

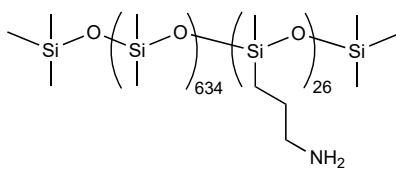
Supporting Information

Antimicrobial Textiles Based on Photocrosslinked Poly(ethylene-co-acrylic acid)

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PDMS-NH₂

Figure S1. Chemical structure of aminopropylmethylsiloxane (6–7 wt%)-dimethylsiloxane copolymers (PDMS-NH₂).

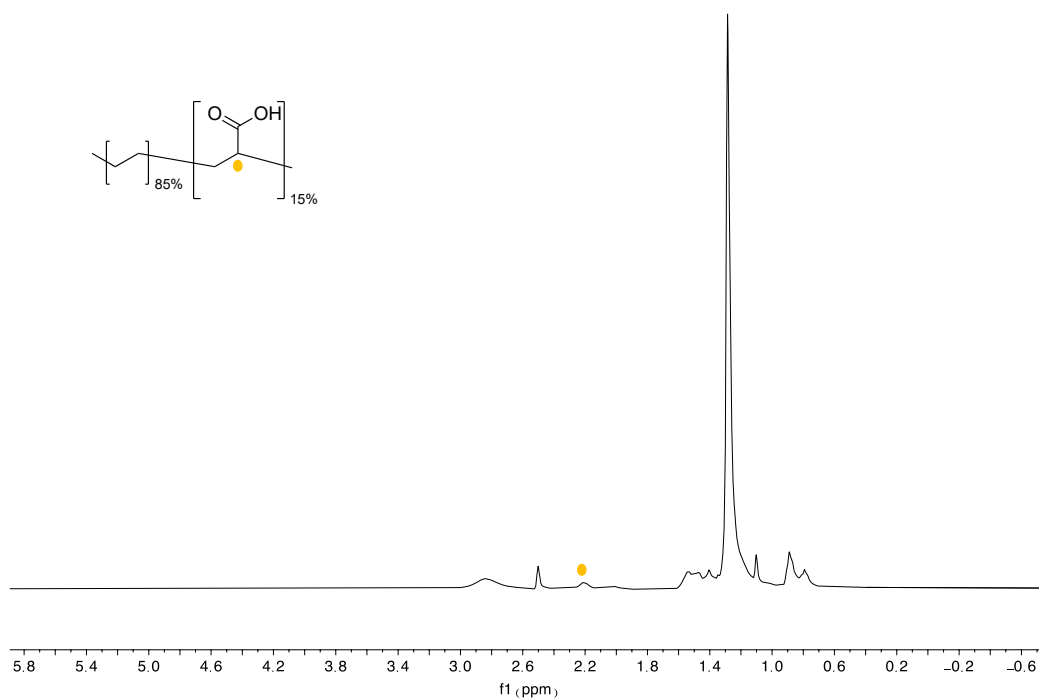


Figure S2. ¹H NMR spectrum of PEAA in DMSO-d₆ at 120°C, 400 MHz.

