

Supporting Information

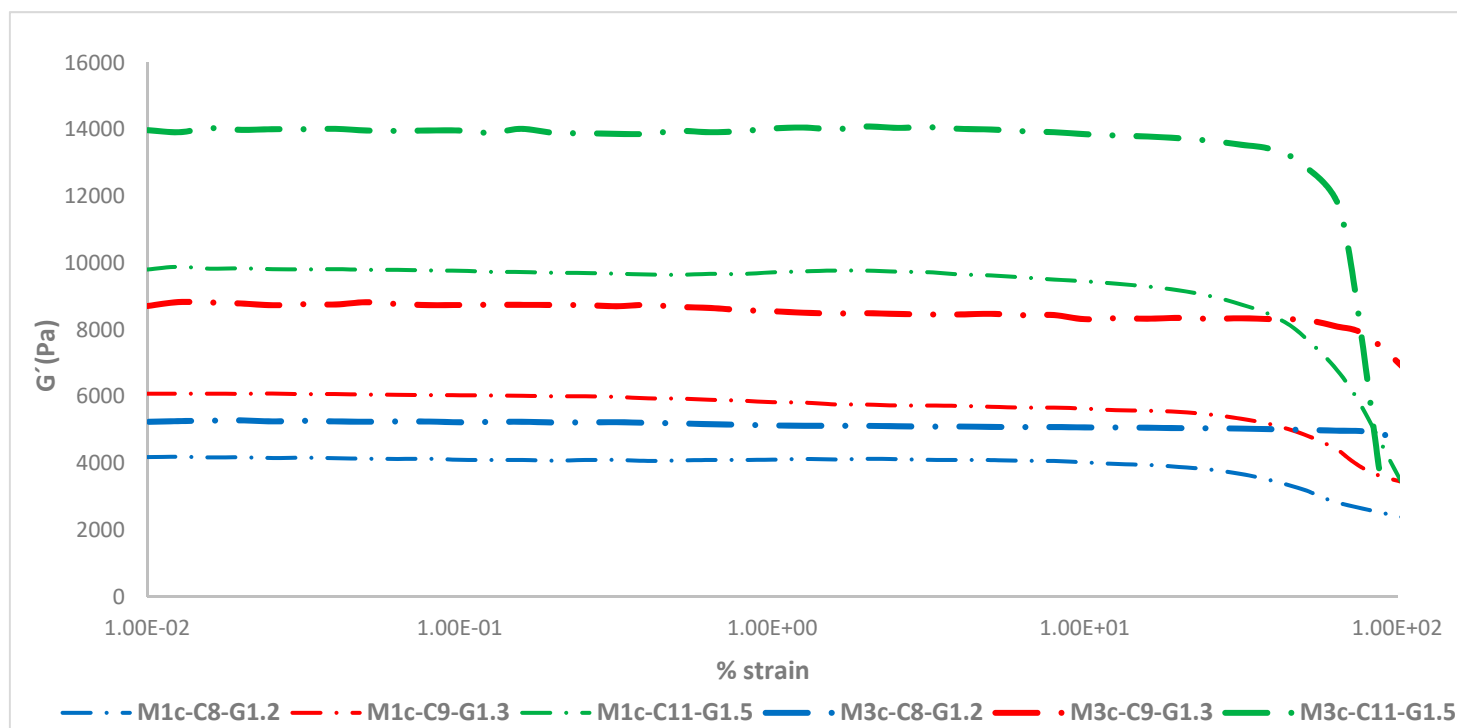


Figure S1. Representation of the effect of curing on the elastic modulus of cured mono-layered and cured tri-layered membranes.

