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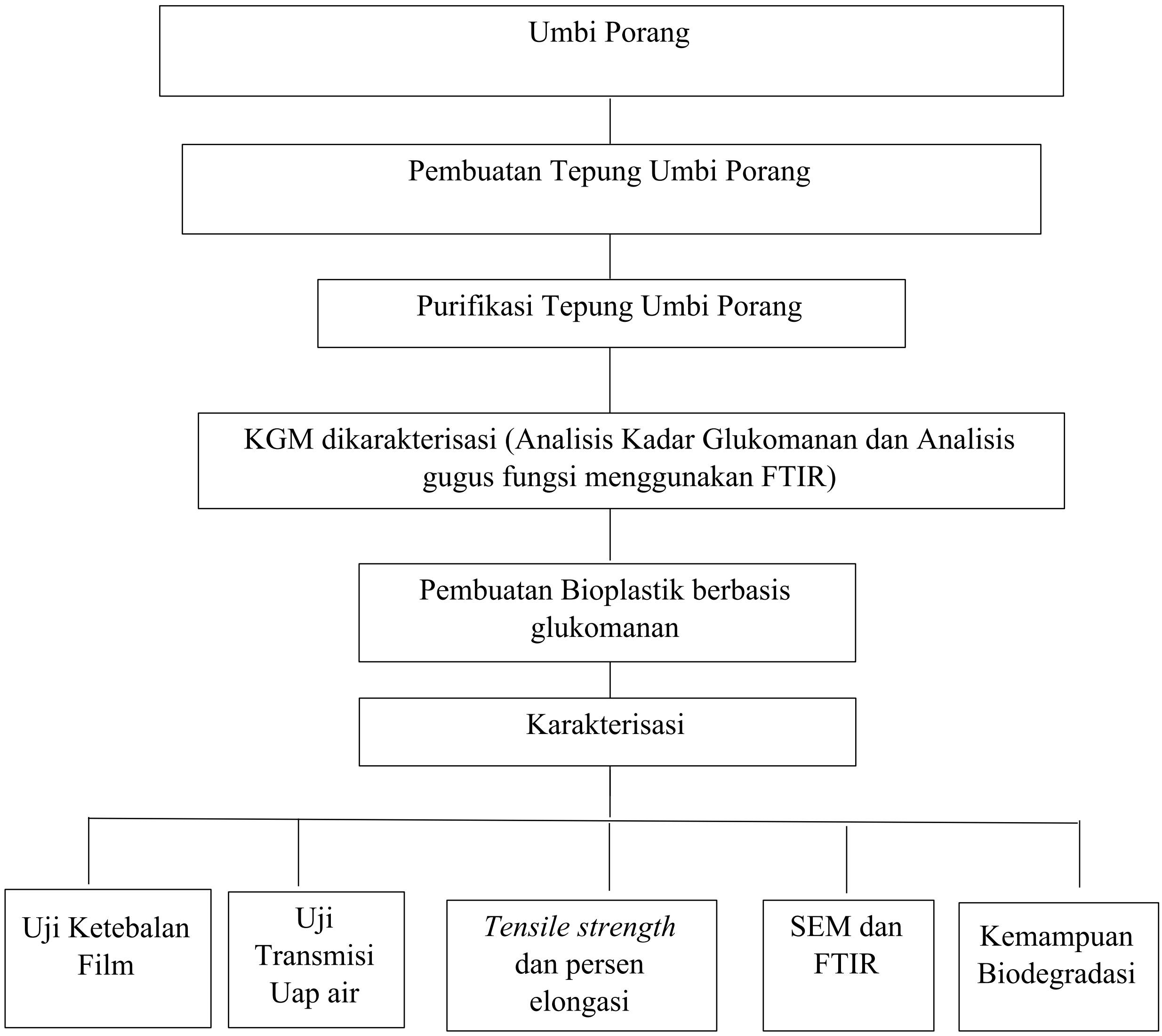
Lampiran 1. Diagram Alir



Lampiran 2. Bagan kerja

1. Preparasi Sampel

Umbi Porang

- Dikupas dengan *peeler* lalu diiris tipis-tipis dengan ketebalan sekitar 2 mm
- Dicuci bersih lalu dikeringkan
- Digiling dengan *food processor*
- Diayak dengan saringan 40 *mesh*

Sampel

2. Purifikasi Tepung Porang

Tepung Porang

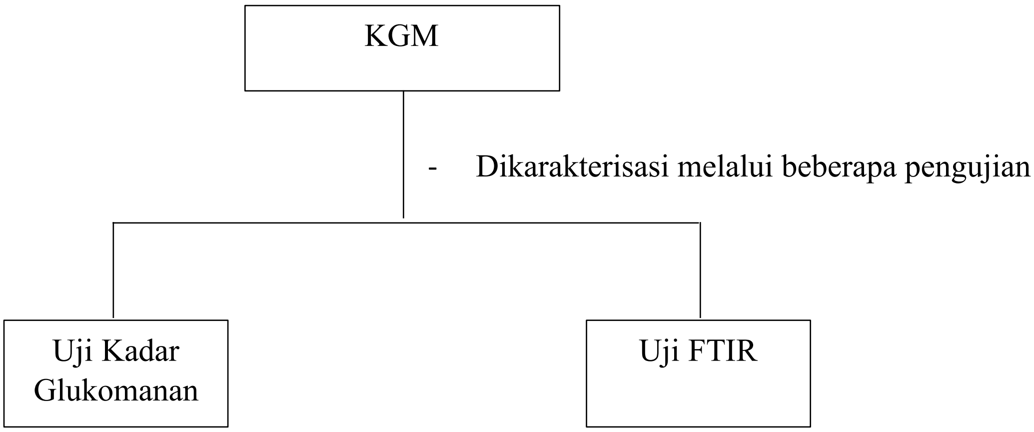
- Ditimbang sebanyak 3 gram lalu dilarutkan dalam 100 mL akuades
- Ditambahkan larutan $Al_2(SO_4)_3$ 0.3% (b/v) dengan perbandingan 1:10
- Diaduk selama 15 menit pada suhu 75 ^oC
- Disentrifugasi dengan kecepatan 2000 rpm selamaa 30 menit

Endapan | Filtrat

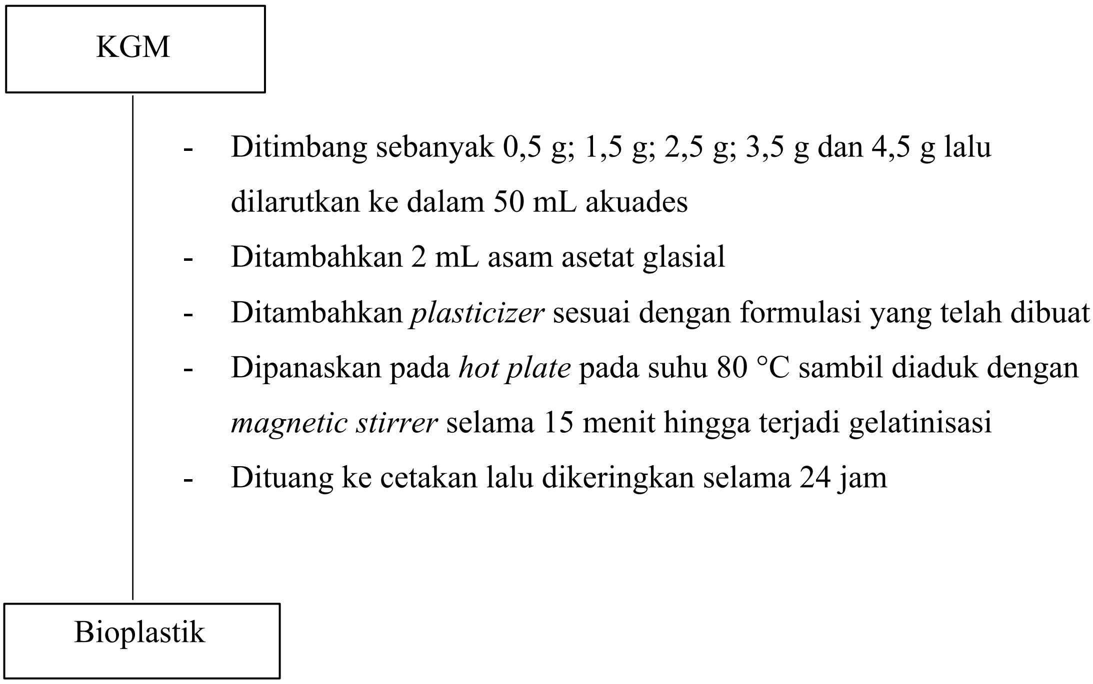
- Ditambahkan etanol 95% dengan perbandingan 1:1 (v/v) pada *supernatant*
- Dipisahkan endapan dengan kain katun tipis
- Dioven pada suhu 45 ^oC selama 24 jam
- Dihaluskan dengan mortat lalu diayak dengan *mesh screen* 250 µm

KGM

3. Karakterisasi KGM



4. Fabrikasi Bioplastik



Keterangan:

Plasticizer : Sorbitol 20% dan polietilen glikol (PEG) 25%

5. Karakterisasi Bioplastik

- **Uji Ketebalan Film**

Bioplastik

- Diukur dengan menggunakan mikrometer sekrup
- Dilakukan pengukuran ketebalan pada 5 titik yang berbeda
- Diperoleh nilai ketebalan film dari rata-rata nilai yang telah diukur

Data

- **Uji Transmisi Uap Air**

Bioplastik

-Ditimbang sebagai berat awal
-Direkatkan pada gelas 50 mL yang telah diisi akuades
-Dimasukkan ke dalam desikator yang mengandung *silica gel*
-Ditimbang setiap 1 jam selama 6 jam
-Dicatat setiap perubahan berat

Data

- **Uji *Tensile Strength* dan Elongasi**

Bioplastik

-Dijepit ujungnya pada mesin penguji *tensile*
-Dinyalakan alat sehingga sampel tertarik dengan kecepatan 10 mm/menit sampai sampel putus

Data

- **Uji SEM**

Bioplastik

-Dipotong dengan ukuran 5 cm x 5 cm

-Disemprot dengan emas-platinum dalam pelapis hummer

-Dianalisis menggunakan alat SEM pada perbesaran 100 sampai 7000 kali

Data

- **Uji FTIR**

Bioplastik

-Diukur menggunakan alat *Fourier transform infrared spectroscopy* FTIR *Spectrometers* SHIMADZU

-Dianalisis pada daerah spektra 4000-500 cm^{-1}

Data

- **Uji Kemampuan Biodegradasi**

Bioplastik

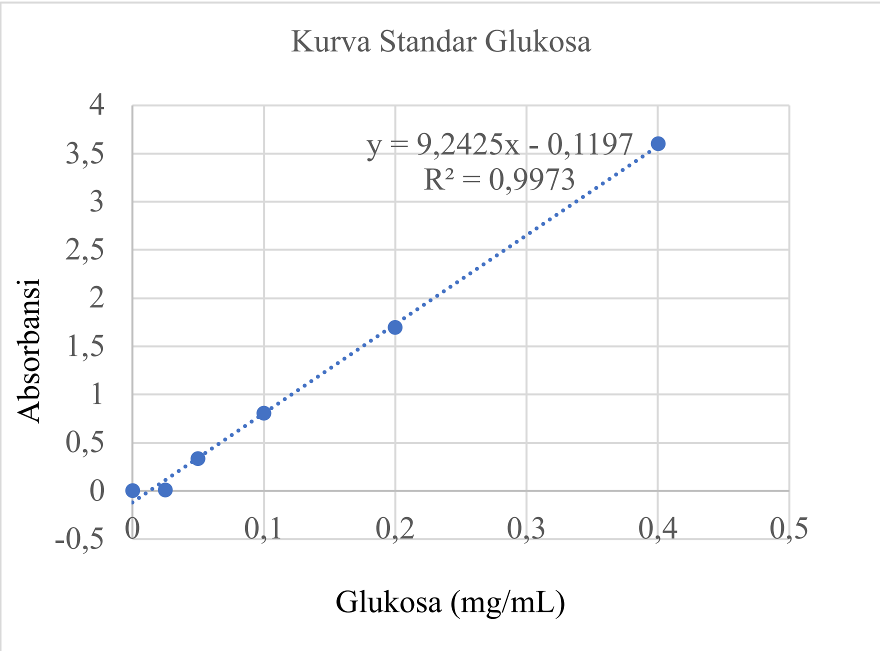
- Dipotong dengan ukuran 3 cm x 3 cm
- Diuji kemampuan degradasi menggunakan media tanah dan media air laut
- Diamati secara visual proses biodegradasi selama 28 hari

Data

Lampiran 3. Perhitungan Kadar Glukomanan

1. Analisis Kadar Glukomanan

Konsentrasi (mg/mL)	**Absorbansi**
0,025	0,011
0,05	0,332
0,1	0,804
0,2	1,697
0,4	3,601



Persamaan regresi linier

$y = 9{,}2425x - 0{,}1197$

$$x = \frac{y + 0{,}1197}{9{,}2425}$$

Nama Sampel	Absorbansi
Ekstrak KGM 1	0,049
Ekstrak KGM 2	0,029
Hidrolisat KGM 1	0,031
Hidrolisat KGM 2	0,025

Mencari kadar glukosa pada sampel

$$x = \frac{y + 0{,}1197}{9{,}2425}\ x\ \text{FP}$$

dimana FP = faktor pengenceran

- Ekstrak KGM 1

$$x = \frac{0{,}049 + 0{,}1197}{9{,}2425}\ x\ 50$$

x = 0,9126 mg

- Ekstrak KGM 2

$$x = \frac{0{,}029 + 0{,}1197}{9{,}2425}\ x\ 50$$

x = 0,8044 mg

- Hidrolisat KGM 1

$$x = \frac{0{,}031 + 0{,}1197}{9{,}2425}\ x\ 50$$

x = 0, 8152 mg

- Hidrolisat KGM 2

$$x = \frac{0{,}025 + 0{,}1197}{9{,}2425}\ x\ 50$$

x = 0,7827 mg

Menghitung Kadar Glukomanan

$$\%\ KGM = \frac{\varepsilon\ (5\text{T-}T_0)\ \text{x}\ 50}{\text{m x } 1000}\ x\ 100\%$$

dimana:
ε = 0,9
T = Jumlah glukosa dalam hidrolisat KGM (mg)
T_0= Jumlah glukosa dalam ekstrak KGM (mg)
m = massa sampel KGM (g)

- Kadar glukomanan pada sampel KGM 1

$$\% KGM = \frac{0{,}9\ (5x\ 0{,}8152\text{-}0{,}9126)\ x\ 50}{0{,}2\ x\ 1000}\ x\ 100\%$$

% KGM = 71,1765%

- Kadar glukomanan pada sampel KGM 2

$$\% KGM = \frac{0{,}9\ (5x\ 0{,}7827\text{-}0{,}8044)\ x\ 50}{0{,}2\ x\ 1000}\ x\ 100\%$$