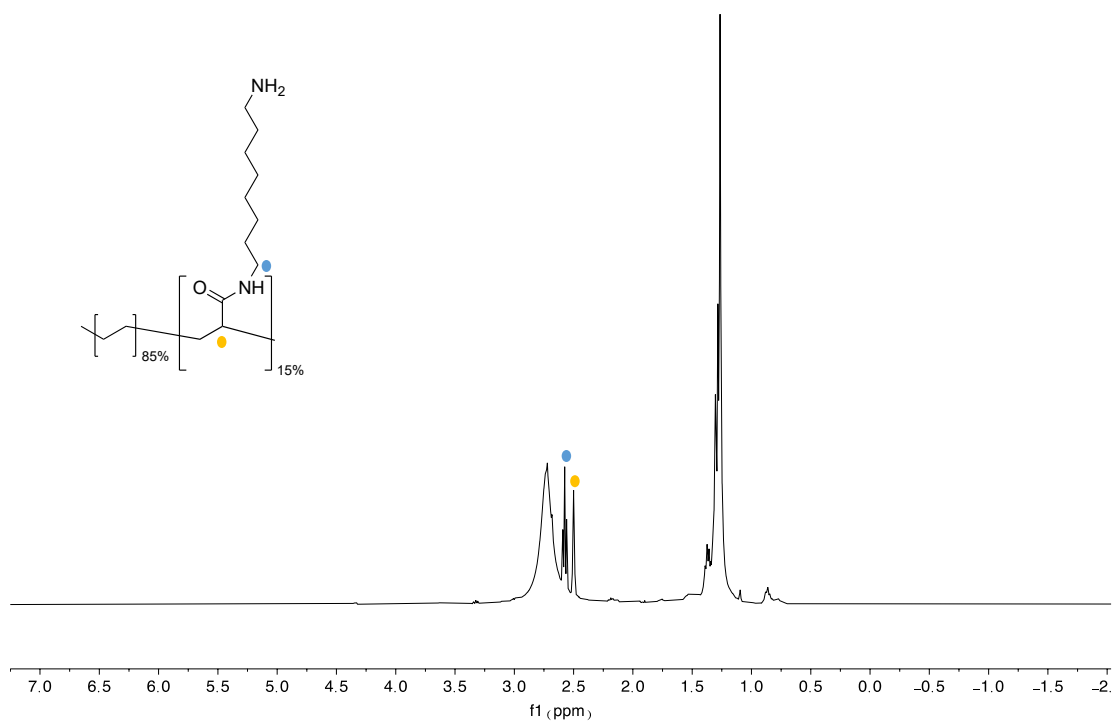


Figure S3. ^1H NMR spectrum of PEAA-8C-NH₂ in DMSO-d₈ at 120 °C, 400 MHz.

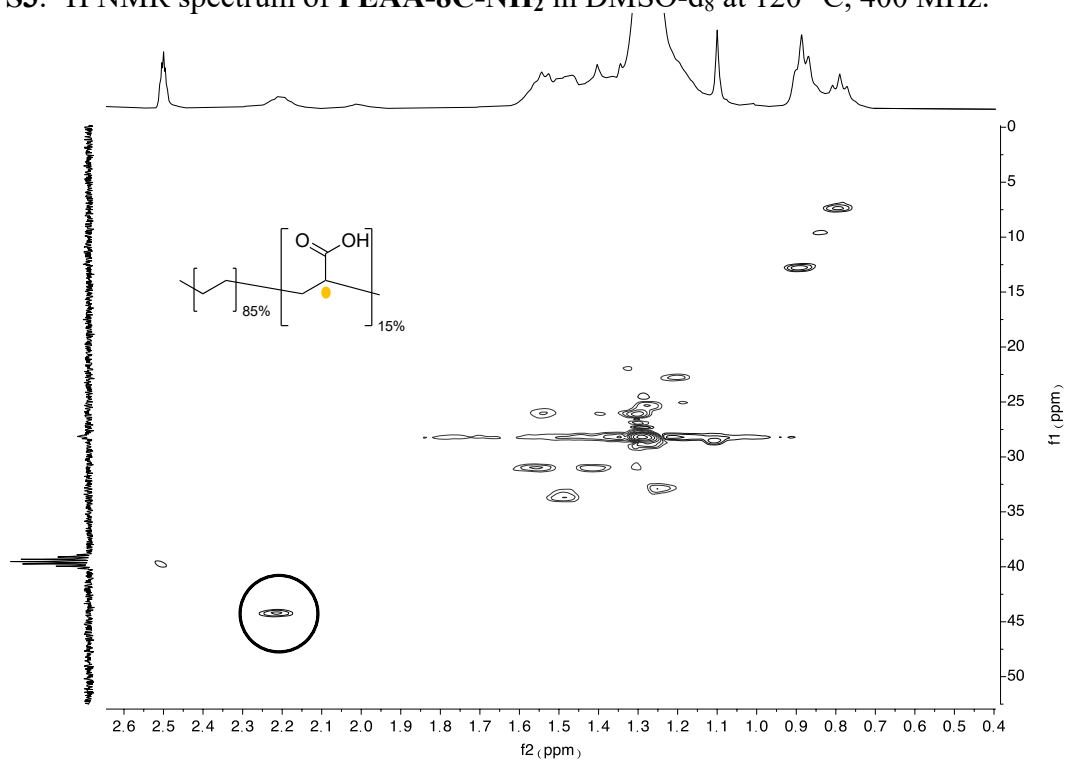


Figure S4. $^{13}\text{C}\{^1\text{H}\}$ - ^1H HSQC of PEAA in DMSO-d₆ at 120 °C, 400 MHz. The α -H peak is circled.

