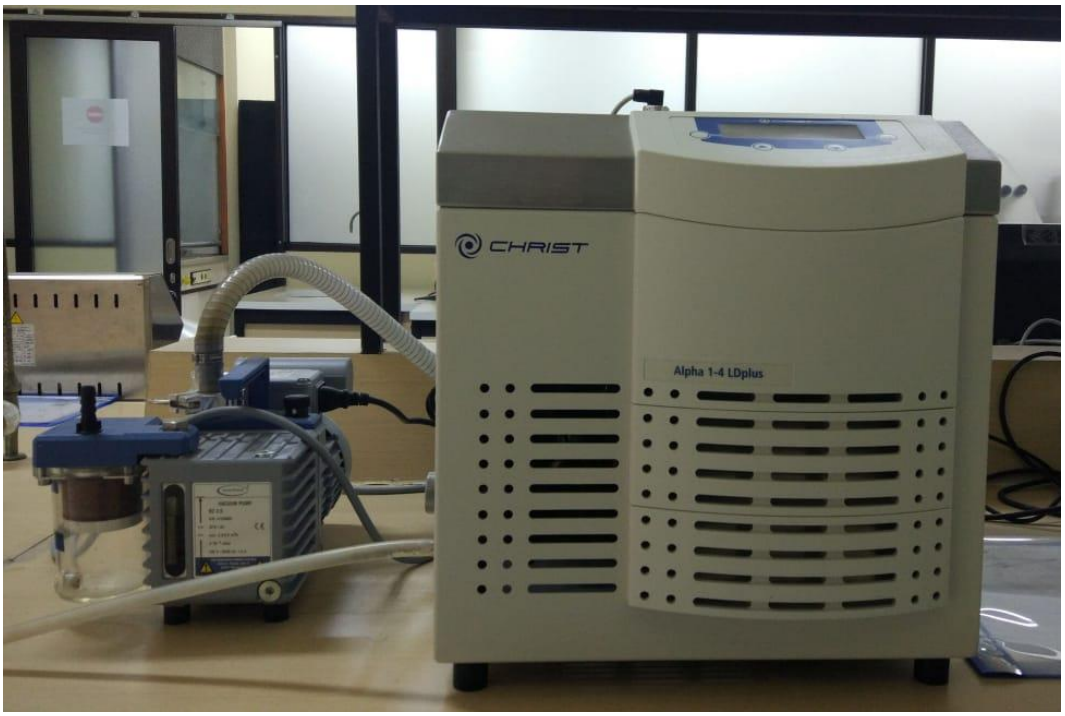
Spektrofotometer UV-Vis

FTIR

PSA


Alat Sentrifugasi

Elektroda Kerja




Alat Freeze Drayer

Potensiostat

SEM

XRD