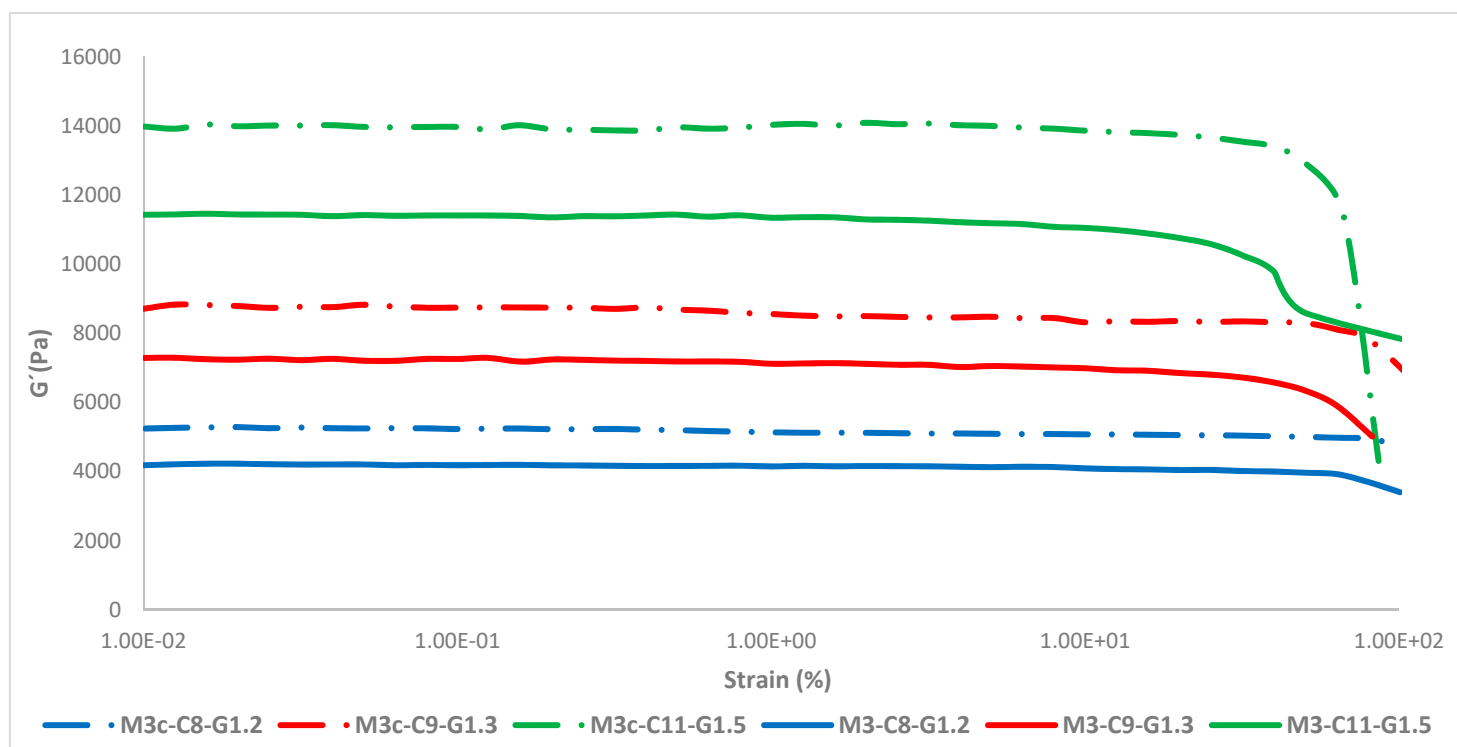


Figure S2. Representation of the curing effect on the elastic modulus of cured and non-cured tri-layered membranes.

