

Supplementary file S

Innovative Biopolymers Composite-Based Thin Film for Wound Healing Applications

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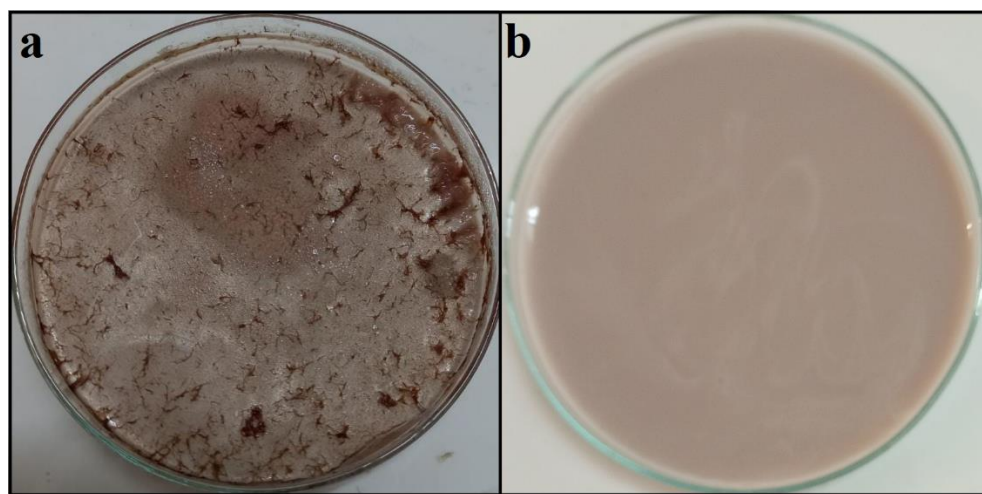


Figure S1: (a) Deposition of M1 thin film on the glass surface, (b) Pouring of M4 in a glass plate for thin film deposition

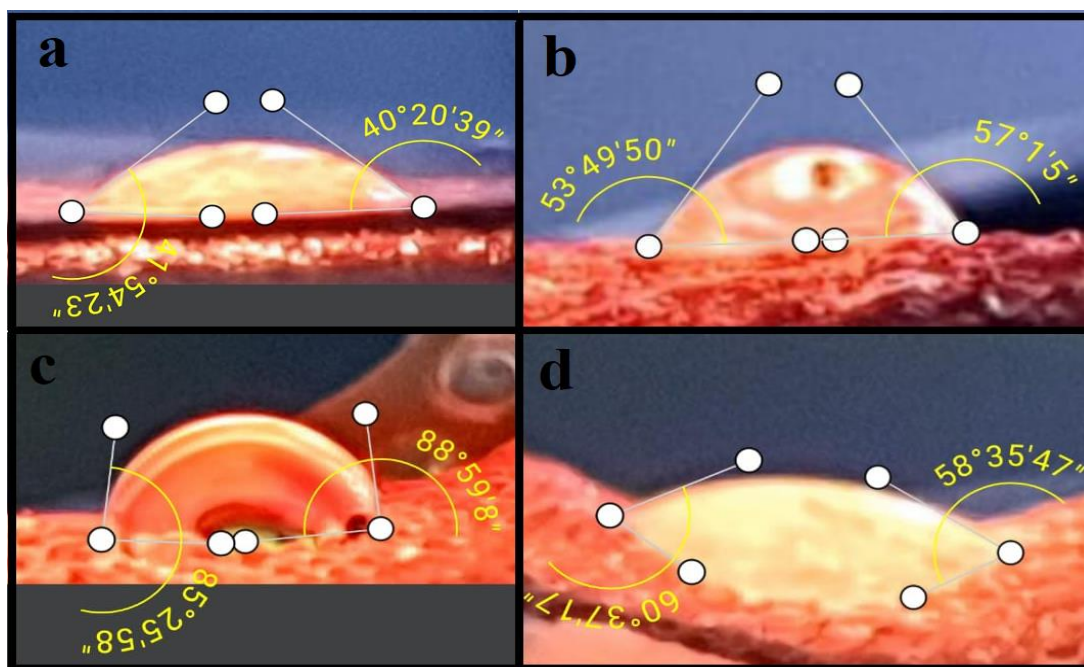


Figure S2: Contact angles of (a) M4, (b) M3, (c) M5 and (d) M2.