% KGM = 69,9548%

Lampiran 4. Perhitungan Ketebalan Bioplastik

Data Hasil Ketebalan Bioplastik

Kode Sampel	Jumlah Titik (mm)					Ketebalan (mm)
	Titik 1	Titik 2	Titik 3	Titik 4	Titik 5	
BP 1.1	0,19	0,23	0,2	0,21	0,23	0,212
BP 1.2	0,23	0,2	0,23	0,25	0,21	0,224
BP 1.3	0,19	0,16	0,27	0,21	0,24	0,214
BP 2.1	0,18	0,17	0,27	0,27	0,34	0,246
BP 2.2	0,24	0,22	0,25	0,38	0,22	0,262
BP 2.3	0,19	0,23	0,36	0,35	0,36	0,298
BP 3.1	0,3	0,29	0,34	0,24	0,31	0,296
BP 3.2	0,25	0,27	0,19	0,22	0,33	0,252
BP 3.3	0,17	0,26	0,23	0,22	0,24	0,224
BP 4.1	0,19	0,38	0,31	0,42	0,34	0,328
BP 4.2	0,22	0,2	0,3	0,31	0,29	0,264
BP 4.3	0,35	0,27	0,28	0,31	0,29	0,3
BP 5.1	0,35	0,28	0,26	0,34	0,32	0,31
BP 5.2	0,42	0,26	0,29	0,32	0,37	0,332
BP 5.3	0,31	0,29	0,26	0,37	0,32	0,31

Contoh perhitungan ketebalan bioplastik (data BP 1.1):

$$\text{Ketebalan} = \frac{\text{Titik 1} + \text{titik 2} + \text{titik 3} + \text{titik 4} + \text{titik 5}}{\text{Jumlah titik}}$$

$$\text{Ketebalan BP 1.1} = \frac{0{,}19 + 0{,}23 + 0{,}20 + 0{,}21 + 0{,}23}{5} = 0{,}212 \text{ mm}$$

Lampiran 5. Perhitungan Laju Transmisi Uap Air

Sampel	Ulangan	Bobot Bioplastik (g)		LTUA
		Awal	Akhir	
BP 1.1	Simplo	1,4815	1,5034	0,4195
	Duplo	1,4815	1,5003	0,3601
BP 1.2	Simplo	0,6636	0,6811	0,3352
	Duplo	0,6636	0,6796	0,3065
BP 1.3	Simplo	0,6627	0,6796	0,3237
	Duplo	0,6627	0,6802	0,3352
BP 2.1	Simplo	1,0048	1,0779	1,4003
	Duplo	1,0048	1,0766	1,4061
BP 2.2	Simplo	1,3109	1,3360	0,4808
	Duplo	1,3109	1,3346	0,4540
BP 2.3	Simplo	0,8756	0,9002	0,4712
	Duplo	0,8756	0,8984	0,4367
BP 3.1	Simplo	1,902	2,2271	6,2279
	Duplo	1,902	2,2247	6,1819
BP 3.2	Simplo	1,468	1,7437	5,2816
	Duplo	1,468	1,74	5,2107
BP 3.3	Simplo	1,1484	1,3963	4,7490
	Duplo	1,1484	1,8534	6,9444
BP 4.1	Simplo	2,5359	2,8948	6,8754
	Duplo	2,5359	2,8916	6,8141
BP 4.2	Simplo	1,825	2,168	6,5708
	Duplo	1,825	2,1599	6,4157
BP 4.3	Simplo	1,7908	2,1267	6,4348
	Duplo	1,7908	2,1242	6,3869
BP 5.1	Simplo	1,9998	2,4626	8,8659
	Duplo	1,9998	2,4502	8,6283
BP 5.2	Simplo	1,7709	2,1865	7,9616
	Duplo	1,7709	2,1761	7,7624
BP 5.3	Simplo	1,4909	1,8534	6,9444
	Duplo	1,4909	1,8481	6,8429

Contoh perhitungan laju transmisi uap air (data simplo BP 1.1):

$$\text{Laju Transmisi Uap Air} = \frac{W - W_0}{t \text{ X } A}$$

$$\text{Laju Transmisi Uap Air} = \frac{1{,}5034 - 1{,}4815}{6 \text{ X } 0{,}0087} = 0{,}41954 \text{ g/m}^2\text{.jam}$$

Lampiran 6. Perhitungan Formulasi Bioplastik

1. Glukomanan 1% w/v sebanyak 50 mL

$$1\% = \frac{\text{gram}}{50 \text{ mL}} \; x \; 100\%$$

gram = 0,5 g

2. Glukomanan 3% w/v sebanyak 50 mL

$$3\% = \frac{\text{gram}}{50 \text{ mL}} \; x \; 100\%$$

gram = 1,5 g

3. Glukomanan 5% w/v sebanyak 50 mL

$$5\% = \frac{\text{gram}}{50 \text{ mL}} \; x \; 100\%$$

gram = 2,5 g

4. Glukomanan 7% w/v sebanyak 50 mL

$$7\% = \frac{\text{gram}}{50 \text{ mL}} \; x \; 100\%$$

gram = 3,5 g

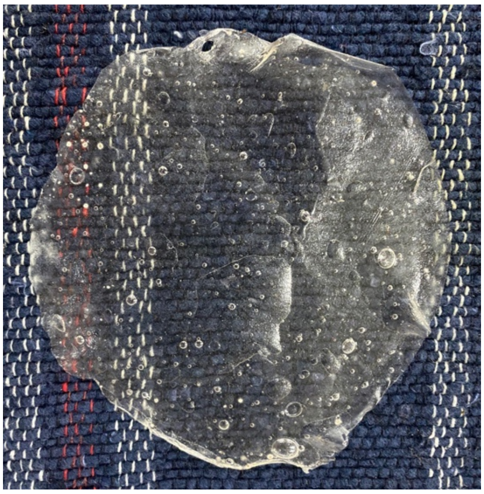
5. Glukomanan 9% w/v sebanyak 50 mL

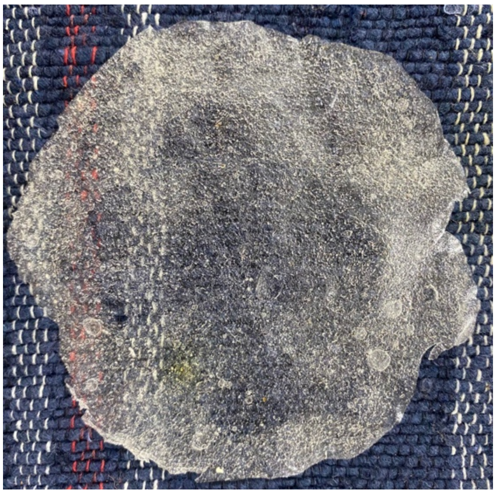
$$9\% = \frac{\text{gram}}{50 \text{ mL}} \; x \; 100\%$$

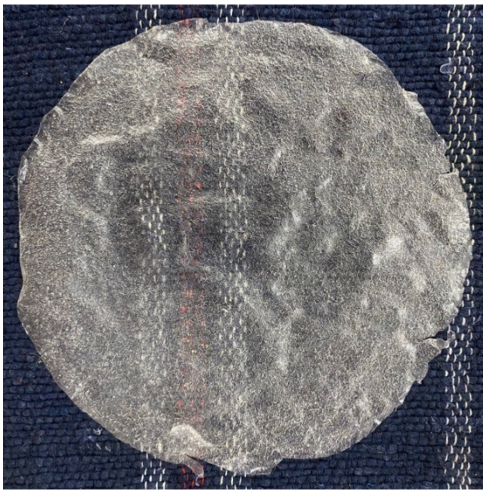
gram = 4,5 g

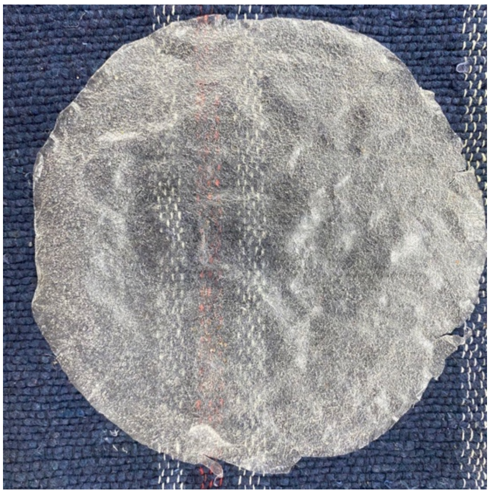
Lampiran 7. Hasil Fabrikasi Bioplastik


BP 1 (konsentrasi glukomanan 1%)


BP 2 (konsentrasi glukomanan 3%)


BP 3 (konsentrasi glukomanan 5%)


BP 4 (konsentrasi glukomanan 7%)


BP 5 (konsentrasi glukomanan 9%)

Lampiran 8. Hasil Pengujian Tensile Strength dan Persen Elongasi

1. Sampel BP 1.1

542/PS/08/22 **25.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

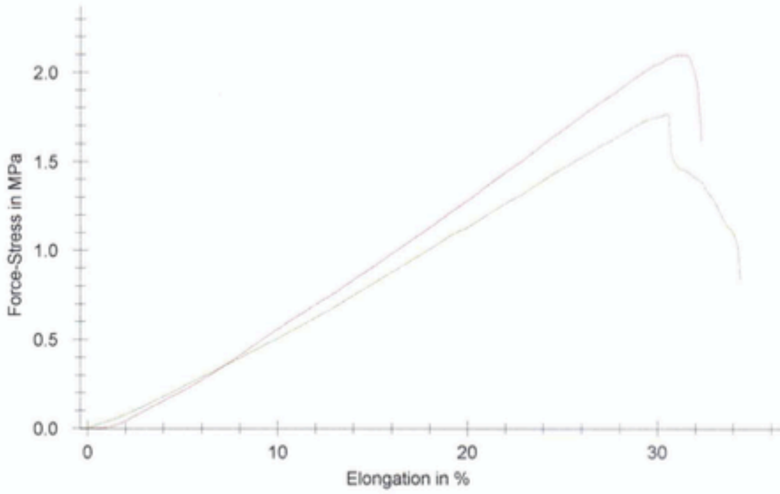
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 1:1

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.367	5	50	3.8560	2.1014	31.1831
2	0.417	5	50	3.6834	1.7666	30.4971

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x̄	0.392	5	50	3.7697	1.9340	30.8401
s	0.03536	0.000	0.000	0.1221	0.2367	0.4851
v	9.02	0.00	0.00	3.24	12.24	1.57

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2. Sampel BP 1.2

542/PS/08/22 **25.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

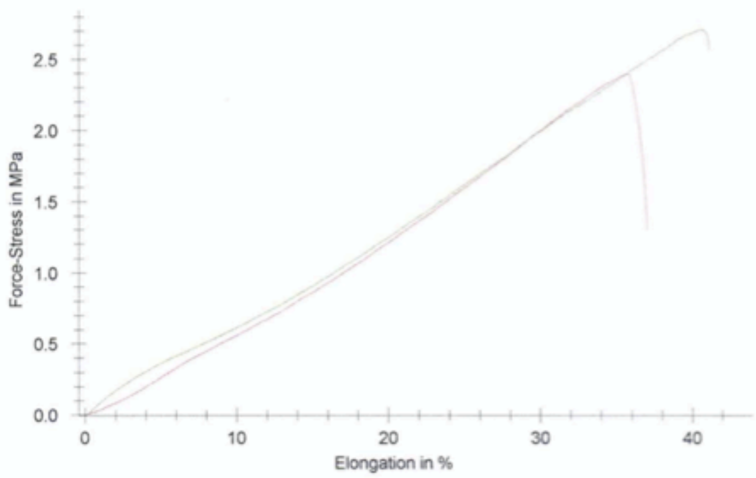
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 1:2

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.273	5	50	3.2720	2.3970	35.5875
2	0.327	5	50	4.4313	2.7103	40.5560

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x	0.3	5	50	3.8516	2.5537	38.0717
s	0.03818	0.000	0.000	0.8198	0.2215	3.5133
v	12.73	0.00	0.00	21.28	8.67	9.23

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3. Sampel BP 1.3

542/PS/08/22 22.08.2022

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

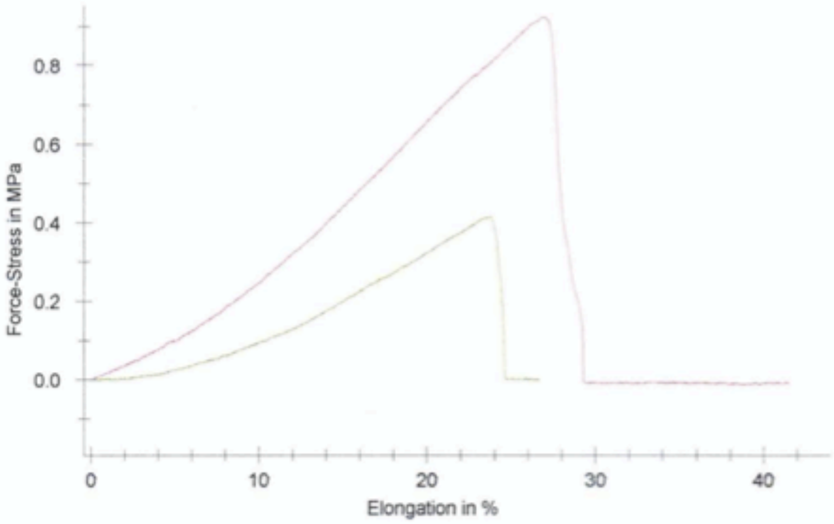
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 1:3

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.236	5	50	1.0924	0.9258	27.0384
2	0.236	5	50	0.4916	0.4166	23.7763

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x̄	0.236	5	50	0.7920	0.6712	25.4073
s	0.000	0.000	0.000	0.4249	0.3600	2.3066
ν	0.00	0.00	0.00	53.64	53.64	9.08

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4. Sampel BP 2.1

542/PS/08/22 **22.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

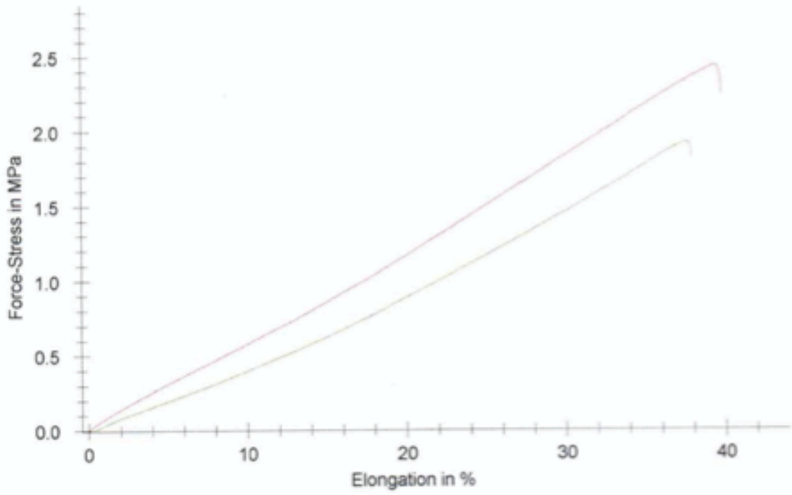
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 2:1

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.302	5	50	3.6720	2.4318	39.4562
2	0.303	5	50	2.9073	1.9190	37.5903

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.3025	5	50	3.2896	2.1754	38.5232
s	0.0007071	0.000	0.000	0.5407	0.3626	1.3194
v	0.23	0.00	0.00	16.44	16.67	3.43