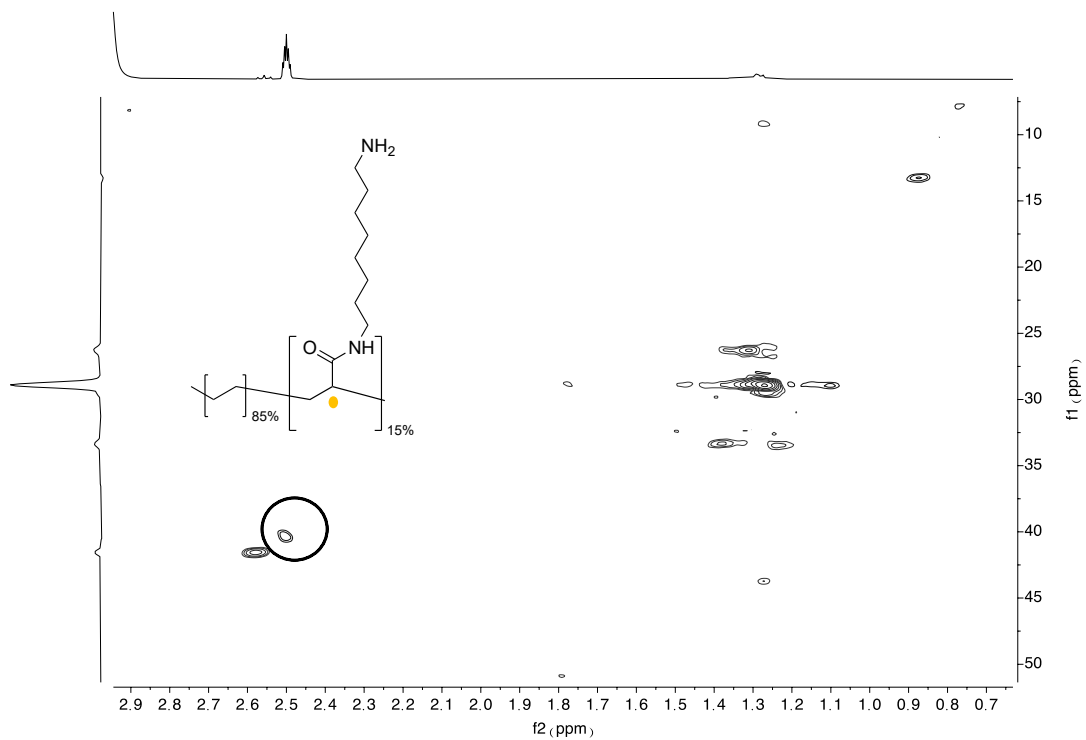


Figure S5. $^{13}\text{C}\{^1\text{H}\}$ - ^1H HSQC of PEAA-8C-NH₂ in DMSO-d₆ at 120 °C, 400 MHz. The α -H peak is circled (overlapped with DMSO peak).

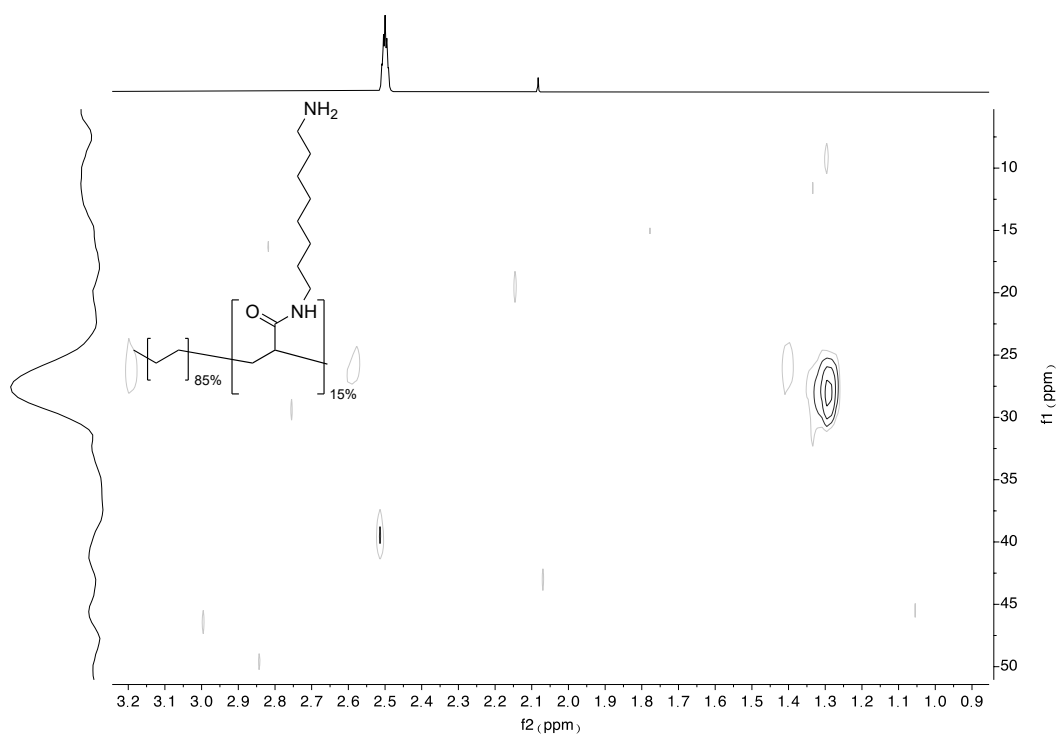


Figure S6. ^1H - ^{13}C HMBC of PEAA-8C-NH₂ in DMSO-d₆ at 120 °C, 400 MHz.

