Electronic Supplementary Information

Visible light active nanofibrous membrane for antibacterial wound dressing

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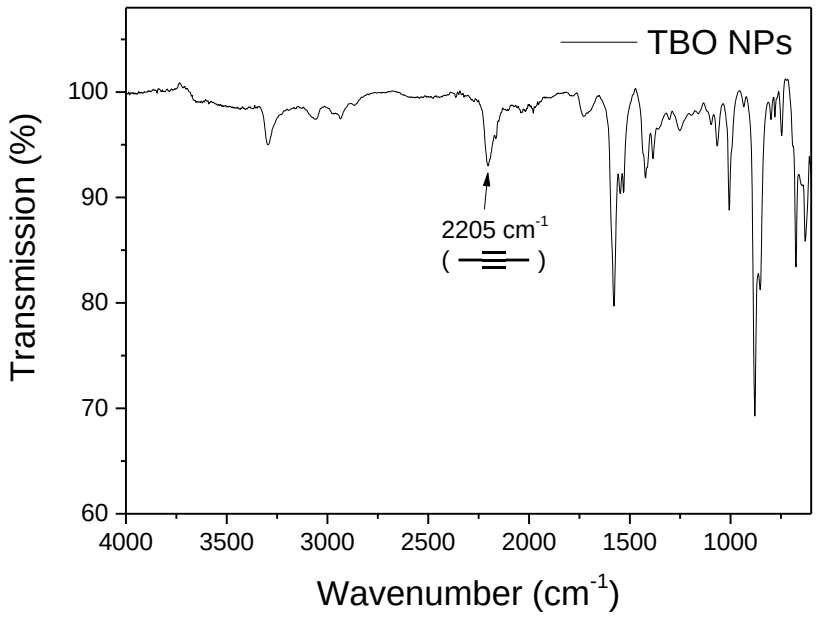

Fig. S1 FTIR spectra of TBO NPs.

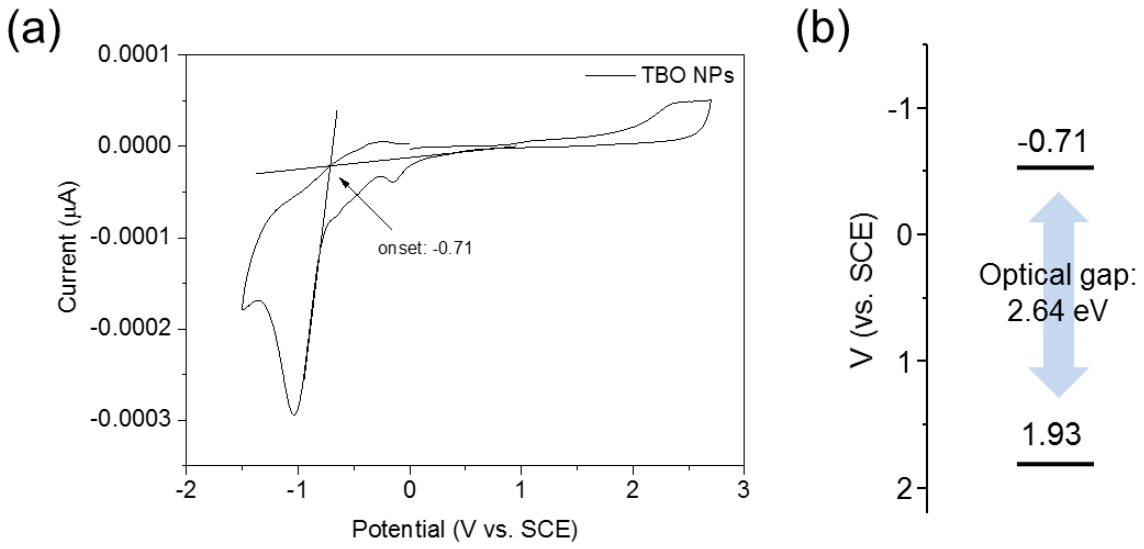

Fig. S2 (a) Cyclic voltammetry measurement for TBO NPs, (b) Corresponding HOMO and LUMO levels and optical band gap.