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5. Sampel BP 2.2

542/PS/08/22 **22.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

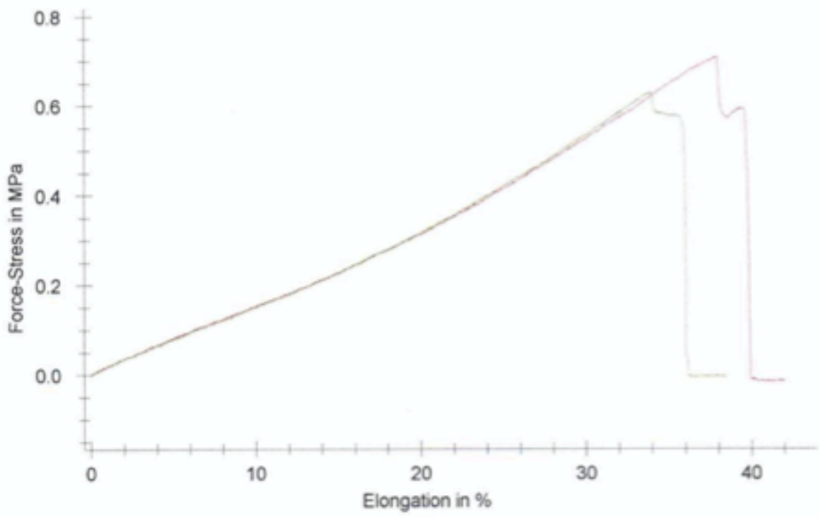
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 2.2

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.236	5	50	0.8361	0.7085	37.9147
2	0.252	5	50	0.7920	0.6286	33.8638

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.244	5	50	0.8140	0.6686	35.8892
s	0.01131	0.000	0.000	0.0311	0.0565	2.8644
v	4.64	0.00	0.00	3.83	8.46	7.98

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6. Sampel BP 2.3

542/PS/08/22 22.08.2022

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

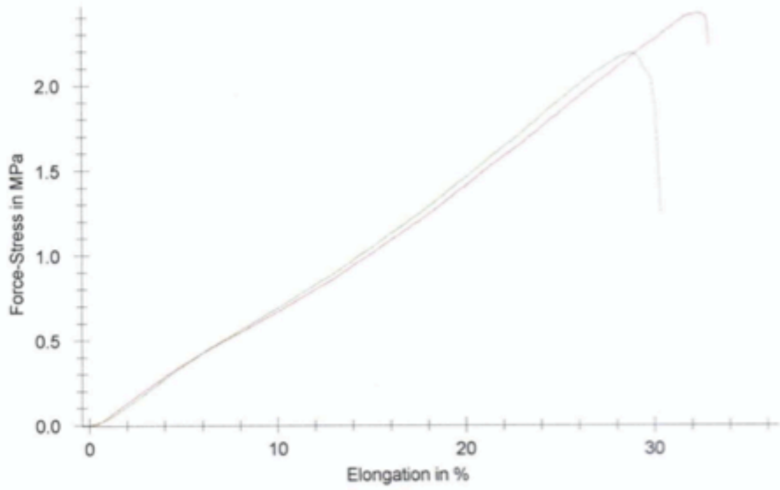
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 2:3

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.297	5	50	3.6050	2.4276	32.2321
2	0.286	5	50	3.1293	2.1883	28.8441

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x̄	0.2915	5	50	3.3672	2.3080	30.5381
s	0.007778	0.000	0.000	0.3364	0.1692	2.3957
v	2.67	0.00	0.00	9.99	7.33	7.84

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7. Sampel BP 3.1

542/PS/08/22 **22.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

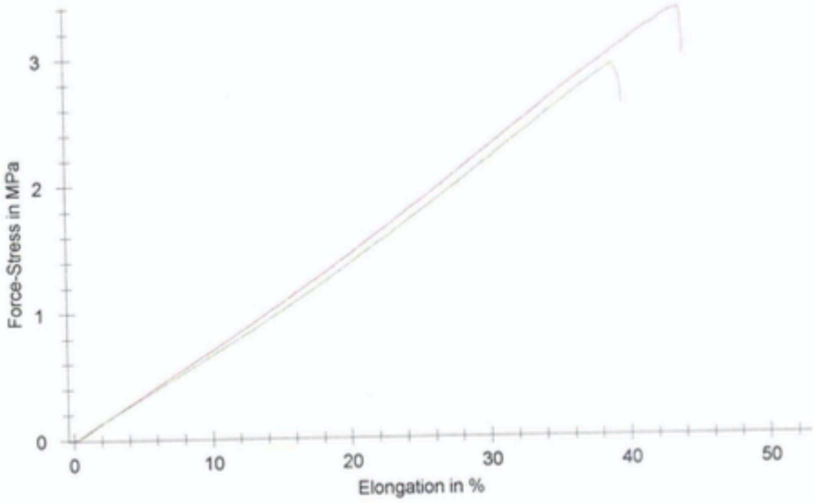
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 3:1

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.279	5	50	4.6895	3.3617	43.6698
2	0.287	5	50	4.0702	2.9177	38.8246

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x̄	0.283	5	50	4.3799	3.1397	41.2472
s	0.005657	0.000	0.000	0.4379	0.3139	3.4261
ν	2.00	0.00	0.00	10.00	10.00	8.31

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8. Sampel BP 3.2

542/PS/08/22 22.08.2022

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

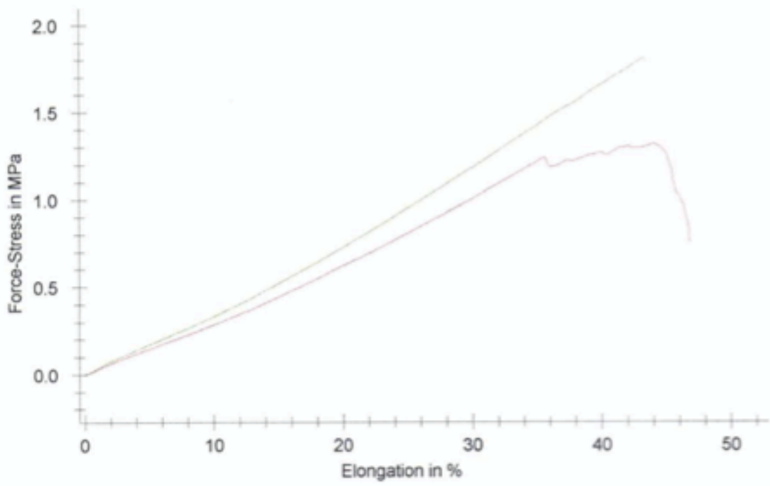
Parameter table:

Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min
Test standard : Tensile strength
Material : BP 3:2

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.426	5	50	2.8113	1.3198	44.0405
2	0.362	5	50	3.2764	1.8102	43.2629

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x̄	0.394	5	50	3.0438	1.5650	43.6517
s	0.04525	0.000	0.000	0.3289	0.3467	0.5498
v	11.49	0.00	0.00	10.81	22.15	1.26

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9. Sampel BP 3.3.

542/PS/08/22 **22.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

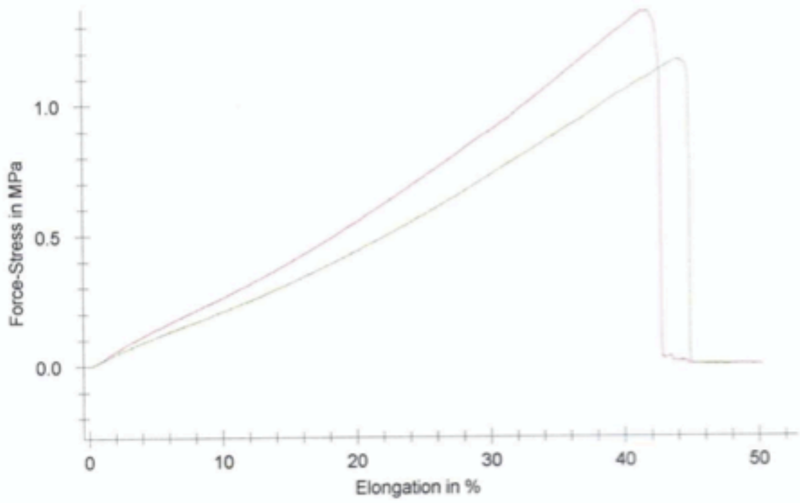
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 3:3

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.346	5	50	2.3470	1.3566	41.3716
2	0.392	5	50	2.2924	1.1696	43.9490

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.369	5	50	2.3197	1.2631	42.6603
s	0.03253	0.000	0.000	0.0386	0.1323	1.8225
v	8.81	0.00	0.00	1.67	10.47	4.27

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10. Sampel BP 4.1

542/PS/08/22 **22.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

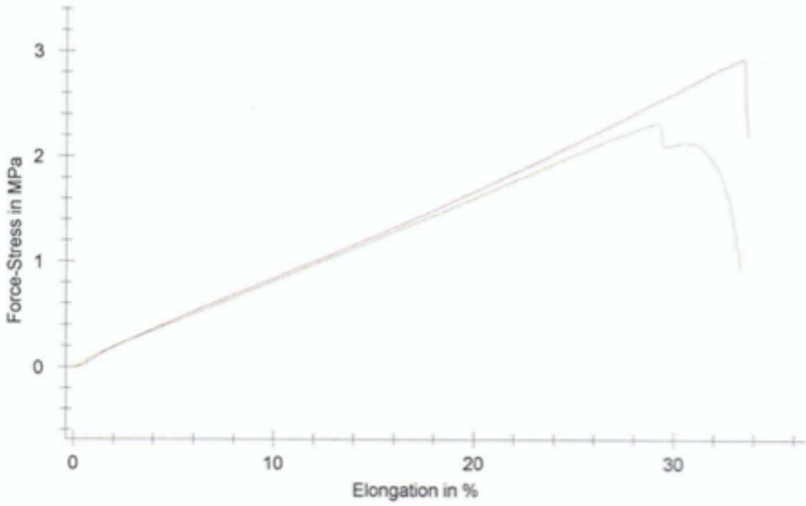
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 4:1

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.342	5	50	5.0217	2.9367	33.4723
2	0.429	5	50	4.9794	2.3214	29.1264

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x̄	0.3855	5	50	5.0005	2.6290	31.2993
s	0.06152	0.000	0.000	0.0299	0.4351	3.0730
ν	15.96	0.00	0.00	0.60	16.55	9.82

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11. Sampel BP 4.2

542/PS/08/22 **23.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

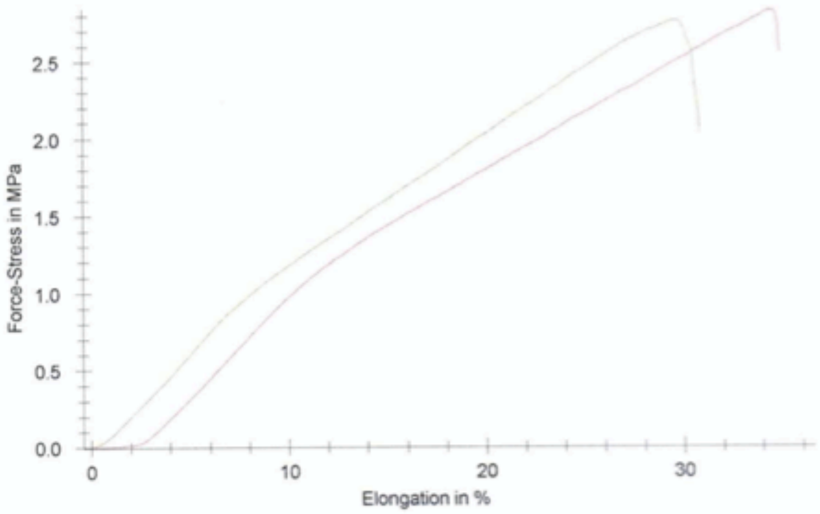
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 4:2

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
1	0.375	5	50	5.3057	2.8297	34.3010
2	0.452	5	50	6.2465	2.7640	29.4290

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax. %
x	0.4135	5	50	5.7761	2.7968	31.8650
s	0.05445	0.000	0.000	0.6653	0.0465	3.4450
v	13.17	0.00	0.00	11.52	1.66	10.81

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12. Sampel BP 4.3

542/PS/08/22 **23.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

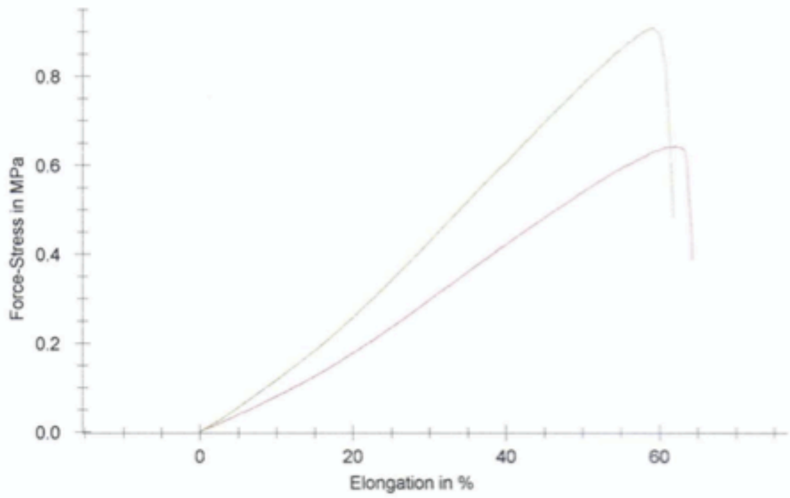
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 4:3

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.969	5	50	3.1131	0.6425	62.0590
2	0.719	5	50	3.2717	0.9101	58.9242

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.844	5	50	3.1924	0.7763	60.4916
s	0.1768	0.000	0.000	0.1121	0.1892	2.2166
v	20.95	0.00	0.00	3.51	24.37	3.66

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13. Sampel BP 5.1

542/PS/08/22 **23.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

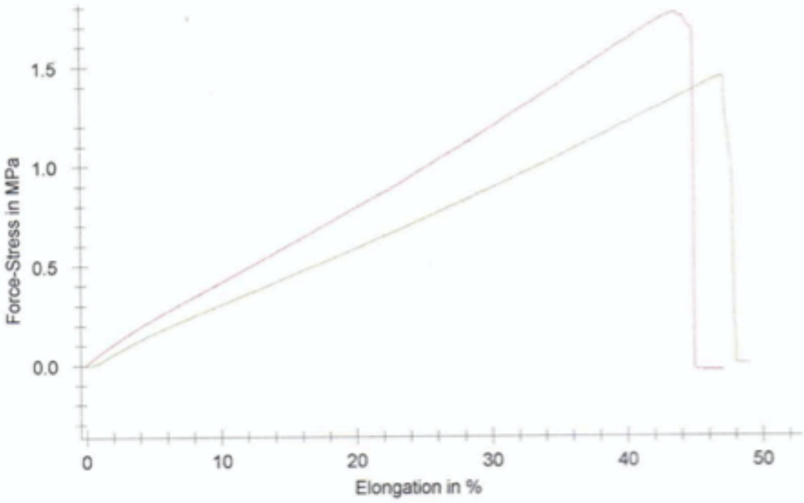
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 5:1

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.235	5	50	2.0789	1.7693	43.4523
2	0.334	5	50	2.4172	1.4474	47.0361

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.2845	5	50	2.2481	1.6084	45.2442
s	0.07	0.000	0.000	0.2392	0.2276	2.5341
v	24.61	0.00	0.00	10.64	14.15	5.60