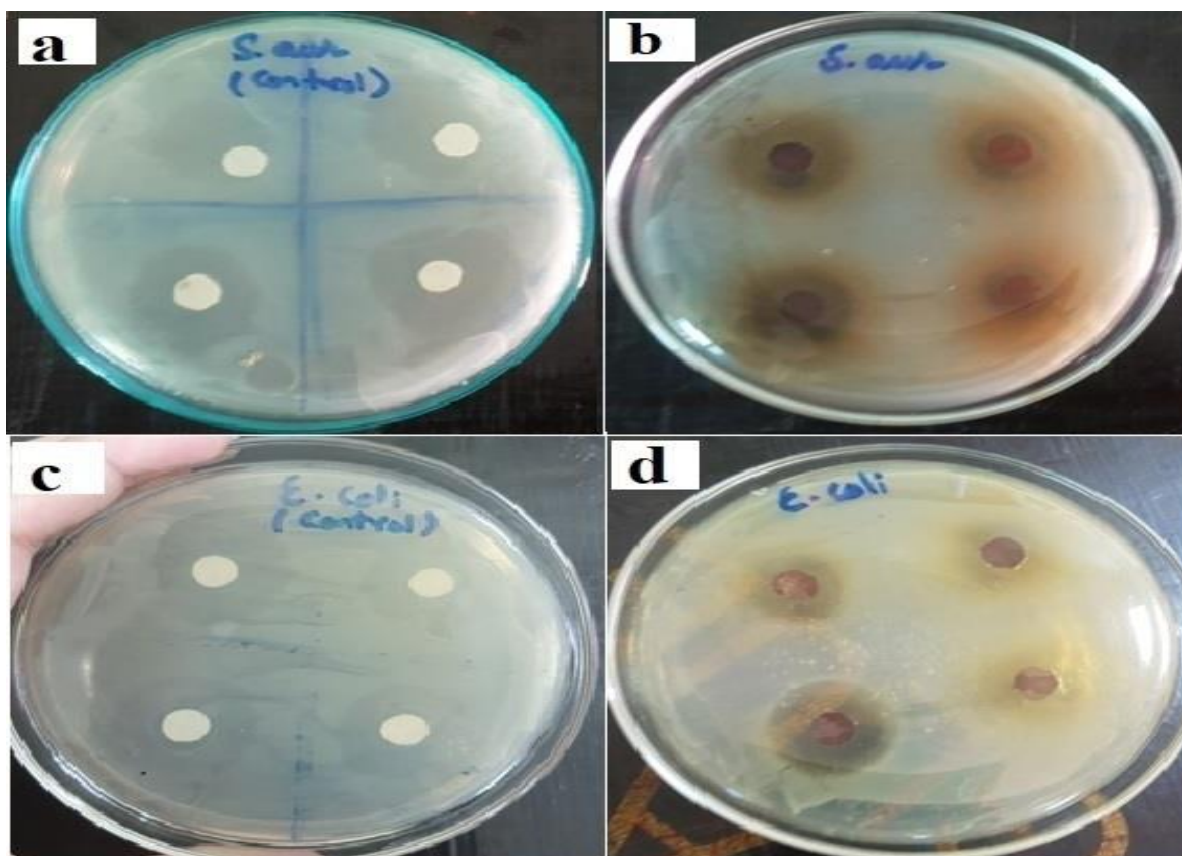


Figure S3: Antibacterial activity representing zone of inhibition against *S. aureus* (a) with amoxicillin and (b) with M4 thin film. Zone of inhibition against *E. coli* (c) with amoxicillin and (d) with M4 thin film.