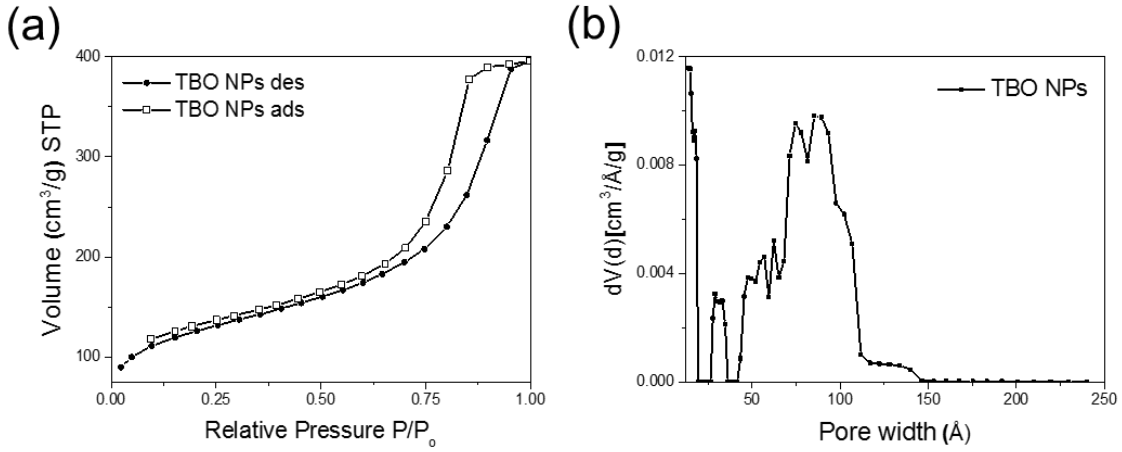

Fig. S3 (a) N_2 sorption isotherms, and (b) pore size distributions of TBO nanoparticles

Fig. S4 Photographs of PVA and PVA-TBO nanofibrous membranes.