Page 1/1

14. Sampel BP 5.2

542/PS/08/22 **23.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

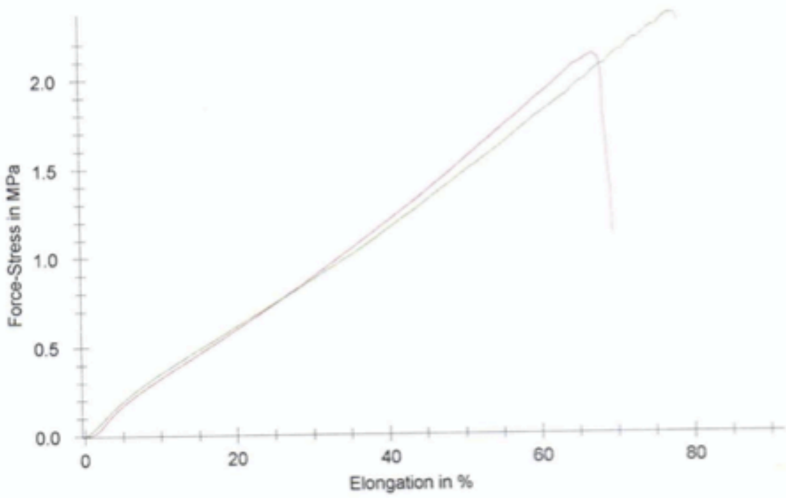
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 5:2

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.532	5	50	5.6678	2.1307	67.0968
2	0.51	5	50	6.0140	2.3584	77.2164

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.521	5	50	5.8409	2.2446	72.1566
s	0.01556	0.000	0.000	0.2448	0.1610	7.1557
v	2.99	0.00	0.00	4.19	7.17	9.92

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15. Sampel BP 5.3

542/PS/08/22 **25.08.2022**

Fakultas Teknologi Pertanian
Universitas Gadjah Mada

Parameter table:

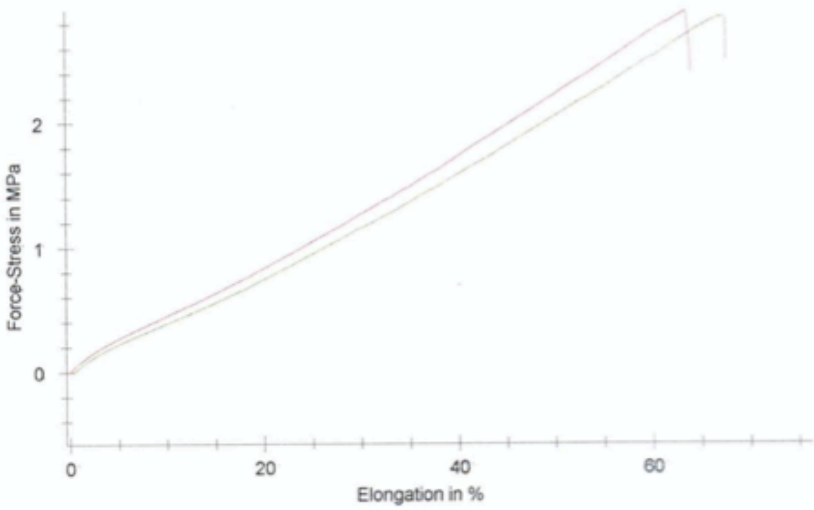
Company name: 542/PS/08/22
Customer : Yusliandi
Tester : Wahyu
Test speed: 10 mm/min

Test standard : Tensile strength
Material : BP 5:3

Results:

Nr	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
1	0.393	5	50	5.6814	2.8913	63.3703
2	0.563	5	50	8.0345	2.8542	67.2373

Series graphics:



Statistics:

Series n = 2	a0 mm	b0 mm	Lc mm	FMax N	Tensile Strength MPa	Strain at Fmax %
x	0.478	5	50	6.8580	2.8727	65.3038
s	0.1202	0.000	0.000	1.6639	0.0263	2.7344
v	25.15	0.00	0.00	24.26	0.91	4.19

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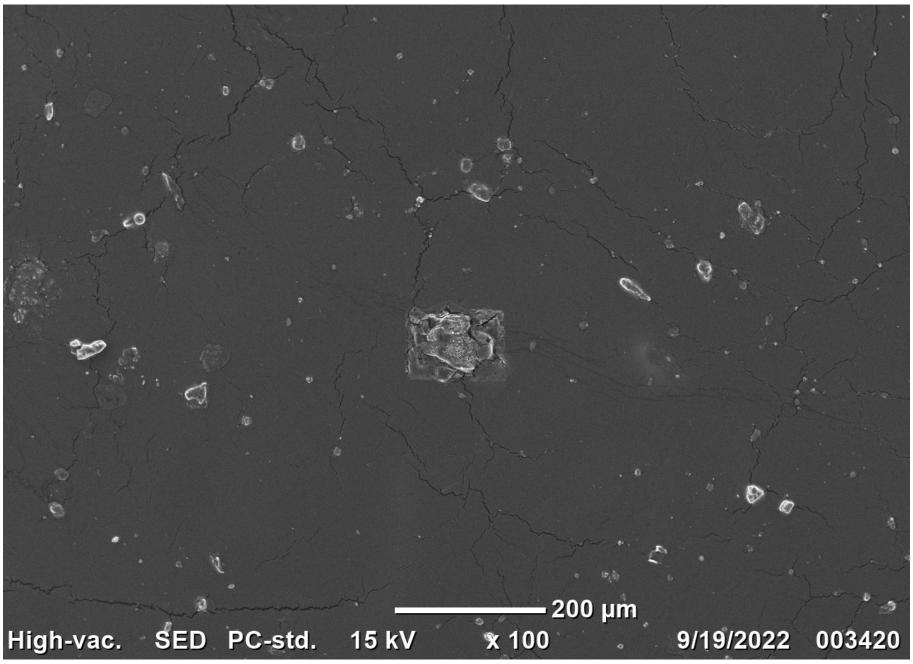
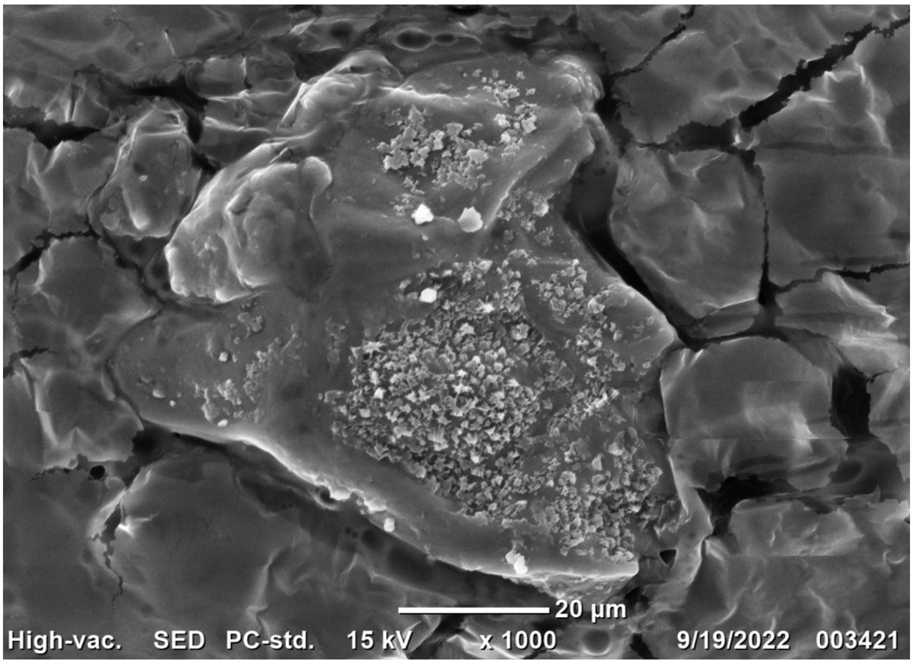
Lampiran 9. Hasil Uji SEM



Sampel BP 2 pada perbesaran 100 kali



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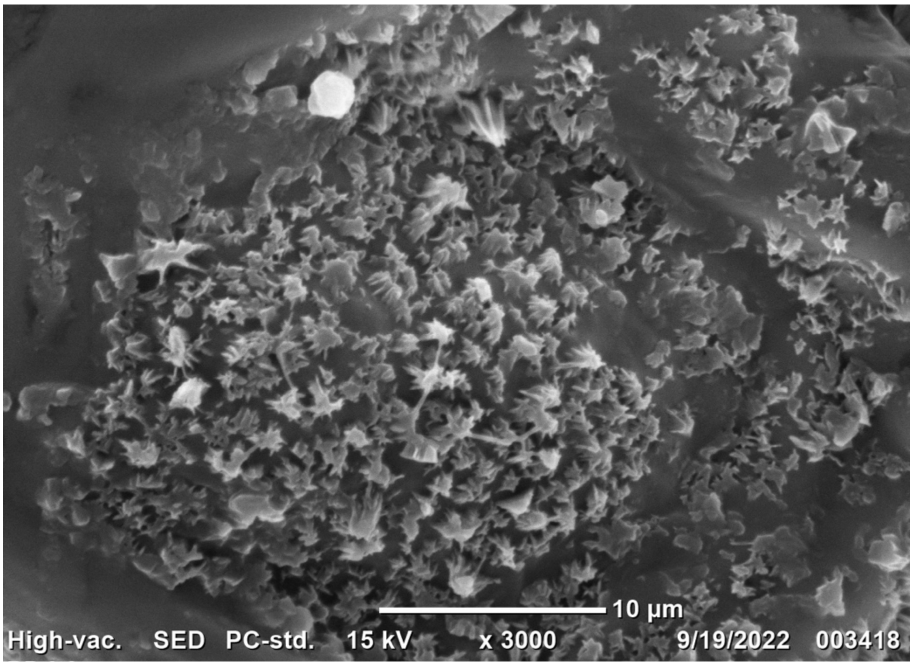

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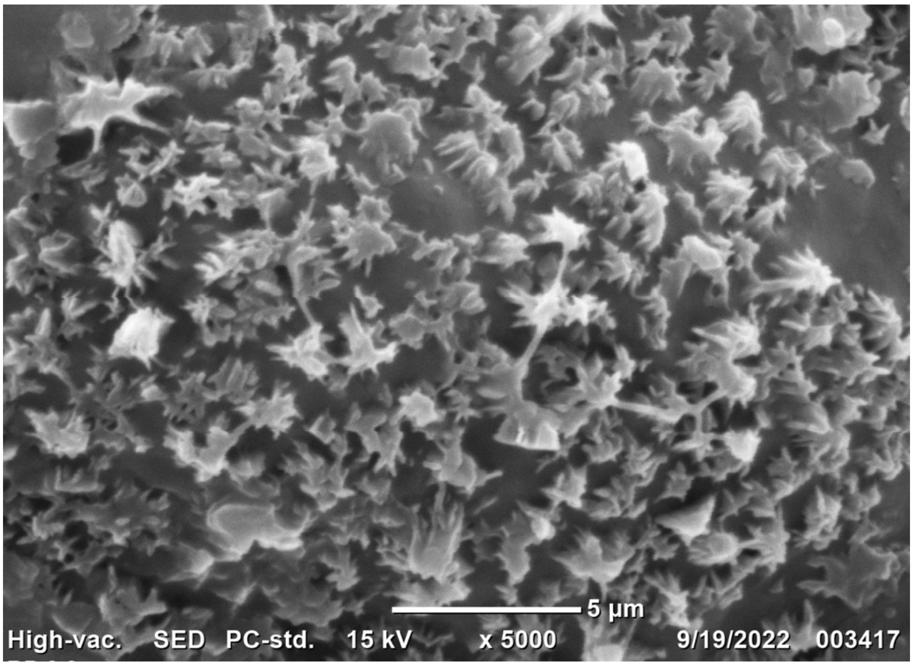
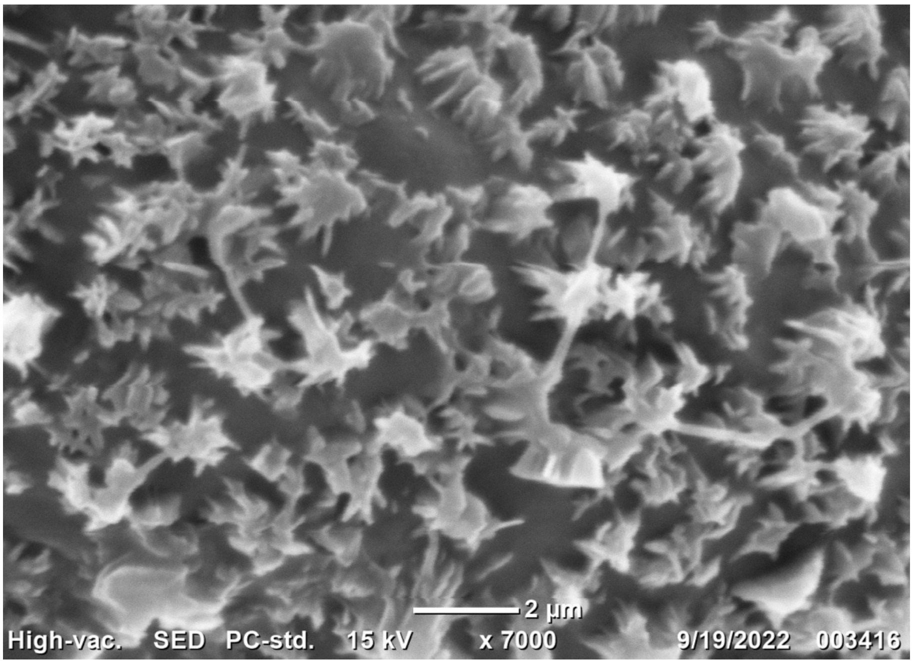
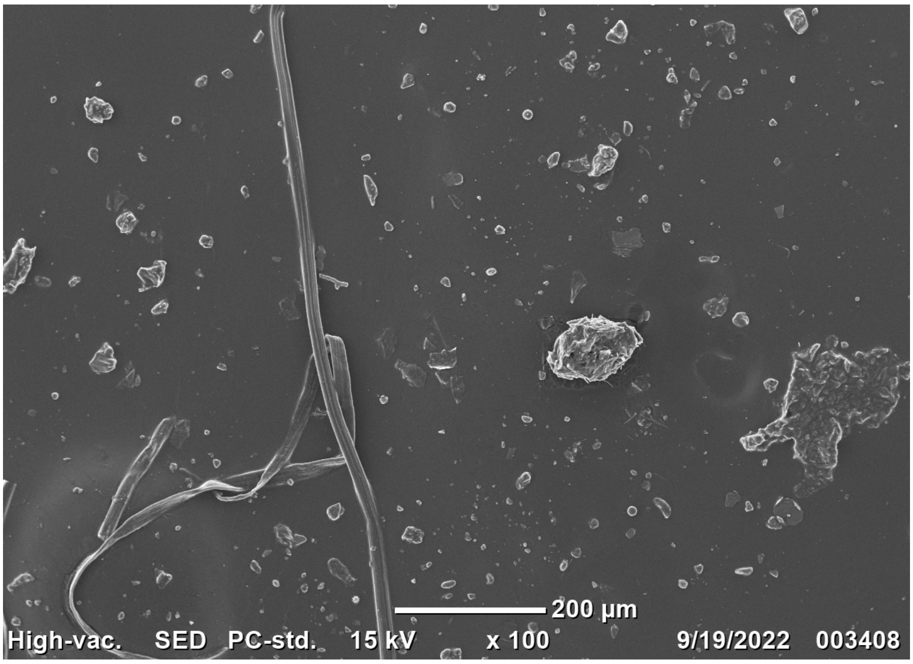