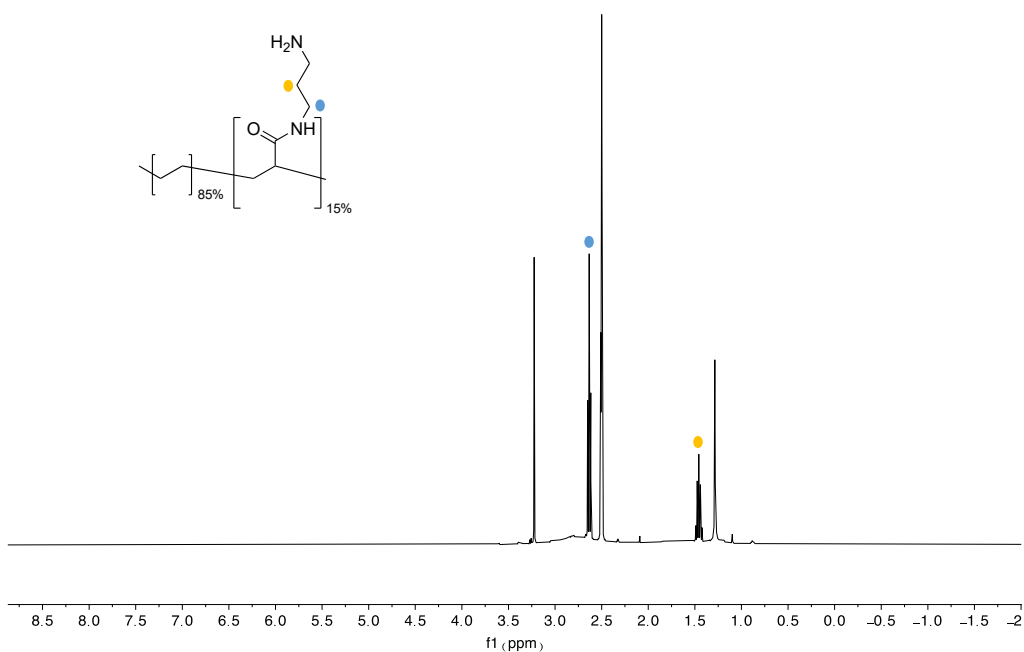


Figure S7. ^1H NMR spectrum of PEAA-3C-NH₂ in DMSO-d₈ at 120 °C, 400 MHz.

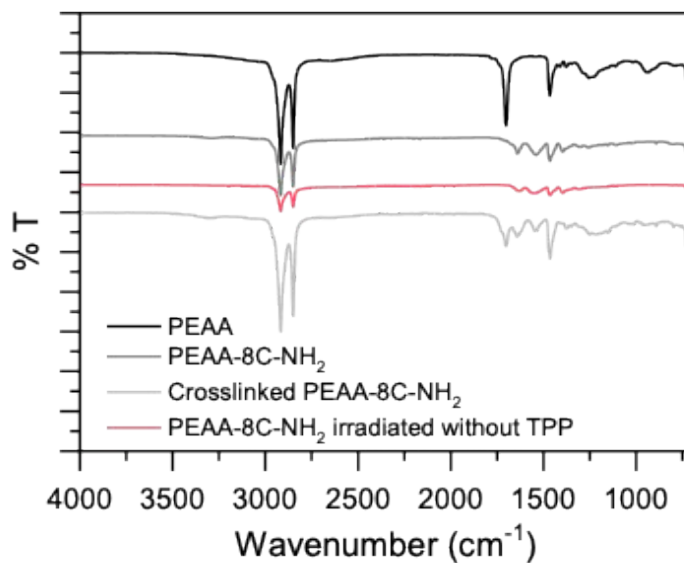


Figure S8. FTIR spectra of PEAA, PEAA-8C-NH₂, crosslinked PEAA-8C-NH₂, and PEAA-8C-NH₂ irradiated without photosensitizer.