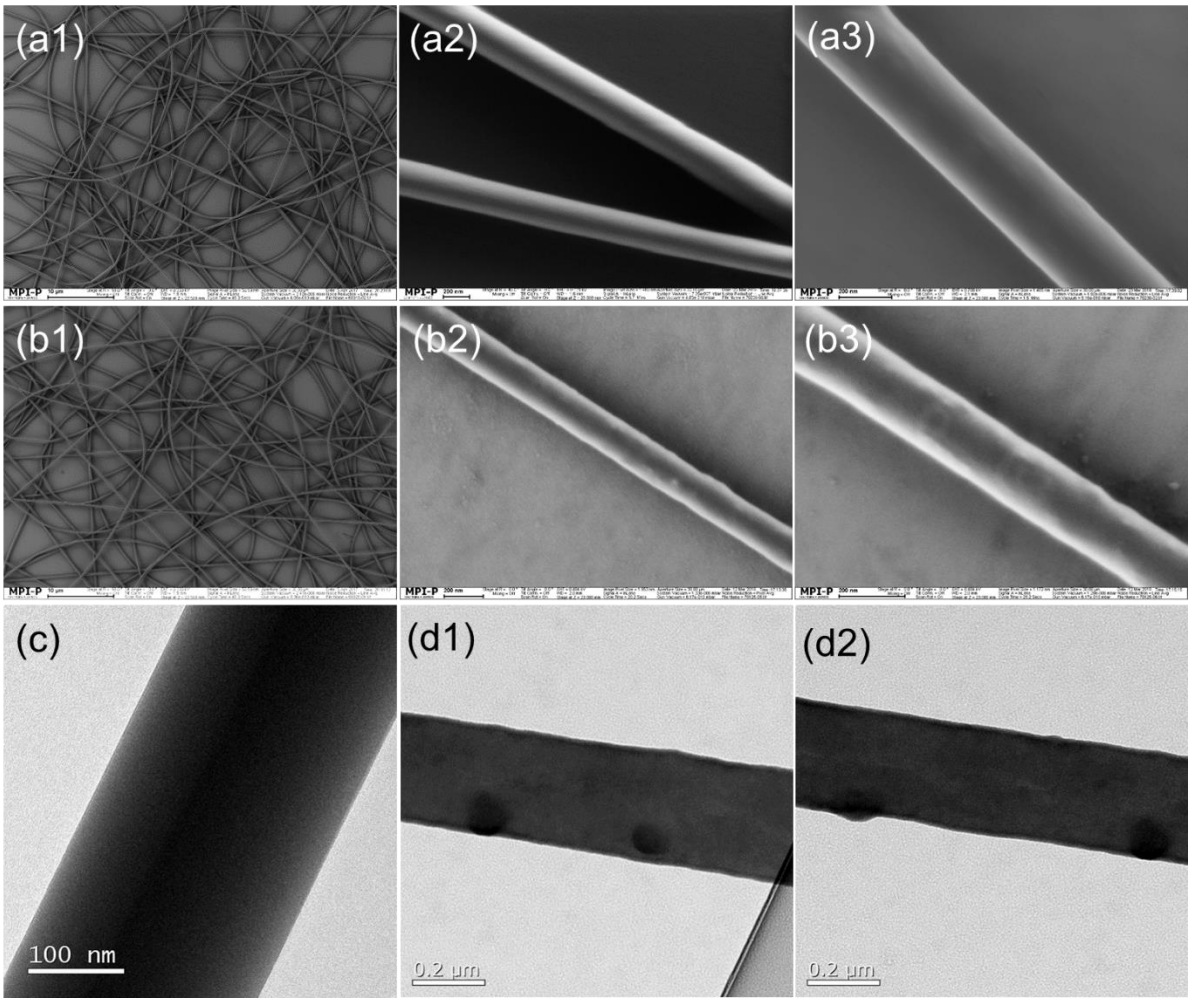

Fig. S5 SEM (a, b) and TEM (c, d) micrographs of PVA (a, c) and PVA-TBO (b, d) nanofibers.

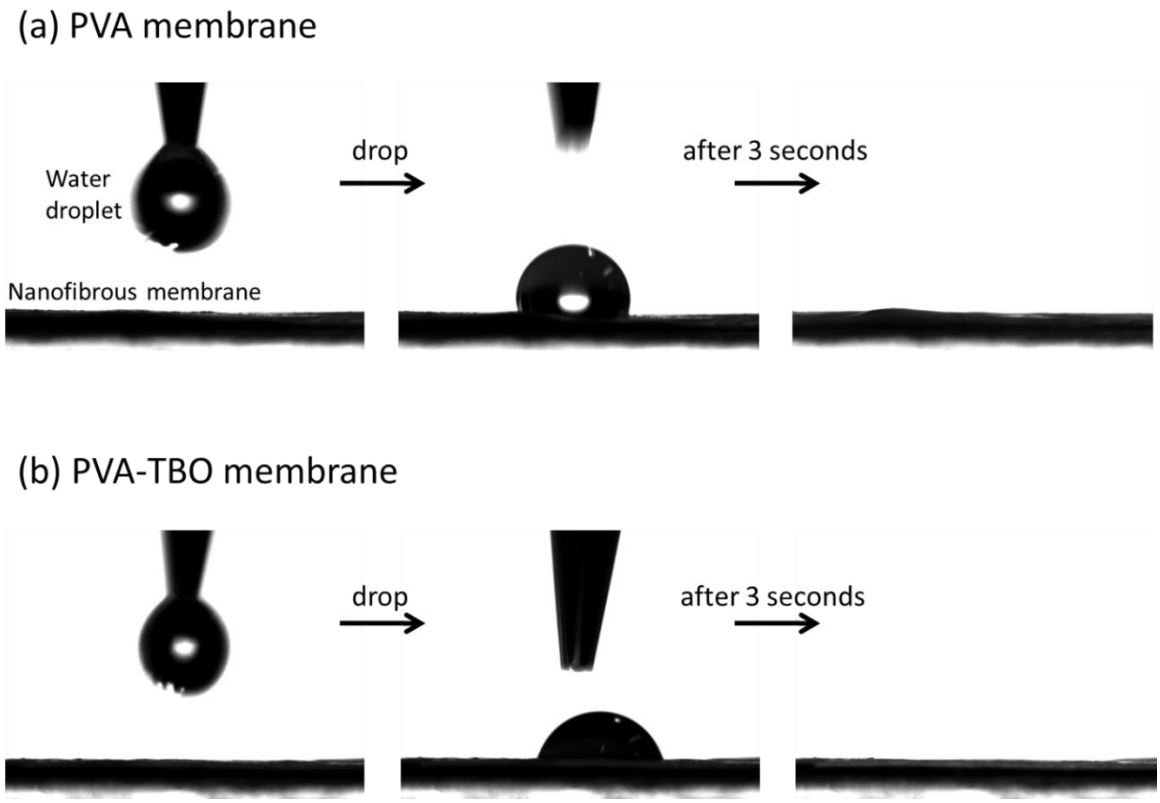

Fig. S6 Water contact angle on PVA and PVA-TBO nanofibrous membranes.