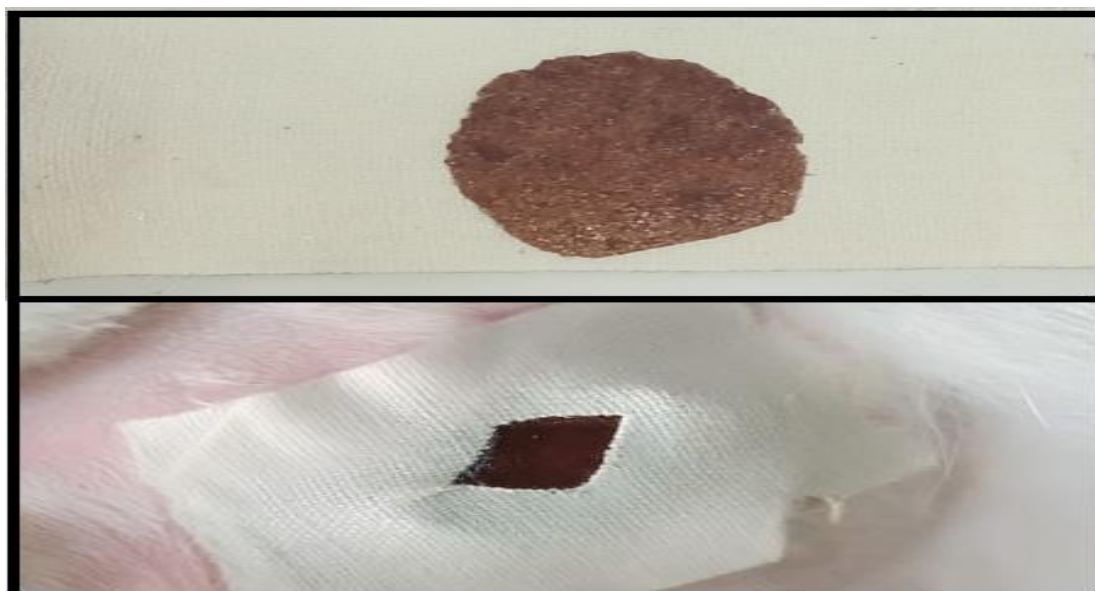


Figure S4: Dressing of wound by M4 thin film.

Table S1: Thickness of thin films (M2, M3, M4 and M5).

Thickness								
	M2		M3		M4		M5	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	22	23.100 $\pm$ 0.332	49	49.6 $\pm$ 0.68	39	39.0 $\pm$ 1.14	26	26.500 $\pm$ 0.224
2	23		52		41		26.5	
3	23.5		48		42		26	
4	23		49		36		27	
5	24		50		37		27	

Table S2: Thickness of films after swelling

Thickness								
	M2		M3		M4		M5	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	37	37.200 $\pm$ 0.374	65	65.4 $\pm$ 0.67	71	72.0 $\pm$ 0.71	32	31.800 $\pm$ 0.374
2	38		64		72		33	
3	37		67		74		32	
4	38		64		70		31	
5	36		67		73		31	

Table S3: Tensile strength of thin films

Tensile Strength $\pm$ SEM								
	M2		M3		M4		M5	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	0.024	0.023 $\pm$ 0.002	0.156	0.157 $\pm$ 0.003	0.220	0.225 $\pm$ 0.003	0.038	0.036 $\pm$ 0.004
2	0.026		0.150		0.231		0.029	
3	0.020		0.161		0.224		0.041	

Table S4: Percentage swelling degree of M2, M3, M4 and M5 thin films.

Swelling Degree (%) $\pm$ SEM								
	M2		M3		M4		M5	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	210	208.33 $\pm$ 4.4	200	216.67 $\pm$ 8.8	281	283.00 $\pm$ 2.0	120	118..33 $\pm$ 1.67
2	200		220		281		115	
3	215		230		287		120	

Table S5. Degree of crosslinking of M3 and M4 films.

	M3		M4	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	96.29	94.063 $\pm$ 0.622	92.30	90.690 $\pm$ 0.828
2	97.01		90.22	
3	94.89		89.55	

Table S6: Water vapor transmission rate for M3, M4 and M5 thin films.