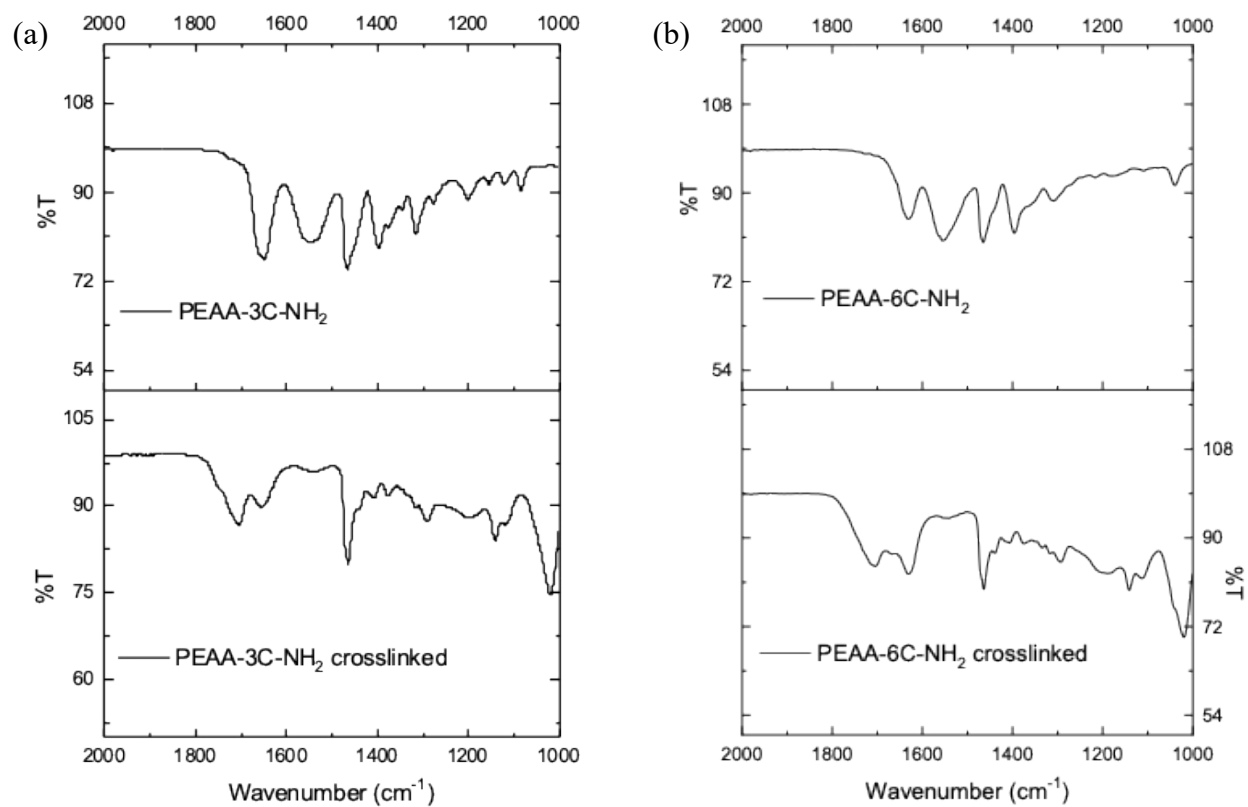
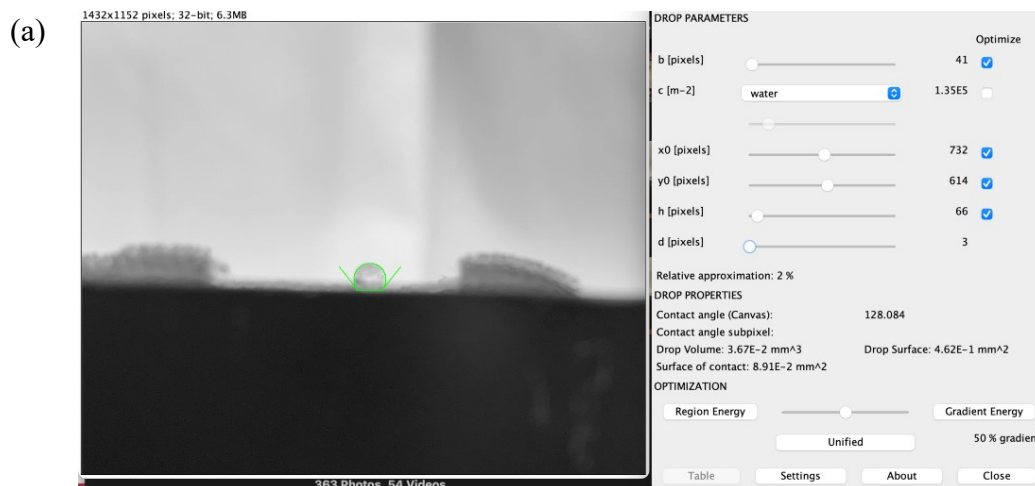


Figure S9. FTIR spectra of (a) PEAA-3C-NH₂ and crosslinked PEAA-3C-NH₂, (b) PEAA-6C-NH₂ and crosslinked PEAA-6C-NH₂.



(b)

	PEAA-NH ₂	PDMS-NH ₂
Average contact angle (°)	N/A	134
STD deviation (°)	N/A	9

Figure S10. (a) A sample of contact angle analysis on ImageJ, in which a drop of deionized water (10 μ L) was placed on each fabric sample. (b) Comparison of contact angle between PEAA-NH₂ and PDMS-NH₂.