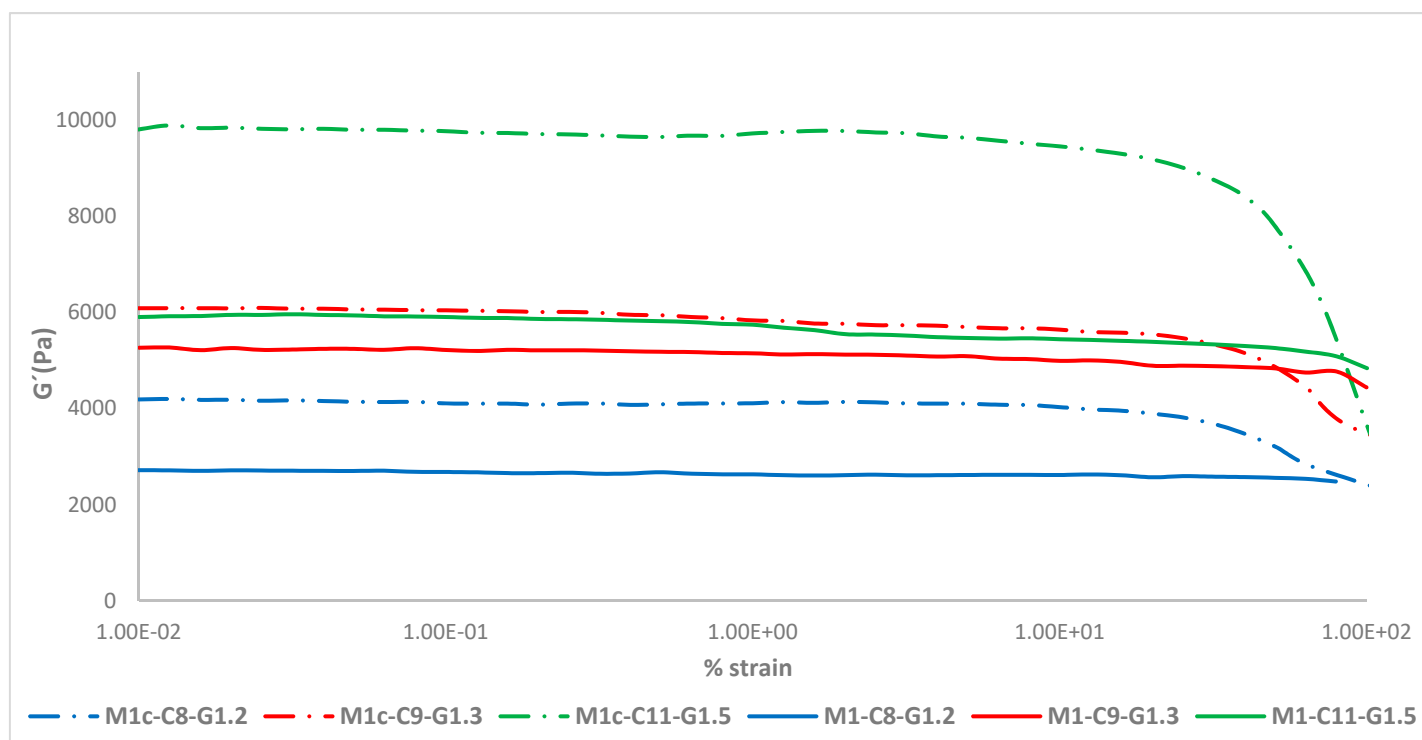


Figure S3. Representation of the curing effect on the elastic modulus of cured and non-cured mono-layered membranes.

Table S1. Special identification system for chitosan membranes [17].

Position	Variable data
First	M = membrane
Second	3, 2, 1 = number of layers
Third	B = base membrane or A = activated membrane
Fourth	C = Chitosan
Fifth	85 or 76 = %DDA
Sixth	A or H = Aldrich or HMC + supplier
Seventh	T from TPP crosslinker
Eighth	X or 0 = crosslinked or non-crosslinked

Table S2. Swelling comparative table of results with chitosan membranes [17].

Chitosan membranes ID	Mean Maximum Swell% \pm SD	Mean Maximum Swell% \pm SD	Collagen Membranes ID
M3B-C85A-TX	107.0 \pm 7.4	337.0 \pm 5.5	M3-C8-G1.2
M3A-C85A-TX	114.0 \pm 6.2	341.7 \pm 4.9	M3-C9-G1.3
M3B-C85H-TX	114.0 \pm 5.2	352.9 \pm 4.1	M3-C11-G1.5
M3A-C85H-TX	115.0 \pm 5.3	426.4 \pm 18.3	M1-C8-G1.2
M3B-C76A-TX	256.0 \pm 63.6	382.7 \pm 15.7	M1-C9-G1.3
M3A-C76A-TX	386.0 \pm 122.3	343.4 \pm 11.1	M1-C11-G1.5

Table S3. Comparative table of results of the rheometric test with non-crosslinked layers in tri-layered chitosan membranes [17].

Chitosan membranes ID	Mean G' (Pa) \pm SD	Mean G' (Pa) \pm SD	Collagen Membranes ID
M3B-C76A-T0	2141.58 \pm 198.96	4114.66 \pm 559.36	M3-C8-G1.2
M3A-C76A-T0	2587.29 \pm 608.81	7014.64 \pm 196.32	M3-C9-G1.3
M3B-C85A-T0	31,332.35 \pm 7033.19	11,012.53 \pm 100.60	M3-C11-G1.5
M3A-C85A-T0	37,512.59 \pm 4967.79		

Table S4. Comparative table of results of the rheometric test with cured tri-layered chitosan membranes [17].