Sampel BP 2 pada perbesaran 5000 kali



Sampel BP 2 pada perbesaran 7000 kali



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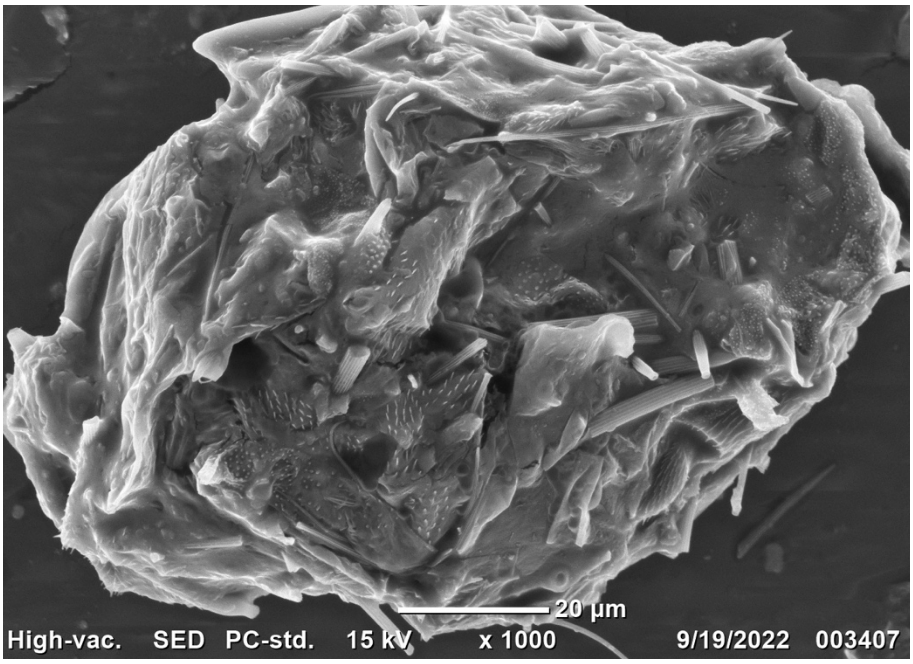

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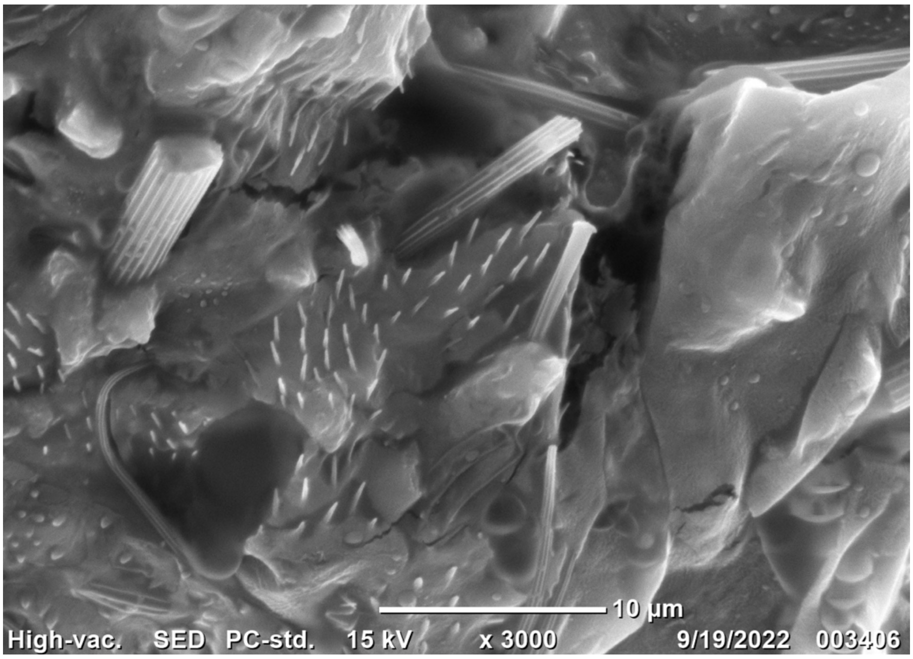

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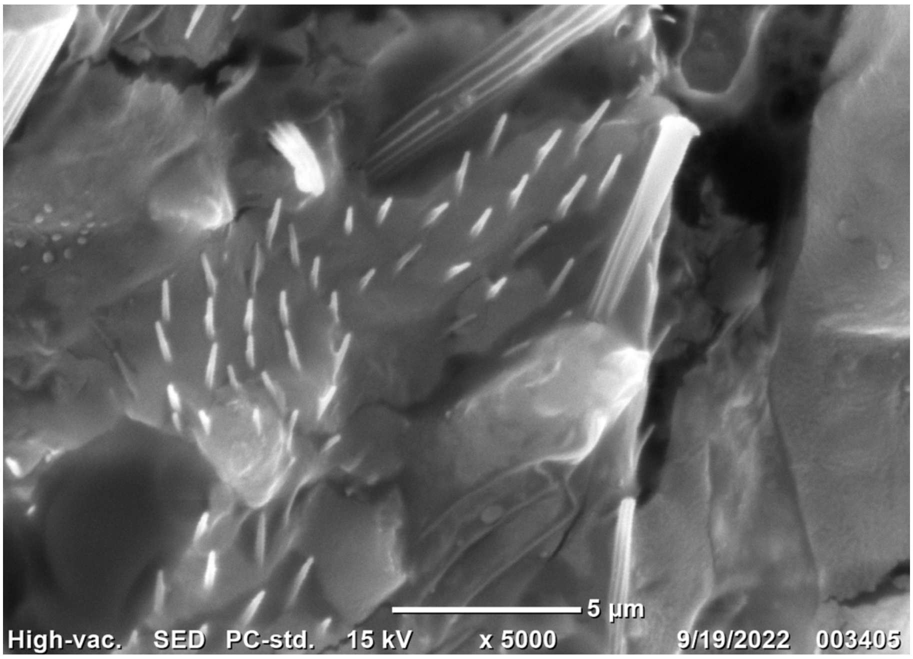

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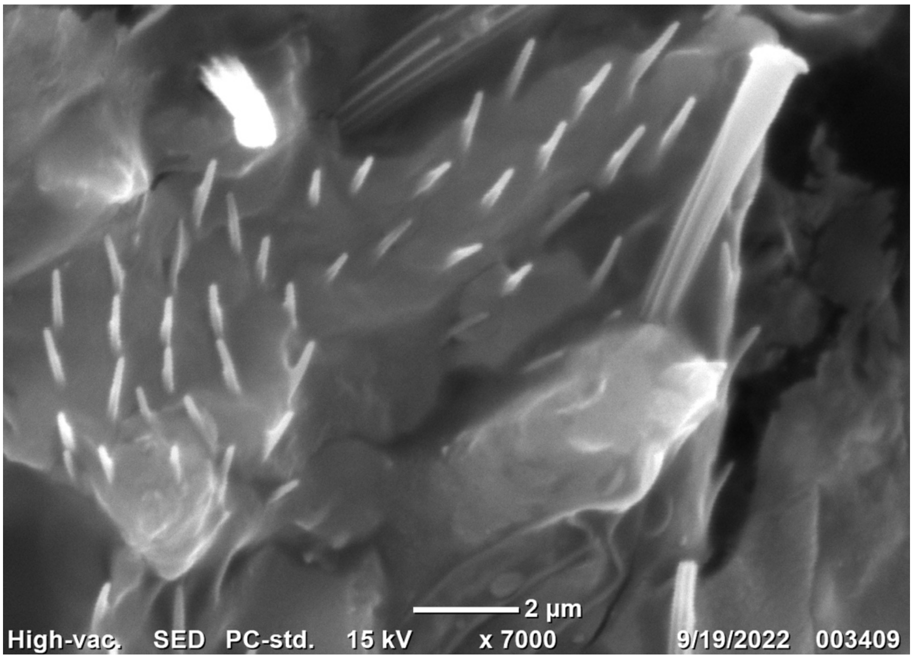

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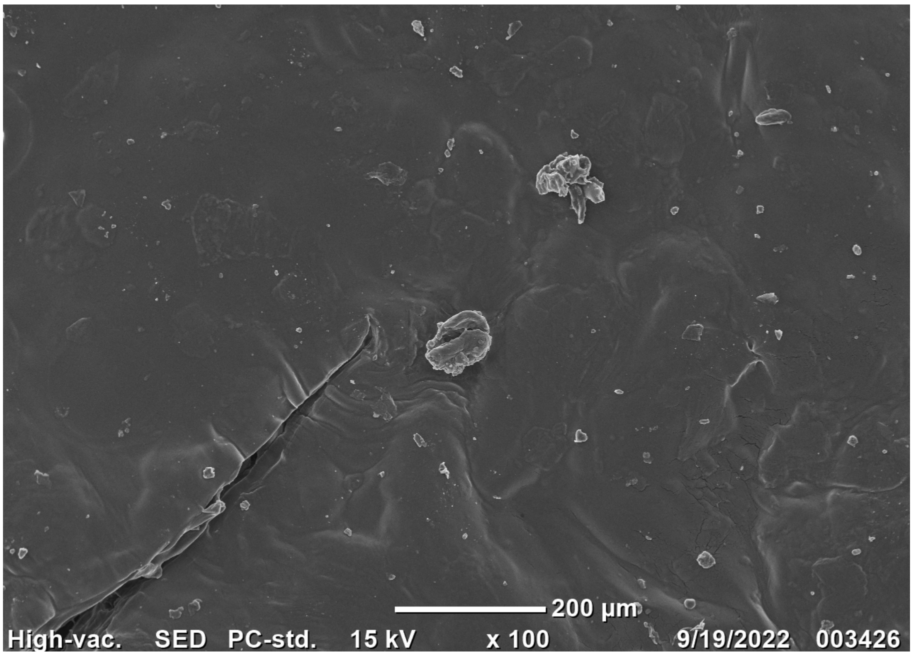

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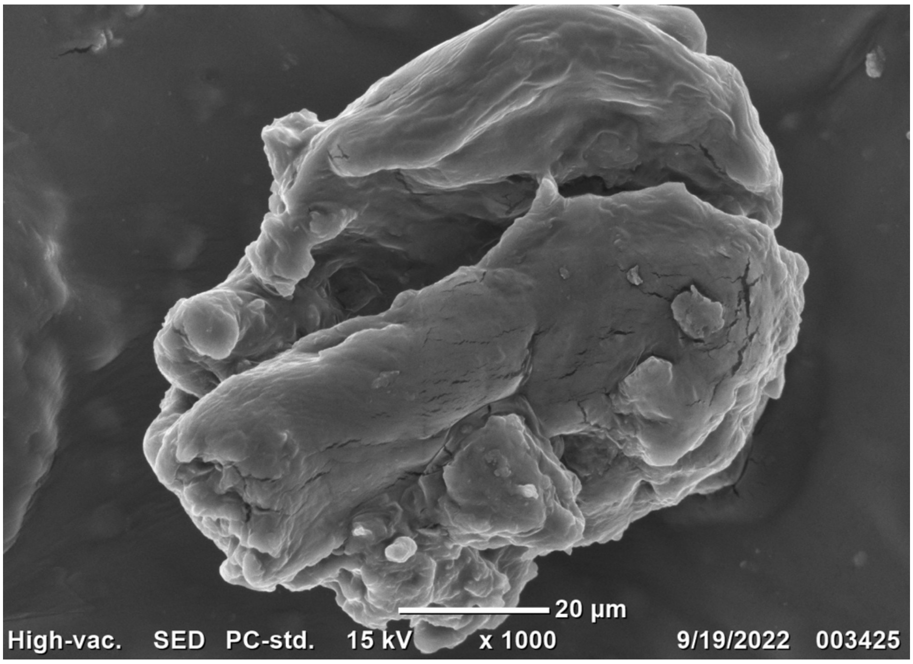

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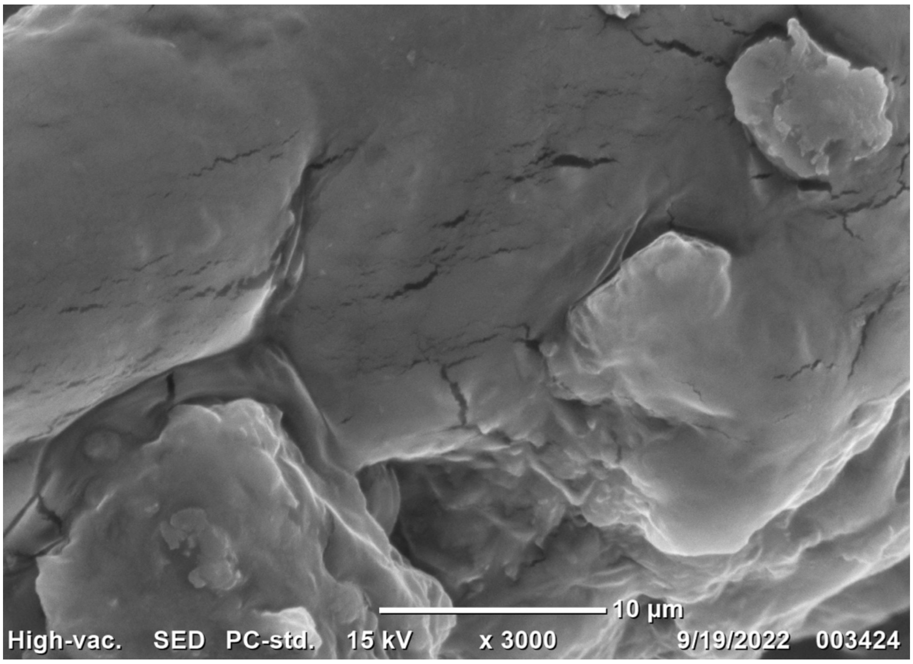

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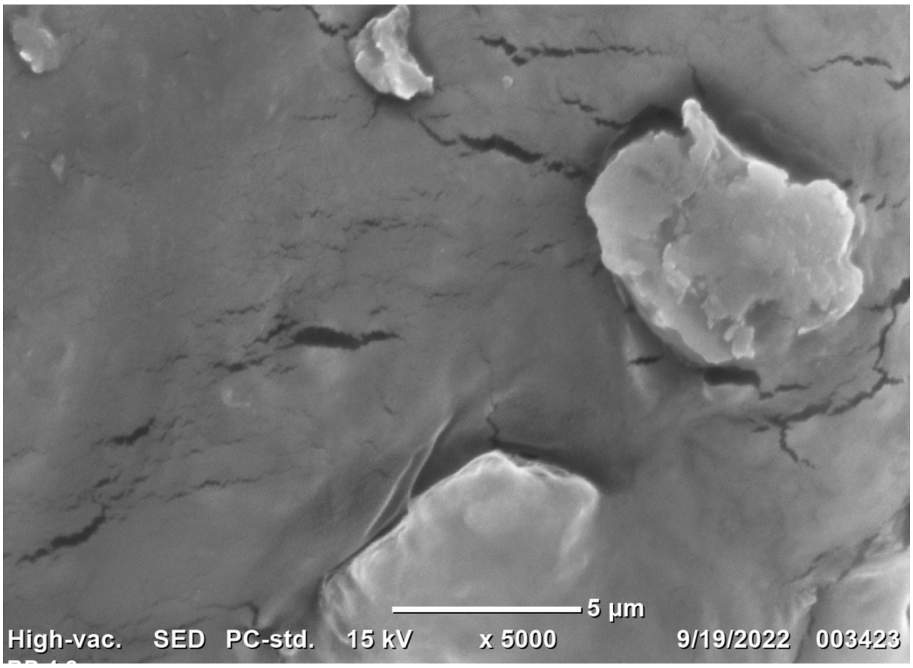