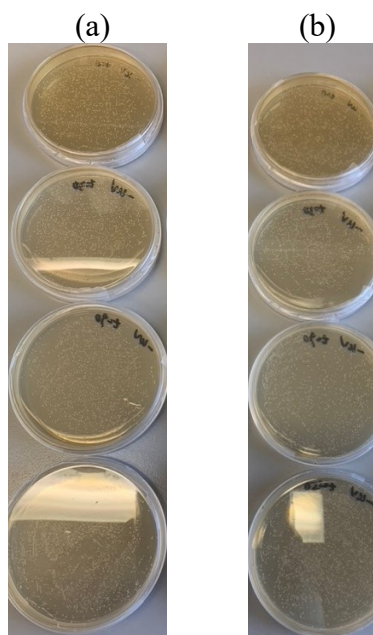


Figure S11. Controls on antimicrobial tests over 150 min with green light irradiation. (a) *E. coli* solution only. (b) *E. coli* solution with untreated cotton. *E. coli* was chosen due to its fast repopulation over contact lysis and singlet oxygen. No bacterial death was observed.

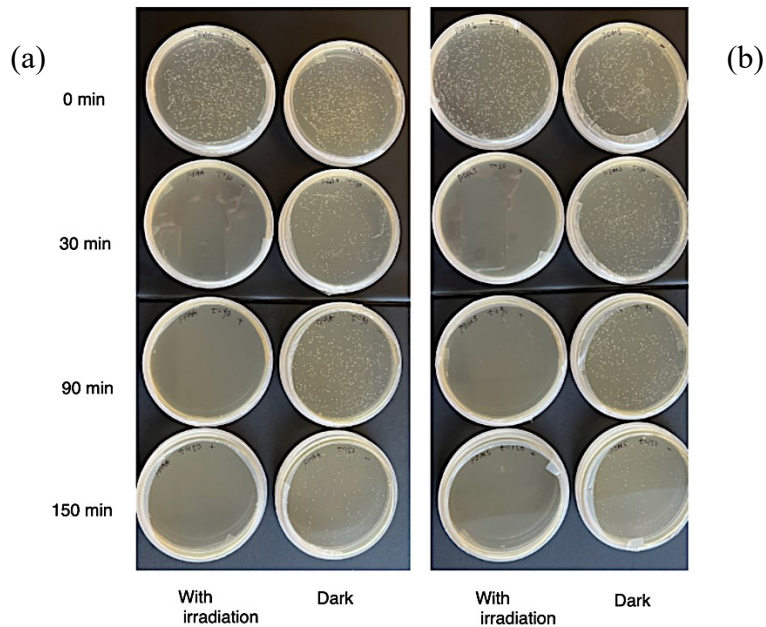
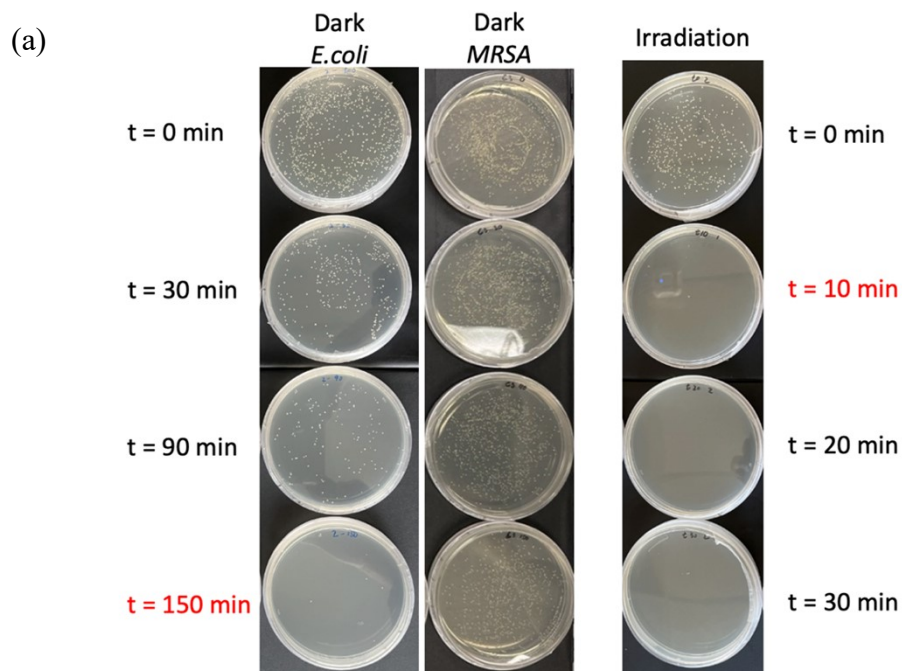


Figure S12. Antimicrobial tests for both (a) 0.5 wt% **PEAA-8C-NH₂** solution-treated cotton and (b) 0.5 wt% **PDMS-NH₂** solution-treated cotton on *E. coli*. All bacteria were killed at 10 min under irradiation of green light. The number of colonies significantly reduced over 150 min by contact lysis.