Water Vapor Transmission Rate (g.m ⁻² .24hr ⁻¹)						
	M3		M4		M5	
	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM	Data	Mean $\pm$ SEM
1	746.562	798.95 $\pm$ 34.65	1925.343	1912.25 $\pm$ 13.10	1571.709	1532.42 $\pm$ 22.69
2	785.855		1925.343		1493.123	
3	864.440		1886.051		1532.416	

Table S7: Concentrations of Tannic acid released from M4 and M3, obtained by interpolation of standard curve and applying dilution factor at different time interval. (b) Percentage drug release from M4 and M3. (c) Data for Higuchi model of drug release for M4 thin film.

Time (min.)	Concentration (ppm) x D.F	
	M4	M3
0	0	0
15	186.35	0
30	222.7	0
45	245.45	60.6
60	268	83.64
75	300	103.8
90	318.5	136.36
105	336.35	145.44
120	345	161.8
180	395.45	186.2
240	440.0	211.0
6 hr	527.20	318.2
12 hr	709.0	400.0
18 hr	827.20	477.25

Percentage Drug Release		
Time (hr)	M4 (%)	M3 (%)
0	0	0
0.25	18.635	0
0.5	22.27	0
0.75	24.545	6.06
1	26.8	8.364
1.25	30	10.38
1.5	31.85	13.636
1.75	33.635	14.544
2	34.5	16.18
3	39.545	18.62
4	44	21.1
6	52.7	31.82
12	70.9	40
18	82.72	47.725
24	89.4	53

Higuchi Model for Drug Release			
Time (hr)	M4 (%)	Mt/M _∞	T ^{1/2}
0	0	0	0
0.25	18.635	0.208	0.5

0.5	22.27	0.249	0.70
0.75	24.545	0.275	0.86
1	26.8	0.299	1
1.25	30	0.335	1.12
1.5	31.85	0.356	1.225
1.75	33.635	0.376	1.323
2	34.5	0.386	1.414
3	39.545	0.442	1.73
4	44	0.492	2
6	52.7	0.589	2.45
12	70.9	0.793	3.46
18	82.72	0.925	4.243
24	89.4	1	4.899

Table S8. Antioxidant activity of M3 and M4

Time (Minutes)	Percentage Inhibition± SEM	
	M3	M4
30	94.90±0.03	95.17±0.02
60	95.03±0.02	95.17±0.03
90	95.04±0.03	95.18±0.02

Table S9: Antibacterial activity of M4 against *S. aureus* and *E. coli*.

Sample	Zone of Inhibition (mm) ± SEM	
	<i>S. aureus</i>	<i>E. coli</i>
M4 Thin Film	19.850±0.076	14.503±0.094
Amoxicillin	24.565±0.080	28.625±0.023

Table S10: Wounded area of burn and infected wound.

Day #	Burn Wound Area (cm)		Infected Wound Area (cm)	
	B1	B2	C1	C2
Day 0	1.2 x 1	1.5 x 1.2	1.3 x 1.2	1.3 x 1.3
Day2	1.1 x 0.9	1.4 x 1.2	1.1 x1.0	1.0 x 1.0
Day4	0.8 x 0.6	1.2 x 1.0	0.9 x 0.7	0.8 x 0.8
Day7	0.4 x 0.2	0.6 x 0.4	0.5 x 0.4	0.4 x 0.4
Day10	0.0 x 0.0	0.3 x 0.2	0.2 x 0.1	0.0 x 0.0
Day12	0.0 x 0.0	0.0 x 0.0	0.0 x 0.0	0.0 x0.0

Table S11. Wound healing percentage of burn and infection up to complete skin regeneration.

Day #	Burn Wound Healing %			Infected Wound Healing %		
	B1	B2	Mean $\pm$ SEM	C1	C2	Mean $\pm$ SEM
Day2	17.53	6.67	12.1 $\pm$ 5.4	29.49	40.82	35.15 $\pm$ 5.7
Day4	60.0	33.33	46.67 $\pm$ 13.3	59.61	62.13	60.87 $\pm$ 1.3
Day7	93.33	86.67	90.0 $\pm$ 3.3	87.18	90.53	88.85 $\pm$ 1.7
Day10	100	96.67	98.33 $\pm$ 1.7	98.71	100	99.35 $\pm$ 0.6
Day12	100	100	100	100	100	100