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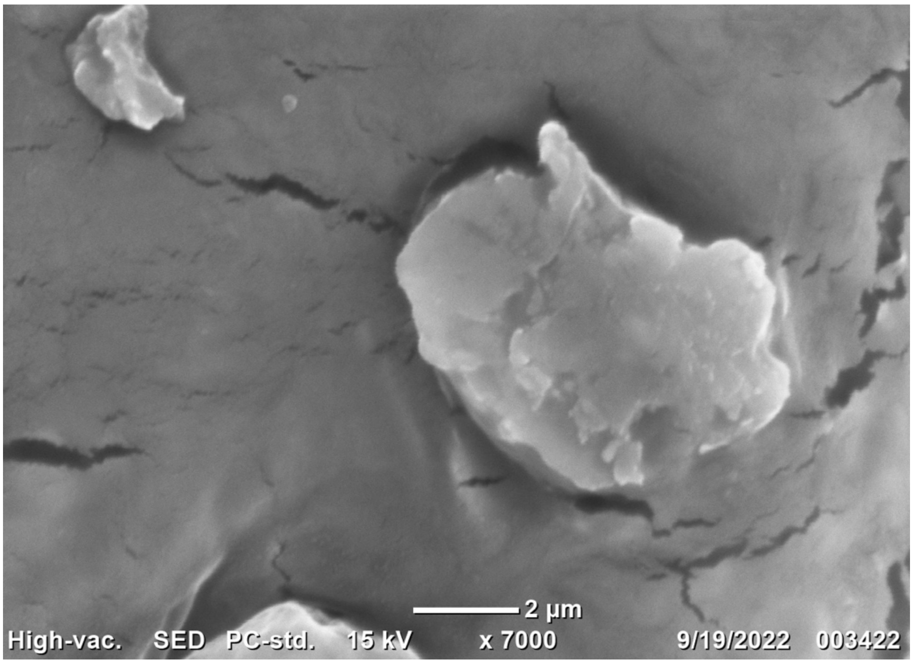
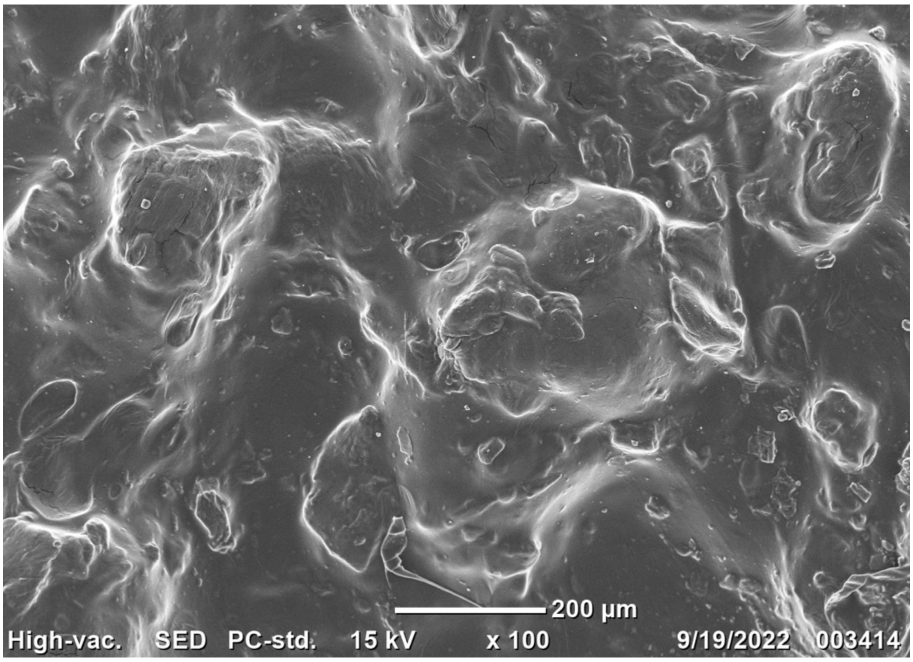
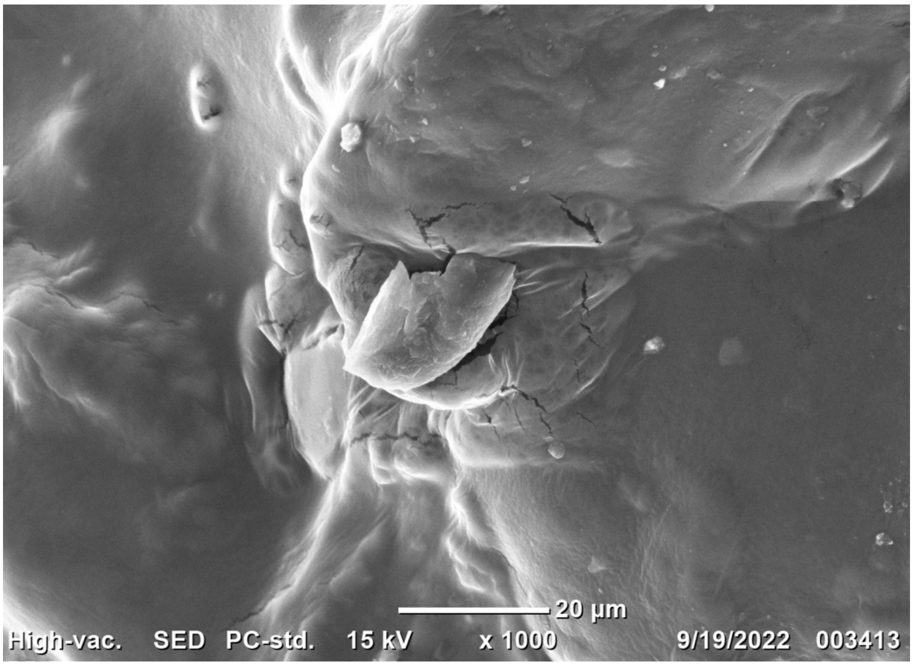


Sampel BP 4 paa perbesaran 7000 kali



Sampel BP 5 pada perbesaran 100 kali



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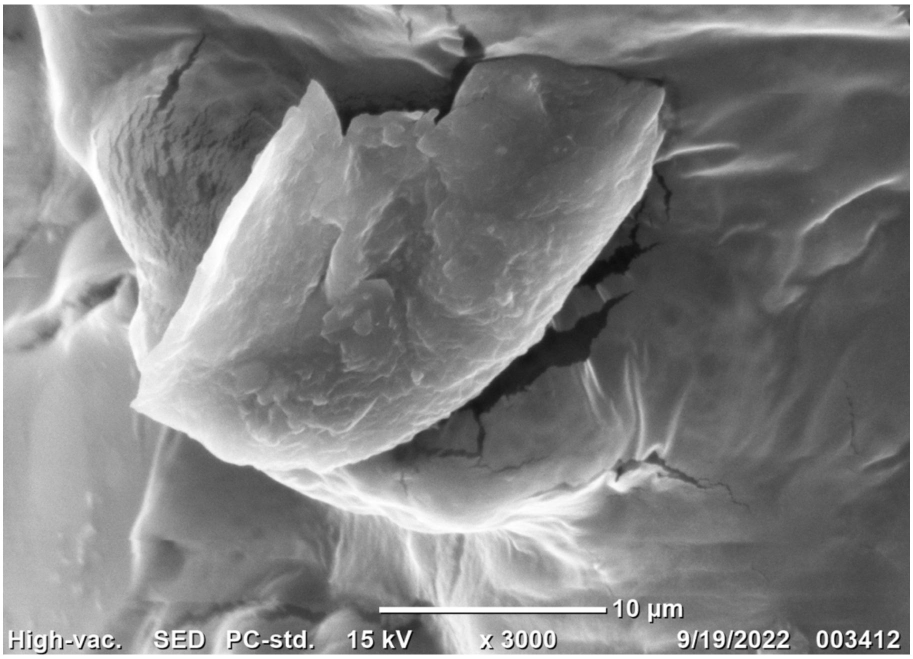

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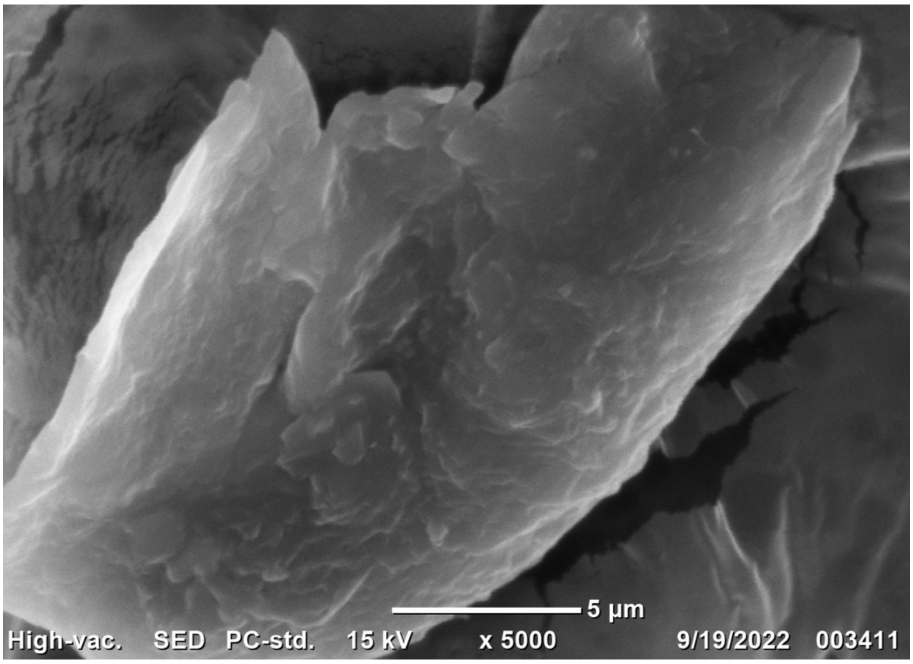

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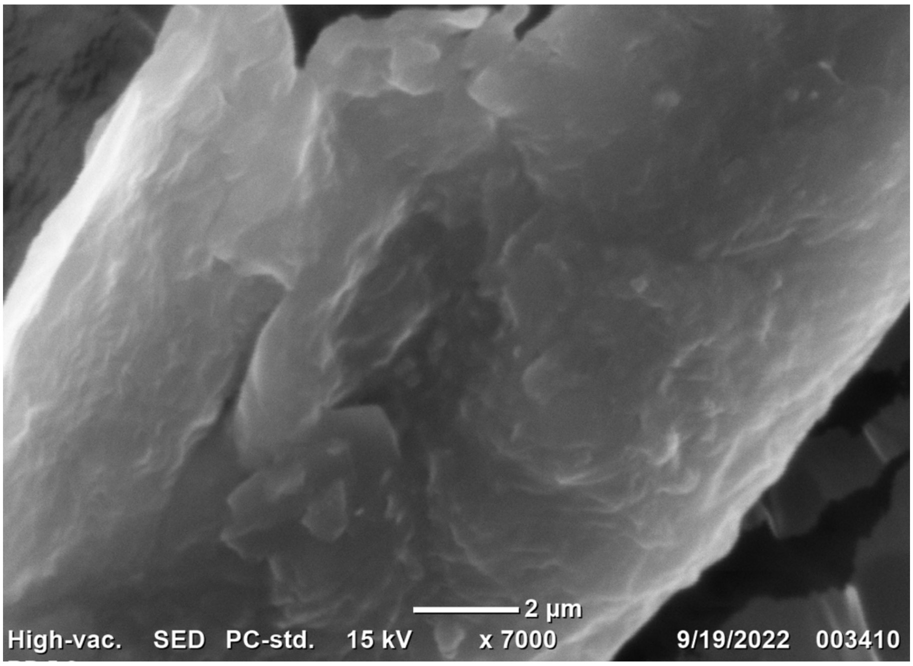
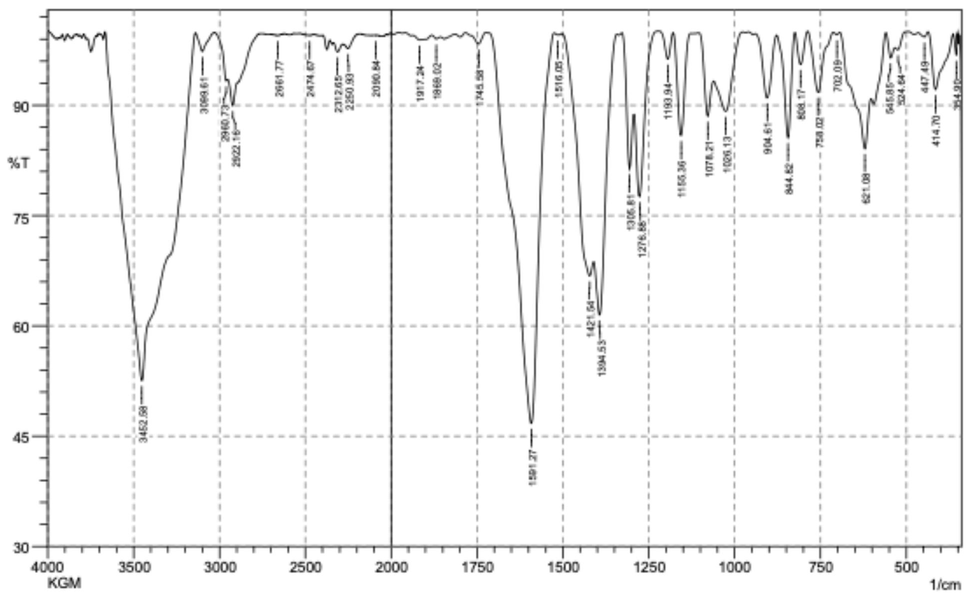


