

Mechanically Robust, Multifunctional and Nanofibrous Membranes for Tuberculosis Elimination

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Supplementary Information

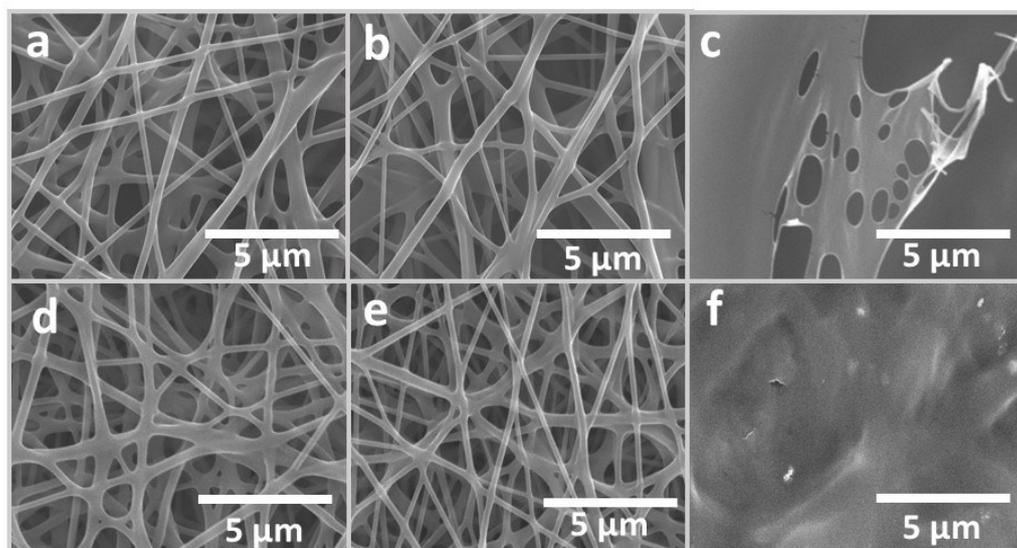


Figure S1. SEM images of (a) GA 2.5, (b) GA 2.5 after heat treatment at 140 °C for an hour and (c) GA 2.5 after heat treatment then immersion in water. SEM images of (d) GA 5, (e) GA 5 after heat treatment at 140 °C for an hour and (f) GA 5 after heat treatment then immersion in water.

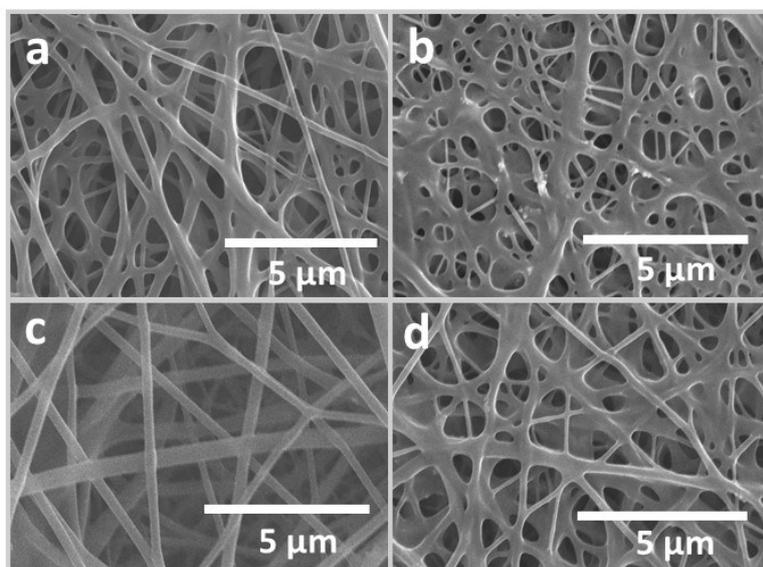


Figure S2. SEM images of (a) GA 10, (b) GA 10_A, (c) PF 10_A and (d) GA/PF 10_A nanofibers after heat treatment at 140 °C for an hour.