Chitosan membranes ID	Mean G' (Pa) \pm SD	Mean G' (Pa) \pm SD	Collagen Membranes ID
M3B-C76A-TX	3559.46 \pm 968.97	5246.19 \pm 202.30	M3c-C8-G1.2
M3A-C76A-TX	5402.78 \pm 1,096.34	8607.78 \pm 95.96	M3c-C9-G1.3
M3B-C85H-TX	34,378.43 \pm 2,702.69	13,677.95 \pm 281.44	M3c-C11-G1.5
M3A-C85H-TX	35,538.68 \pm 9,561.26		
M3B-C85A-TX	53,633.68 \pm 2,413.52		
M3A-C85A-TX	45,997.65 \pm 5,515.39		

Table S5. Comparative table of results of the rheometric test with mono-layered chitosan membranes [17].

Chitosan membranes ID	Mean G' (Pa) \pm SD	Mean G' (Pa) \pm SD	Collagen Membranes ID
M1A-C76A	874.70 \pm 161.95	2638.95 \pm 216.54	M1-C8-G1.2
M1B-C76A	996.11 \pm 6.48	3946.16 \pm 373.22	M1c-C8-G1.2
M1A-C85A	20,299.41 \pm 1,053.55	5685.29 \pm 284.25	M1-C9-G1.3
M1B-C85A	21,199.80 \pm 5,058.00	5758.55 \pm 157.37	M1c-C9-G1.3
		5695.77 \pm 92.85	M1-C11-G1.5
		9329.93 \pm 417.36	M1c-C11-G1.5

Table S6. DOE 1 variable data.

Collagen % (w/w)	GTA % (w/w)	Dry time (days)	
8.0	1.2	2	+
6.0	1.0	1	-

Table S7. Results of DOE 1 G' modulus.

Membrane	GTA	Collagen	t dry	GTA x Collagen	GTA x t dry	Collagen x t dry	Mean of G' (Pa)
1	+	-	-	-	-	+	1698.00
2	+	+	-	+	-	-	2639.70
3	+	-	+	-	+	-	1331.17
4	+	+	+	+	+	+	1822.29
5	-	-	-	+	+	+	1470.68
6	-	+	-	-	+	-	2546.68
7	-	-	+	+	-	-	1175.80
8	-	+	+	-	-	+	2155.98

Table S8. Effects and interactions of the variables regarding module G' of the DOE 1.

Effects	Results	Interactions	Results
GTA	35.25	GTA x Collagen	-155.75
Collagen	872.25	GTA x t dry	284.25
t dry	-58.75	Collagen x t dry	272.25
		GTA x Collagen x t dry	320.25

Table S9. DOE 2 variable data.

Collagen % (w/w)	GTA % (w/w)	Dry time (days)	
9.0	1.3	2	+
7.0	1.1	1	-

Table S10. Results of DOE 2 G' modulus.

Membrane	GTA	Collagen	t dry	GTA x Collagen	GTA x t dry	Collagen x t dry	Mean of G' (Pa)
1	+	-	-	-	-	+	2746.90
2	+	+	-	+	-	-	5685.29
3	+	-	+	-	+	-	3484.38
4	+	+	+	+	+	+	5097.67
5	-	-	-	+	+	+	2273.37
6	-	+	-	-	+	-	3434.05
7	-	-	+	+	-	-	3487.08
8	-	+	+	-	-	+	4145.46

Table S11. Effects and interactions of the variables regarding module G' of the DOE 2.

Effects	Results	Interactions	Results
GTA	918.75	GTA x Collagen	683.25
Collagen	1,592.75	GTA x t dry	-443.75
t dry	518.75	Collagen x t dry	-456.75
		GTA x Collagen x t dry	-205.25

Table S12. DOE 3 variable data.

Collagen % (w/w)	GTA % (w/w)	Dry time (days)	
11.0	1.3	2	+
9.0	1.5	1	-

Table S13. Results of DOE 3 G' modulus.

Membrane	GTA	Collagen	t dry	GTA x Collagen	GTA x t dry	Collagen x t dry	Mean of G' (Pa)
1	+	-	-	-	-	+	3967.74
2	+	+	-	+	-	-	5962.14
3	+	-	+	-	+	-	2568.91
4	+	+	+	+	+	+	4003.29
5	-	-	-	+	+	+	2418.80
6	-	+	-	-	+	-	5707.54
7	-	-	+	+	-	-	Null
8	-	+	+	-	-	+	4282.15

Table S14. Effects and interactions of the variables regarding module G' of the DOE 3.

Effects	Results	Interactions	Results
GTA	948.5	GTA x Collagen	-1111.0
Collagen	2675.0	GTA x t dry	1026.0
t dry	-896.0	Collagen x t dry	1012.5
		GTA x Collagen x t dry	516.5