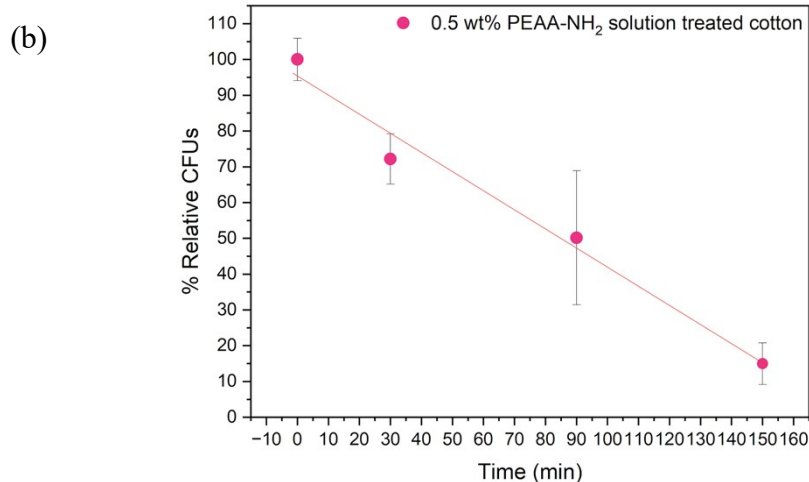


Figure S13. (a) Antimicrobial tests for 0.5 wt% **PEAA-8C-NH₂** solution-treated cotton on *E. coli* and *MRSA*, and (b) % relative CFUs as a function of time for *E. coli* on 0.5 wt% **PEAA-8C-NH₂** solution-treated cotton over time. All bacteria were killed at 10 min under irradiation. The number of *E. coli* colonies significantly reduced over 150 min by contact lysis. However, the number of *MRSA* colonies barely reduced over 150 min by contact lysis.

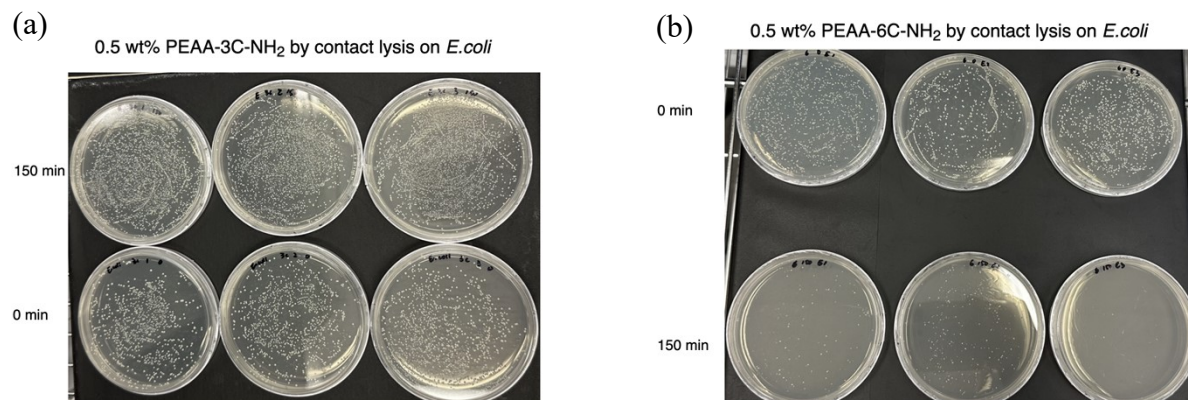


Figure S14. (a) Antimicrobial tests for 0.5 wt% **PEAA-3C-NH₂** solution-treated cotton on *E. coli* by contact lysis over 150 min, and (b) the antimicrobial tests for 0.5 wt% **PEAA-6C-NH₂** solution-treated cotton on *E. coli* by contact lysis over 150 min. The 0.5 wt% **PEAA-3C-NH₂** solution-treated cotton did not show any elimination of *E. coli*, while 0.5 wt% **PEAA-6C-NH₂** solution-treated cotton behaved the same as **PEAA-8C-NH₂** solution-treated cotton. Both **PEAA-3C-NH₂** and **PEAA-6C-NH₂** behave the same as **PEAA-8C-NH₂** solution-treated cotton towards *MRSA*.

Table S1. Normalized % relative CFUs of *E.coli* and *MRSA* remained after 150 minutes of contact lysis in dark by **PEAA-3C-NH₂**, **PEAA-6C-NH₂**, and **PEAA-8C-NH₂** solution-treated cotton.