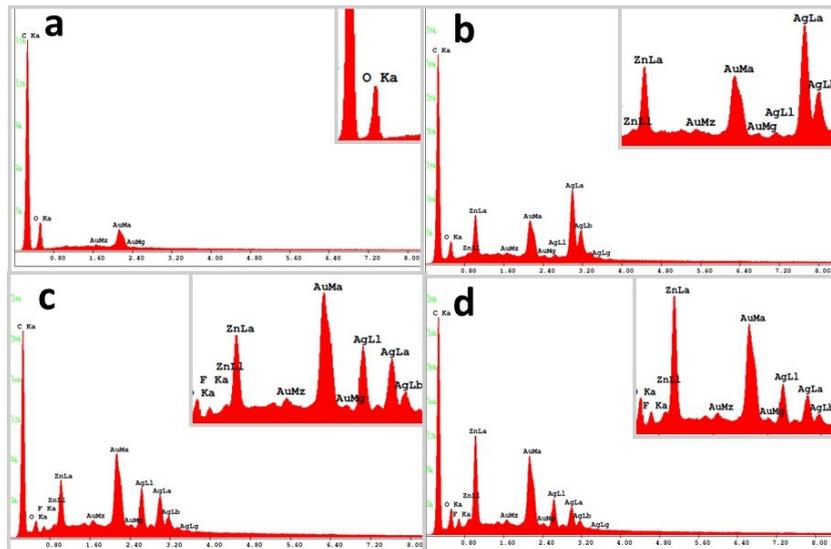


Figure S3. SEM-EDX of (a) GA 10, (b) GA 10_A, (c) PF 10_A and (d) GA/PF 10_A nanofibers.

Table S1 Tensile strength and elongation at break of the nanomembrane before and after exposure to simulated weathering condition.

Nanofibers	Before exposure to simulated weathering condition		After exposure to simulated weathering condition	
	Average tensile strength (N)	Average elongation percentage (%)	Average tensile strength (N)	Average elongation percentage (%)
GA 10	5.27	54.45	0.44	21.67
GA 10_A	2.98	31.11	10.67	35.00
PF 10_A	2.19	28.33	3.85	65
GA/PF 10_A	4.08	35.56	6.68	73.61

Table S2 UPF, UV-A and UV-B transmittance values of the nanomembrane at dry and wet condition.

Nanofibers	UPF		UV-A transmittance Percentage (%)		UV-B transmittance Percentage (%)	
	Dry	Wet	Dry	Wet	Dry	Wet
GA 10	7	3	23.1	43.7	12.4	27.2
GA 10_A	50+	32	0.2	2.0	0.2	2.5
PF 10_A	50+	50+	<0.1	<0.1	<0.1	<0.1
GA/PF 10_A	50+	50+	0.1	0.1	0.1	0.1

Table S3 Anti-bacterial efficiency of the nanomembrane after evaluation by AATCC TM 100:2004 and AATCC TM 147:2011 standard testing method.

Nanofibers	AATCC TM 100:2004		AATCC TM 147:2011			
	<i>Step. (+)</i>	<i>Klep. (-)</i>	Bact. Growth		Zone of inhibition (mm)	
			<i>Step. (+)</i>	<i>Klep. (-)</i>	<i>Step. (+)</i>	<i>Klep. (-)</i>
GA 10	>99.95	>99.93	Growth	Growth	0	0
GA 10_A	>99.94	>99.90	No Growth	No Growth	0.6	0
PF 10_A	>99.92	>99.95	No Growth	No Growth	2.2	1.2
GA/PF 10_A	>99.95	>99.93	No Growth	No Growth	3.0	2.8