Sampel BP 5 pada perbesaran 7000 kali

Lampiran 10. Hasil Uji FTIR

1. FTIR KGM

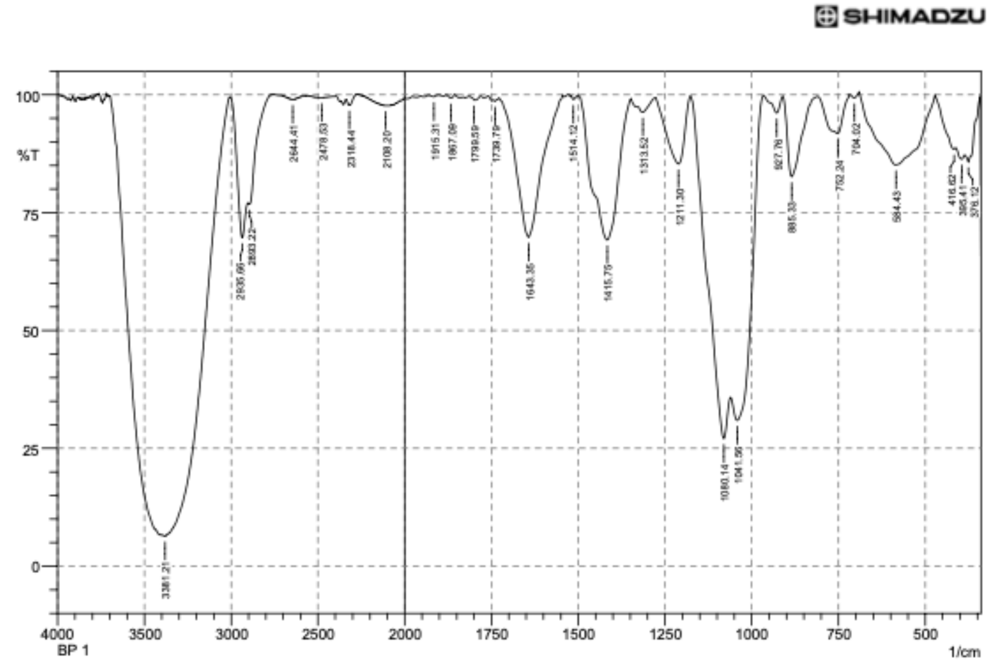
SHIMADZU



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	354.9	96.823	2.989	364.55	351.04	0.083	0.07
2	414.7	92.168	7.721	435.91	364.55	1.314	1.261
3	447.49	99.307	0.631	464.84	437.84	0.051	0.041
4	524.64	97.558	0.856	532.35	503.42	0.179	0.041
5	545.85	96.467	2.382	559.36	532.35	0.274	0.138
6	621.08	84.116	8.518	692.44	603.72	3.743	1.837
7	702.09	99.581	0.347	711.73	694.37	0.02	0.014
8	758.02	91.783	8.238	786.96	713.66	1.169	1.17
9	808.17	95.551	4.407	825.53	786.96	0.376	0.371
10	844.82	85.628	14.11	877.61	825.53	1.504	1.437
11	904.61	91.003	8.575	937.4	879.54	1.15	1.047
12	1026.13	89.194	6.837	1060.85	975.98	2.414	1.178
13	1078.21	88.525	7.11	1105.21	1062.78	1.247	0.577
14	1155.36	85.919	13.91	1178.51	1128.36	1.46	1.421
15	1193.94	96.294	3.659	1219.01	1178.51	0.281	0.277
16	1276.88	77.607	13.738	1292.31	1224.8	2.975	1.436
17	1305.81	81.403	11.229	1327.03	1294.24	1.715	0.807
18	1394.53	61.507	14.479	1409.96	1344.38	7.099	2.051
19	1421.54	66.822	5.116	1502.55	1411.89	8.332	1.231
20	1516.05	99.557	0.115	1525.69	1512.19	0.019	0.003
21	1591.27	46.751	53.072	1712.79	1525.69	23.843	23.7
22	1745.58	98.344	1.56	1782.23	1724.36	0.199	0.173
23	1869.02	99.02	0.39	1882.52	1857.45	0.082	0.019
24	1917.24	98.887	0.35	1936.53	1899.88	0.146	0.026
25	2090.84	99.516	0.021	2100.48	2081.19	0.04	0.001
26	2250.93	97.744	1.019	2281.79	2183.42	0.563	0.143
27	2312.65	97.287	1.133	2335.8	2281.79	0.513	0.137
28	2474.67	99.517	0.152	2532.54	2451.53	0.138	0.033
29	2661.77	99.5	0.218	2708.06	2621.26	0.148	0.041
30	2922.16	89.959	4.497	2951.09	2760.14	3.906	1.15
31	2960.73	93.318	0.87	3026.31	2953.02	0.907	-0.179
32	3099.61	97.353	2.503	3140.11	3026.31	0.611	0.542
33	3452.58	52.594	47.31	3666.68	3140.11	74.267	74.024

Date/Time; 10/31/2022 3:21:38 PM
No. of Scans;

2. FTIR BP 1

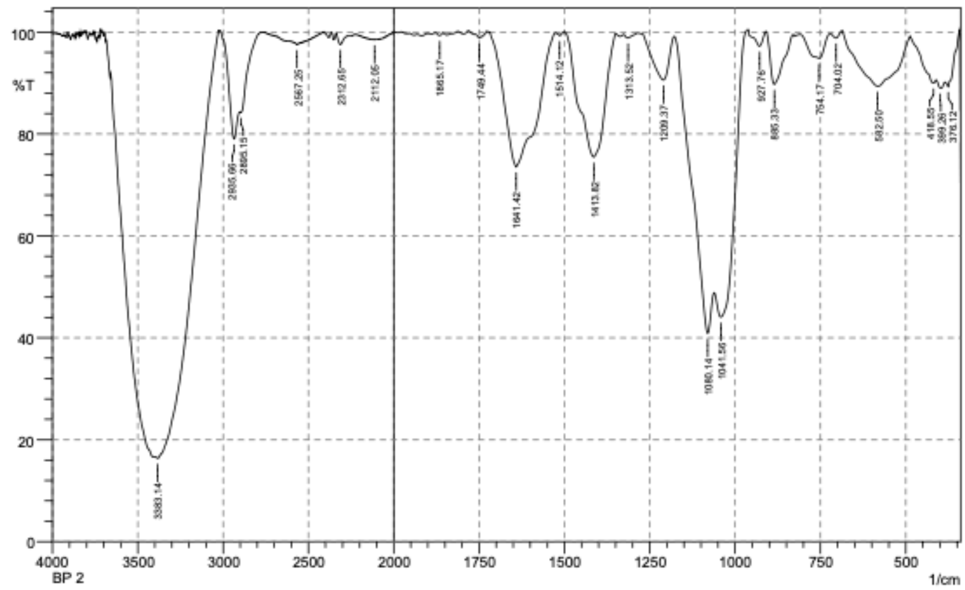


No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	376.12	85.787	4.122	385.76	343.33	1.804	0.511
2	395.41	86.344	1.361	410.84	387.69	1.399	0.102
3	416.62	88.464	1	470.63	412.77	1.869	0.274
4	584.43	85.126	15.109	690.52	472.56	9.511	9.722
5	704.02	99.353	0.979	719.45	690.52	0.03	0.069
6	752.24	91.769	8.124	810.1	719.45	1.937	1.873
7	885.33	82.653	17.004	910.4	812.03	3.591	3.437
8	927.76	96.141	3.592	966.34	910.4	0.478	0.422
9	1041.56	30.934	17.939	1060.85	966.34	28.883	8.658
10	1080.14	27.099	18.442	1174.65	1062.78	32.164	6.854
11	1211.3	85.335	14.263	1276.88	1176.58	3.855	3.659
12	1313.52	96.285	1.673	1327.03	1276.88	0.537	0.187
13	1415.75	69.21	30.161	1500.62	1350.17	12.632	12.254
14	1514.12	98.999	0.787	1519.91	1500.62	0.05	0.034
15	1643.35	69.788	29.779	1728.22	1544.98	11.995	11.668
16	1739.79	98.633	0.405	1745.58	1728.22	0.083	0.015
17	1799.59	98.889	0.103	1815.02	1797.66	0.05	-0.003
18	1867.09	99.318	0.76	1880.6	1855.52	0.041	0.049
19	1915.31	99.588	0.374	1928.82	1901.81	0.029	0.024
20	2108.2	97.701	0.1	2272.15	2102.41	0.882	0.072
21	2318.44	97.784	1.559	2337.72	2272.15	0.32	0.196
22	2478.53	99.402	0.339	2561.47	2395.59	0.329	0.143
23	2644.41	99.013	0.8	2758.21	2582.68	0.354	0.252
24	2893.22	76.823	1.764	2902.87	2758.21	5.549	0.167
25	2935.66	69.677	14.146	3007.02	2904.8	9.025	3.171
26	3381.21	6.406	93.227	3697.54	3008.95	388.591	387.463

Comment;
BP 1

Date/Time; 10/31/2022 3:16:19 PM
No. of Scans;
Resolution;
Apodization;

3. FTIR BP 2



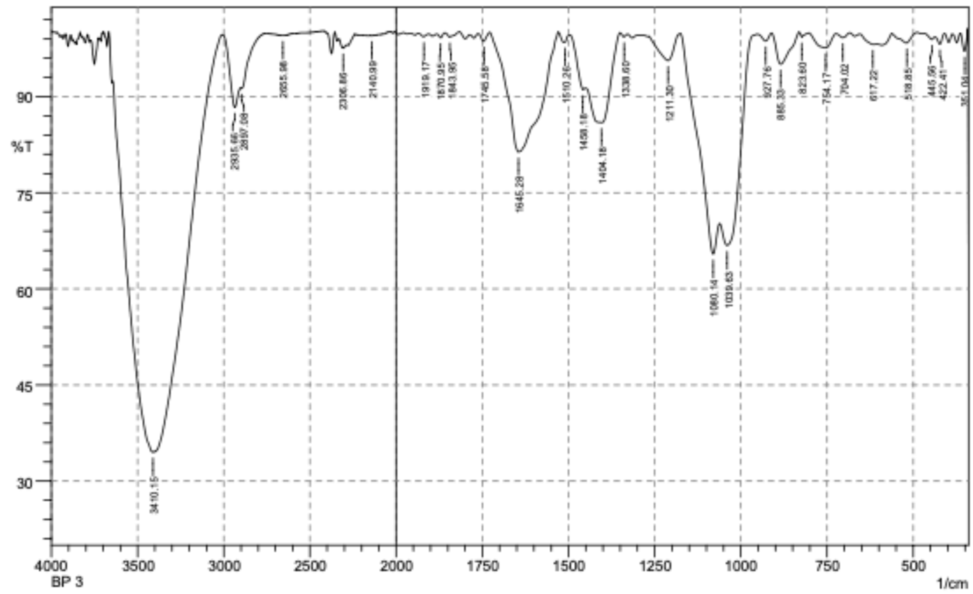
	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	376.12	89.318	2.648	383.83	343.33	1.187	0.31
2	399.26	89.003	1.409	410.84	385.76	1.199	0.097
3	418.55	89.986	1.193	486.06	412.77	2.03	0.24
4	582.5	89.397	10.312	686.66	487.99	6.116	5.881
5	704.02	98.817	1.138	721.38	686.66	0.097	0.09
6	754.17	94.845	4.75	808.17	721.38	1.191	1.034
7	885.33	89.761	10.128	908.47	831.32	1.972	1.893
8	927.76	97.254	2.972	962.48	910.4	0.315	0.379
9	1041.56	44.07	14.899	1060.85	962.48	20.196	5.861
10	1080.14	40.896	15.538	1176.58	1062.78	22.463	4.353
11	1209.37	90.597	8.74	1282.66	1178.51	2.305	2.063
12	1313.52	98.845	0.774	1327.03	1282.66	0.137	0.073
13	1413.82	75.482	24.402	1500.62	1350.17	9.659	9.6
14	1514.12	99.299	0.675	1527.62	1500.62	0.04	0.037
15	1641.42	73.548	26.367	1718.58	1527.62	13.128	13.047
16	1749.44	98.808	0.501	1761.01	1741.72	0.073	0.019
17	1865.17	99.34	0.577	1878.67	1853.59	0.045	0.036
18	2112.05	98.506	0.133	2231.64	2100.48	0.613	0.061
19	2312.65	97.576	1.986	2337.72	2268.29	0.447	0.291
20	2567.25	97.561	2.427	2767.85	2412.95	1.922	1.905
21	2895.15	84.269	0.735	2900.94	2769.78	3.443	0.081
22	2935.66	79.004	9.63	3024.38	2902.87	6.189	1.967
23	3383.14	16.369	5.369	3406.29	3026.31	148.529	9.756

Comment;
BP 2

Date/Time; 10/31/2022 3:11:48 PM
No. of Scans;
Resolution;
Apodization;

4. FTIR BP 3

SHIMADZU



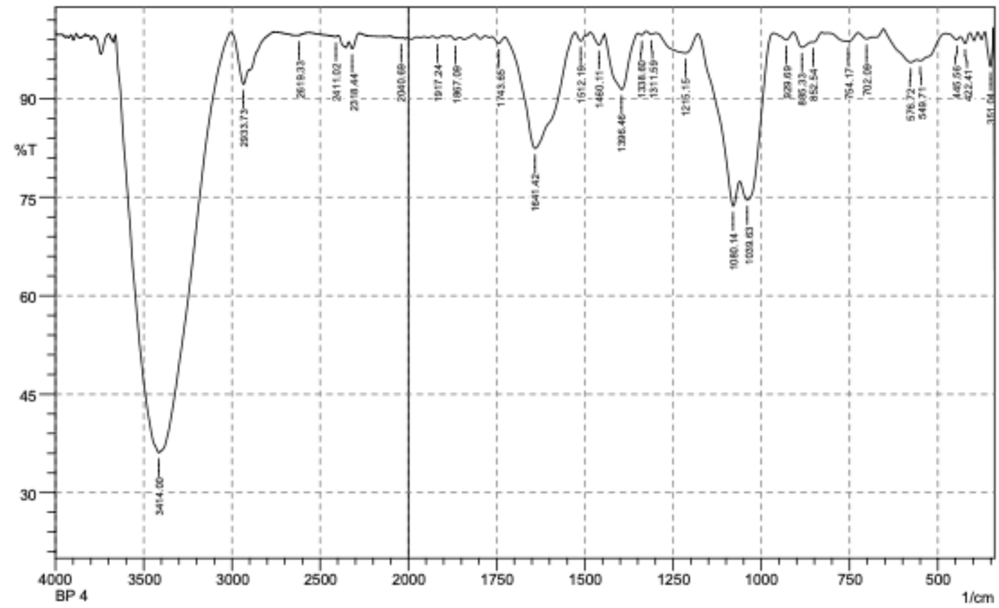
	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	351.04	97.113	3.224	364.55	341.4	0.148	0.175
2	422.41	98.19	1.41	437.84	408.91	0.133	0.08
3	445.56	98.914	0.54	466.77	437.84	0.085	0.032
4	518.85	98.373	1.574	563.21	487.99	0.277	0.254
5	617.22	98.124	0.422	655.8	605.65	0.29	0.064
6	704.02	99.204	0.679	723.31	684.73	0.079	0.06
7	754.17	97.601	2.254	802.39	723.31	0.506	0.46
8	823.6	99.308	0.727	831.32	802.39	0.036	0.036
9	885.33	95.065	4.904	910.4	831.32	0.939	0.938
10	927.76	98.668	1.174	952.84	910.4	0.135	0.103
11	1039.63	66.797	9.193	1060.85	952.84	10.267	2.657
12	1080.14	65.444	9.301	1174.65	1062.78	10.894	2.118
13	1211.3	95.63	4.033	1265.3	1176.58	1.006	0.859
14	1338.6	99.318	0.507	1352.1	1328.95	0.039	0.023
15	1404.18	85.956	1.003	1408.04	1352.1	2.032	0.286
16	1458.18	91.093	1.339	1494.83	1452.4	1	0.119
17	1510.26	98.511	0.143	1512.19	1496.76	0.061	-0.002
18	1645.28	81.367	18.697	1728.22	1529.55	9.227	9.287
19	1745.58	98.643	1.286	1762.94	1728.22	0.103	0.092
20	1843.95	99.284	0.714	1859.38	1815.02	0.062	0.067
21	1870.95	99.192	0.652	1882.52	1859.38	0.046	0.03
22	1919.17	99.356	0.458	1934.6	1905.67	0.05	0.027
23	2140.99	99.515	0.037	2150.63	2102.41	0.091	0.007
24	2306.86	97.587	0.912	2331.94	2283.72	0.419	0.106
25	2655.98	99.525	0.331	2758.21	2588.47	0.22	0.114
26	2897.08	91.298	0.246	2900.94	2762.06	1.973	0.032
27	2935.66	88.327	5.599	3007.02	2902.87	3.269	1.137
28	3410.15	34.533	60.507	3643.53	3008.95	147.417	136.007