Contact lysis		PEAA-3C-NH₂ coated cotton	PEAA-6C-NH₂ coated cotton	PEAA-8C-NH₂ coated cotton
Normalized % relative CFUs of <i>E.coli</i> remained	At 150 min	100.0 ± 5.9 % (No kill)	26.8 ± 21.0 %	14.9 ± 5.9 %
Normalized % relative CFUs of <i>MRSA</i> remained	At 150 min	100.0 ± 5.9 % (No kill)	80.3 ± 10.1 %	70.5 ± 16.1 %

Table S2. Averaged tensile data of untreated plain cotton and **PEAA-8C-NH₂** solution-treated cotton.

Sample	Load average (N)	Standard deviation (N)
Plain cotton (10 samples)	15.68	2.04
PEAA-8C-NH₂ solution-treated cotton (10 samples)	17.08	2.10

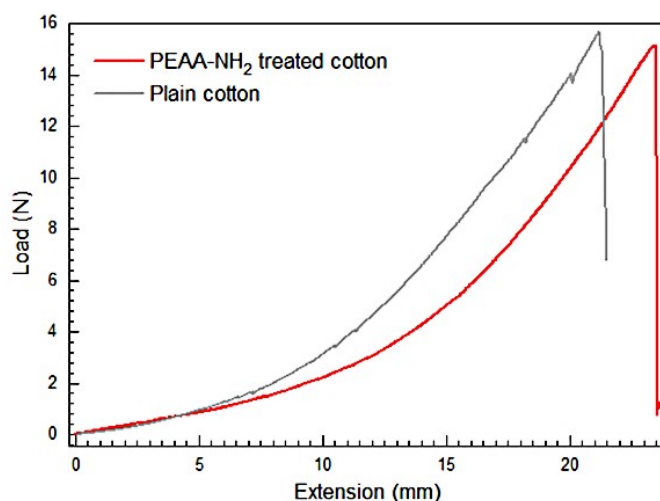


Figure S15. Representative tensile test curves determined from Instron mechanical testing of untreated plain cotton and **PEAA-8C-NH₂** solution-treated cotton.

Table S3. The absorption and calculated percentage of amine remained after crosslinking of **PEAA-3C-NH₂**, **PEAA-6C-NH₂**, and **PEAA-8C-NH₂** by ninhydrin test at 570 nm.

	Abs of Sample 1	Abs of Sample 2	Abs of Sample 3	% NH ₂ remaining (sample 1)	% NH ₂ remaining (sample 2)	% NH ₂ remaining (sample 3)	Average % NH ₂ remaining	Stdev%
PEAA-3C-NH₂	0.3914	0.3806	0.3803					
Crosslinked PEAA-3C-NH₂	0.2531	0.2138	0.2436	64.67	56.18	64.06	62	5
PEAA-6C-NH₂	0.2951	0.2610	0.2673					
Crosslinked PEAA-6C-NH₂	0.0679	0.0669	0.0599	23.02	25.64	22.42	24	2
PEAA-8C-NH₂	0.2108	0.1989	0.1935					
Crosslinked PEAA-8C-NH₂	0.0465	0.0551	0.0381	22.07	27.72	19.71	23	4

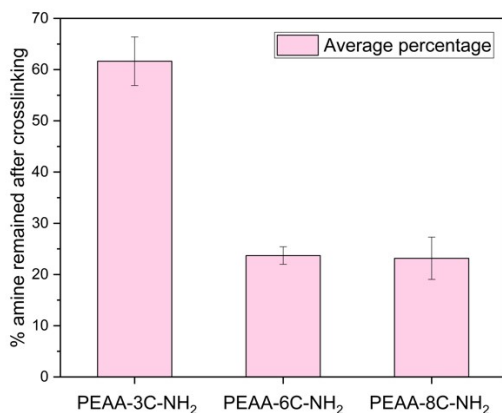


Figure S16. A bar chart of the percentage of amine remained after crosslinking of **PEAA-3C-NH₂**, **PEAA-6C-NH₂**, and **PEAA-8C-NH₂**.



Figure S17. An optical image of untreated plain cotton (left), **PEAA-8C-NH₂** solution-treated cotton with TPP removed (middle), and **PEAA-8C-NH₂** solution-treated cotton after RB treatment (right).

Table S4. The absorption and calculated wt% of RB per **PEAA-3C-NH₂**, **PEAA-6C-NH₂**, and **PEAA-8C-NH₂** solution treated cotton and plain cotton at 560 nm.

	Average wt% of RB ¹	Stdev (%)
Plain cotton	3.7	0.1
PEAA-3C-NH₂ solution treated cotton	3.3	0.2
PEAA-6C-NH₂ solution treated cotton	3.0	0.2
PEAA-8C-NH₂ solution treated cotton	3.3	0.4

¹ measurements were run in triplicate and averaged.