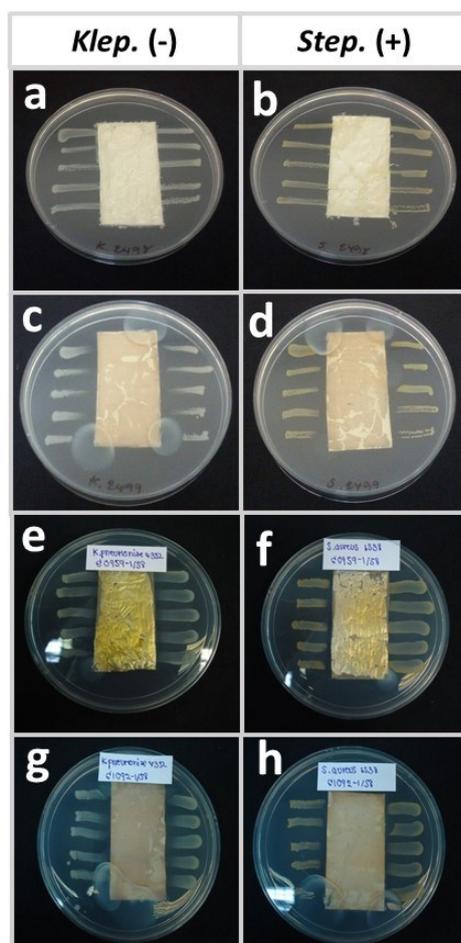


Figure S5. Pictures of anti-bacterial testing procedure and clear zone measurement by AATCC 147:2011 standard testing method of (a and b) GA 10, (c and d) GA 10_A, (e and f) PF 10_A and (g and h) GA/PF 10_A nanomembrane.

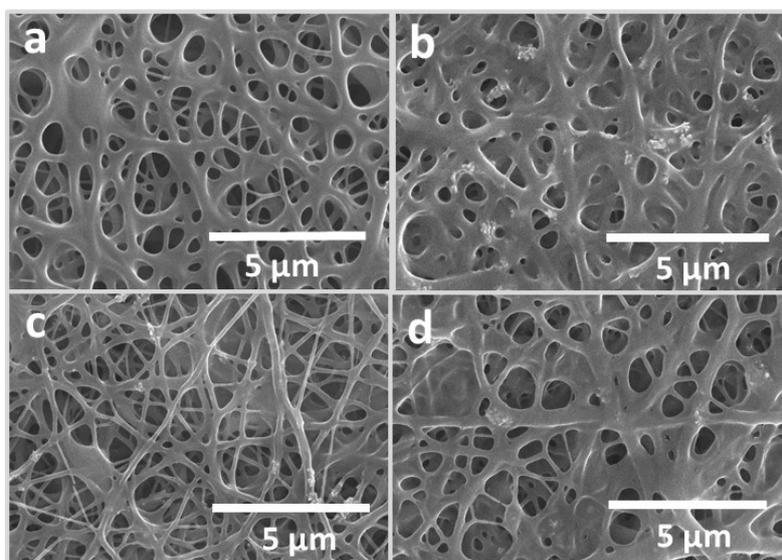


Figure S6. SEM images of (a) GA 10, (b) GA 10_A, (c) PF 10_A and (d) GA/PF 10_A nanofibers after water filtration experiment.



Figure S7. Pictures of nanofilter after pleating and framed at (a) back side, (b) front side and (c) nanofilter assemble inside the commercial air filtration machine.