Comment;
BP 3

Date/Time; 10/31/2022 3:35:09 PM
No. of Scans;
Resolution;
Apodization;

5. FTIR BP 4

SHIMADZU



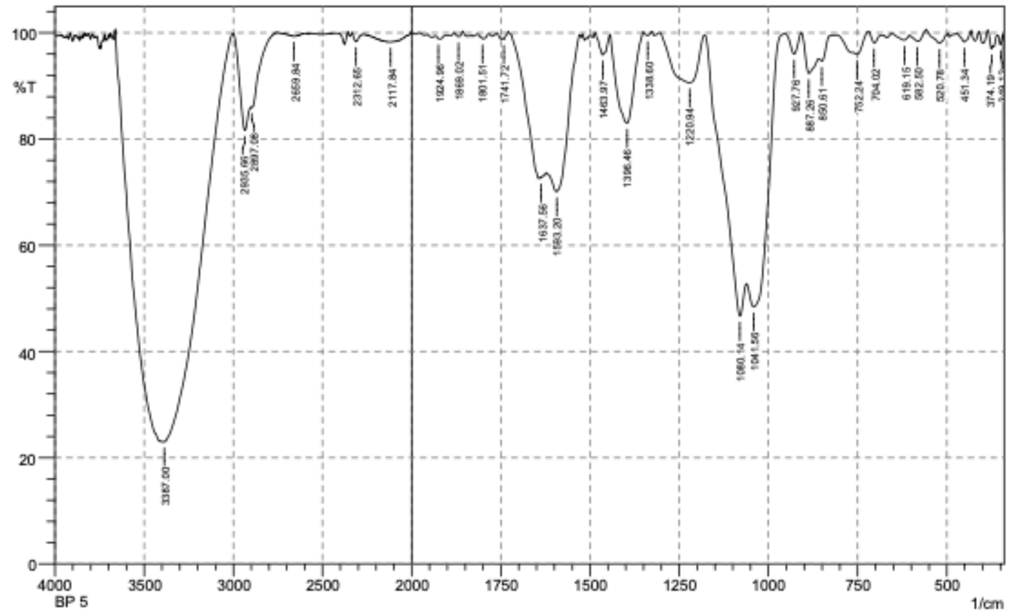
No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	351.04	94.958	5.658	366.48	341.4	0.298	0.356
2	422.41	98.423	1.318	435.91	408.91	0.104	0.073
3	445.56	98.98	0.592	478.35	435.91	0.09	0.037
4	549.71	95.821	0.598	559.36	478.35	0.918	0.183
5	576.72	95.548	1.174	653.87	561.29	1.108	0.387
6	702.09	99.138	0.536	727.16	686.66	0.093	0.049
7	754.17	98.738	1.329	808.17	727.16	0.248	0.267
8	852.54	98.627	0.321	858.32	829.39	0.106	0.028
9	885.33	97.848	1.615	908.47	858.32	0.316	0.185
10	929.69	98.983	1.11	964.41	908.47	0.113	0.13
11	1039.63	74.57	7.922	1060.85	966.34	7.2	2.177
12	1080.14	73.675	7.057	1178.51	1062.78	7.621	1.087
13	1215.15	96.989	2.925	1298.09	1180.44	0.991	0.963
14	1311.59	99.794	0.368	1325.1	1298.09	0.003	0.022
15	1338.6	99.694	0.436	1350.17	1325.1	0.005	0.02
16	1396.46	91.427	8.481	1444.68	1350.17	2.014	1.976
17	1460.11	98.208	1.735	1485.19	1444.68	0.16	0.157
18	1512.19	98.835	1.079	1527.62	1496.76	0.088	0.076
19	1641.42	82.454	17.226	1724.36	1529.55	8.304	8.077
20	1743.65	98.44	1.01	1762.94	1726.29	0.168	0.08
21	1867.09	98.993	0.476	1882.52	1853.59	0.092	0.026
22	1917.24	99.227	0.331	1930.74	1901.81	0.076	0.021
23	2040.69	99.238	0.054	2052.26	2031.04	0.068	0.002
24	2318.44	97.667	1.432	2337.72	2277.93	0.344	0.17
25	2411.02	99.45	0.236	2563.4	2395.59	0.177	0.082
26	2619.33	99.662	0.463	2762.06	2563.4	0.077	0.205
27	2933.73	92.246	7.877	3007.02	2762.06	3.246	3.402
28	3414	36.12	63.729	3658.96	3008.95	136.437	136.149

Comment;
BP 4

Date/Time; 10/31/2022 3:26:07 PM
No. of Scans;
Resolution;
Apodization;

6. FTIR BP 5

SHIMADZU



No.	Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area
1	349.12	97.811	1.837	356.83	341.4	0.087	0.063
2	374.19	97.014	1.247	385.76	370.33	0.11	0.042
3	451.34	98.283	1.883	472.56	432.05	0.157	0.184
4	520.78	98.039	2.11	557.43	497.63	0.251	0.312
5	582.5	98.43	1.616	605.65	557.43	0.176	0.19
6	619.15	98.634	0.977	655.8	605.65	0.185	0.117
7	704.02	98.125	1.829	719.45	684.73	0.151	0.138
8	752.24	95.943	1.391	763.81	719.45	0.474	0.137
9	850.61	94.702	1.569	858.32	829.39	0.462	0.112
10	887.26	92.367	5.577	906.54	860.25	1.155	0.627
11	927.76	96.018	3.952	954.76	908.47	0.397	0.389
12	1041.56	48.415	12.898	1060.85	954.76	18.329	4.808
13	1080.14	46.656	13.08	1178.51	1062.78	19.905	3.531
14	1220.94	90.638	9.121	1303.88	1180.44	3.452	3.364
15	1338.6	99.519	0.701	1350.17	1327.03	0.021	0.044
16	1396.46	82.989	16.823	1442.75	1352.1	4.182	4.108
17	1463.97	95.896	0.915	1487.12	1460.11	0.276	0.055
18	1593.2	70.104	11.638	1622.13	1529.55	9.126	3.025
19	1637.56	72.674	0.283	1641.42	1624.06	2.364	0.016
20	1741.72	98.786	0.664	1747.51	1730.15	0.054	0.028
21	1801.51	98.902	0.198	1816.94	1797.66	0.059	0.005
22	1869.02	99.294	0.867	1882.52	1857.45	0.039	0.056
23	1924.96	98.888	0.127	1932.67	1923.03	0.037	0.002
24	2117.84	98.284	0.046	2127.48	2102.41	0.186	0.004
25	2312.65	98.373	1.567	2333.87	2268.29	0.242	0.209
26	2659.84	99.379	0.588	2756.28	2596.19	0.213	0.203
27	2897.08	85.971	0.196	2899.01	2756.28	3.137	0.04
28	2935.66	81.661	9.28	2997.38	2900.94	5.327	2.054
29	3387	22.986	1.919	3396.64	3005.1	117.599	3.657

Comment;
BP 5

Date/Time; 10/31/2022 3:30:29 PM
No. of Scans;
Resolution;
Apodization;

Lampiran 11. Hasil Uji Biodegradasi

1. Hari ke- 1 media tanah

BP 1

BP 2

BP 3

BP 4

BP 5

2. Hari ke-7 media tanah

BP 1

BP 2

BP 3

BP 4

BP 5

3. Hari ke-15 media tanah

BP 1

BP 2

BP 3

BP 4

BP 5

4. Hari ke-30 media tanah

BP 1

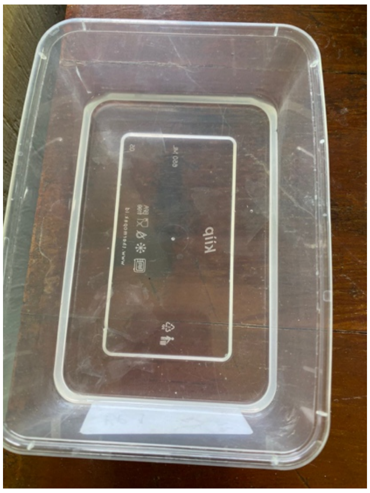
BP 2

BP 3

BP 4

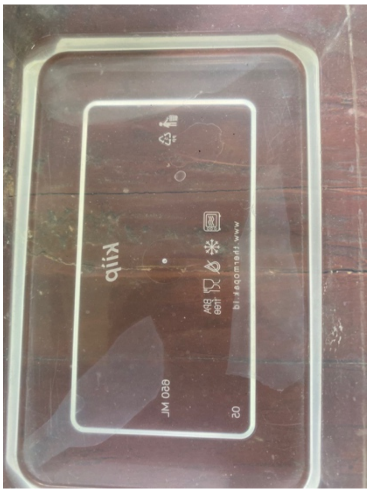
BP 5

5. Hari ke-1 media air laut

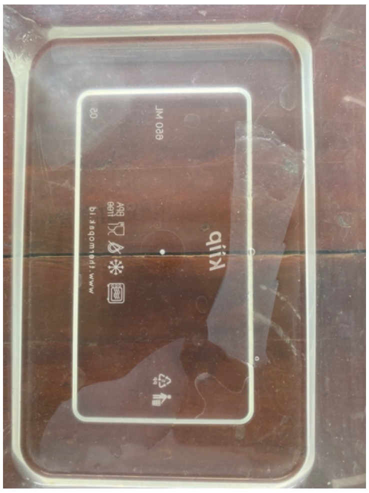


BP 1

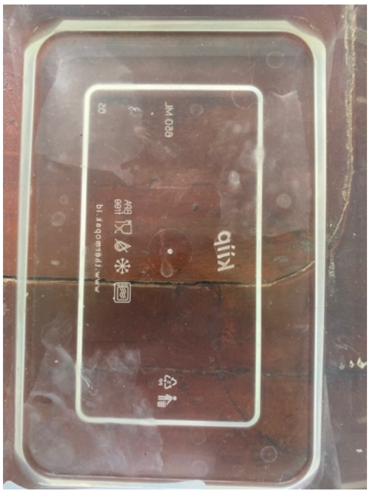
BP 2



BP 3



BP 4



BP 5

6. Hari ke-7 media air laut

BP 1

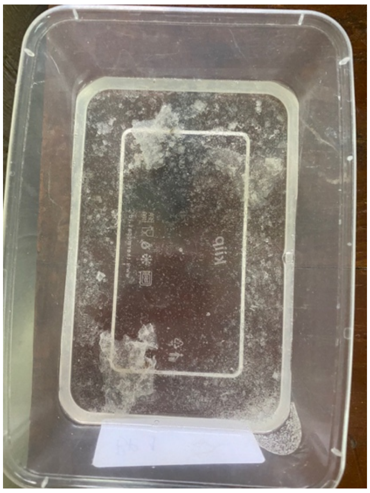
BP 2

BP 3

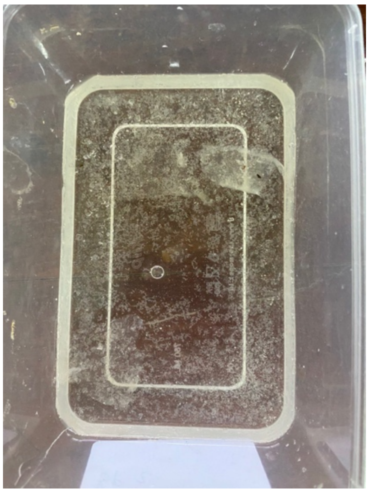
BP 4

BP 5

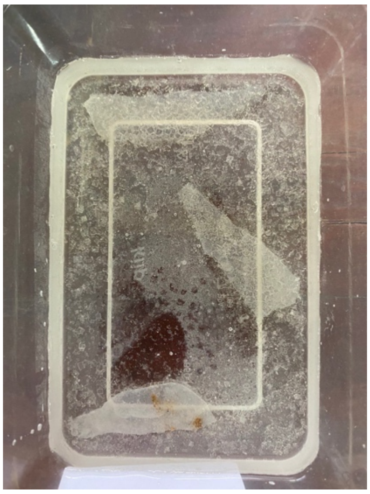
7. Hari ke-15 media air laut



BP 1

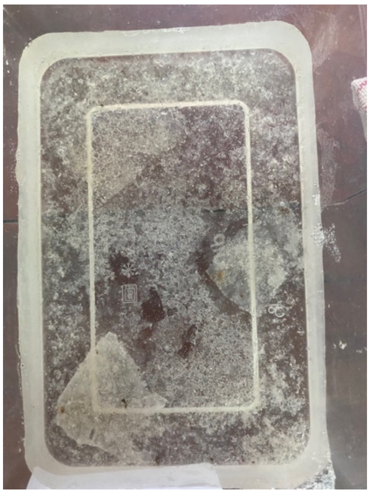


BP 2



BP 3

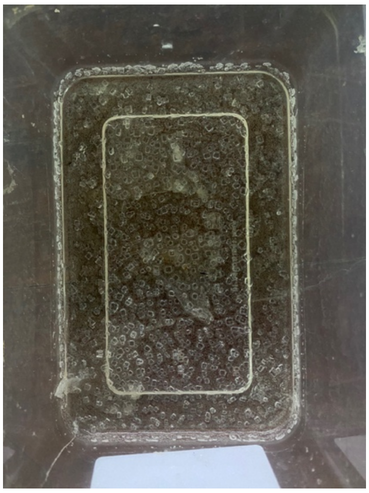
BP 4



BP 5

8. Hari ke-30 media air laut

BP 1



BP 2

BP 3

BP 4

BP 5

Lampiran 12 Dokumentasi Penelitian

Sampel Umbi Porang

Umbi Porang diiris tipis-tipis

Chip Porang

Tepung Porang

Tepung porang dilakukan Purifikasi

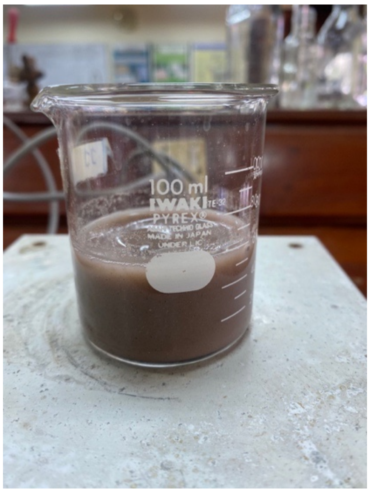
Proses sentrifugasi

Produksi KGM dari tepung porang

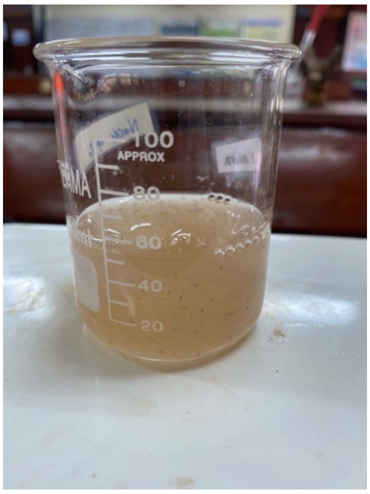
KGM hasil purifikasi

Penimbangan KGM

Proses Fabrikasi Bioplastik



Pembuatan Ektrak KGM



Pembuatan Hidrolisat KGM

Analisis kadar glukomanan metode DNS

Pengujian SEM

Pengujian Biodegradasi