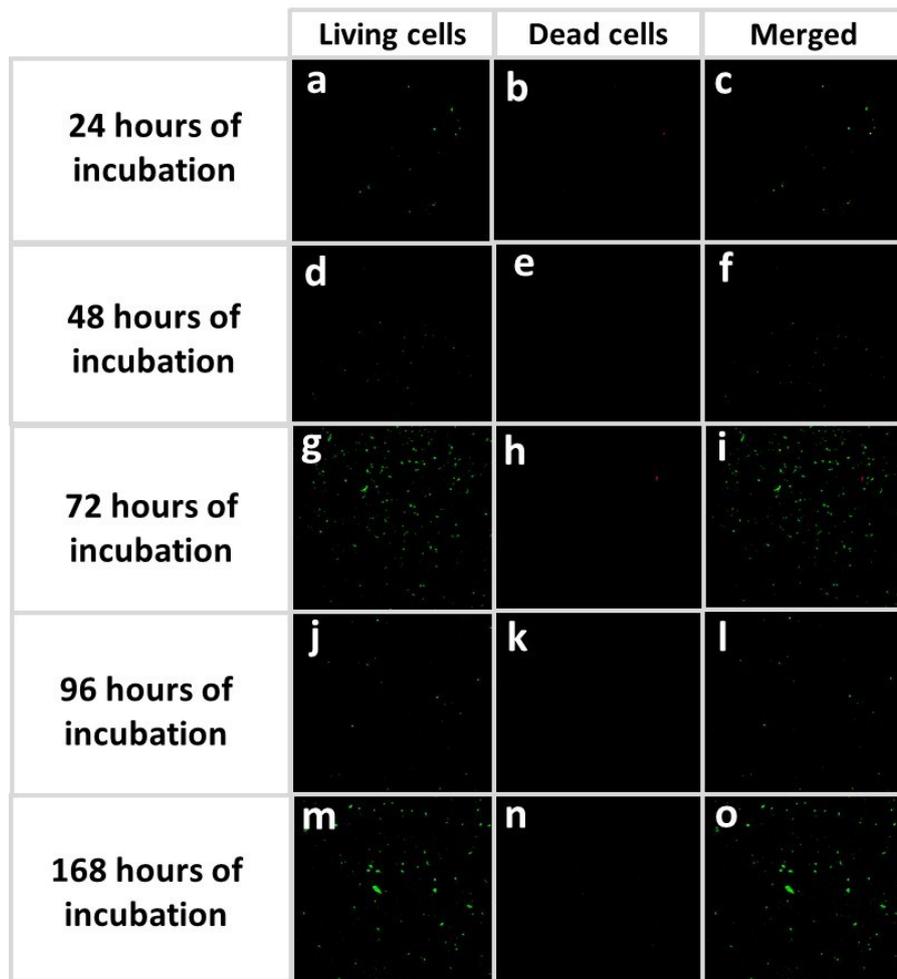


Figure S8. Confocal laser scanning microscopic images showing dead (Red) and living (Green) *M. tuberculosis* H37Ra cells on the GA 10 nanofilter (Control) after aerosol droplets filtration inside the biosafety cabinet class III at (a-c) 24, (d-f) 48, (g-i) 72, (j-l) 96 and (m-o) 168 hours of incubation.

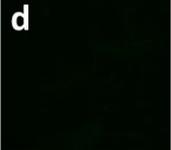
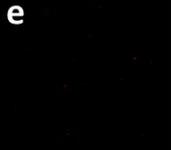
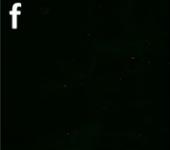
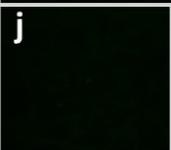
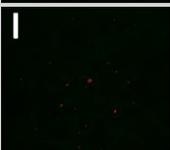
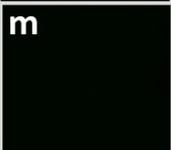
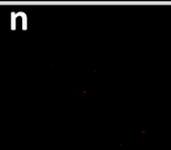
	Living cells	Dead cells	Merged
24 hours of incubation			
48 hours of incubation			
72 hours of incubation			
96 hours of incubation			
168 hours of incubation			

Figure S9. Confocal laser scanning microscopic images showing dead (Red) and living (Green) *M. tuberculosis* H37Ra cells on the GA/PF 10_A nanofilter after aerosol droplet filtration inside the biosafety cabinet class III at (a-c) 24, (d-f) 48, (g-i) 72, (j-l) 96 and (m-o) 168 hours of incubation.