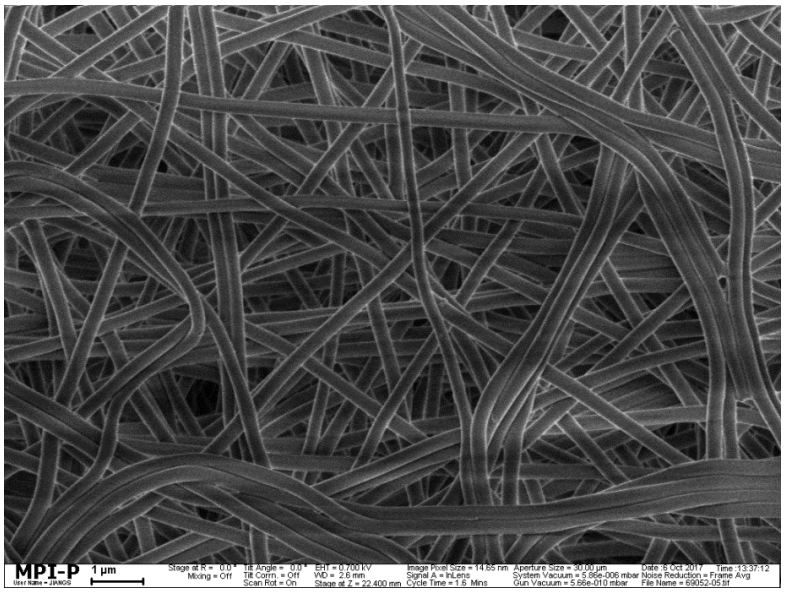

Fig. S7 SEM micrograph of PVA-TBO nanofibers after their immersion in water for 4 days.

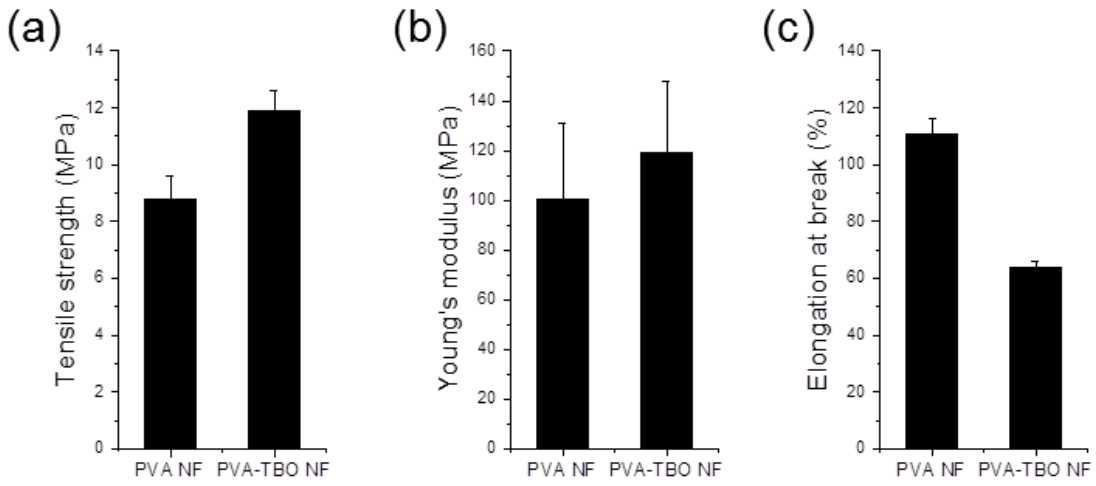

Fig. S8 Mechanical properties of PVA and PVA-TBO membranes.

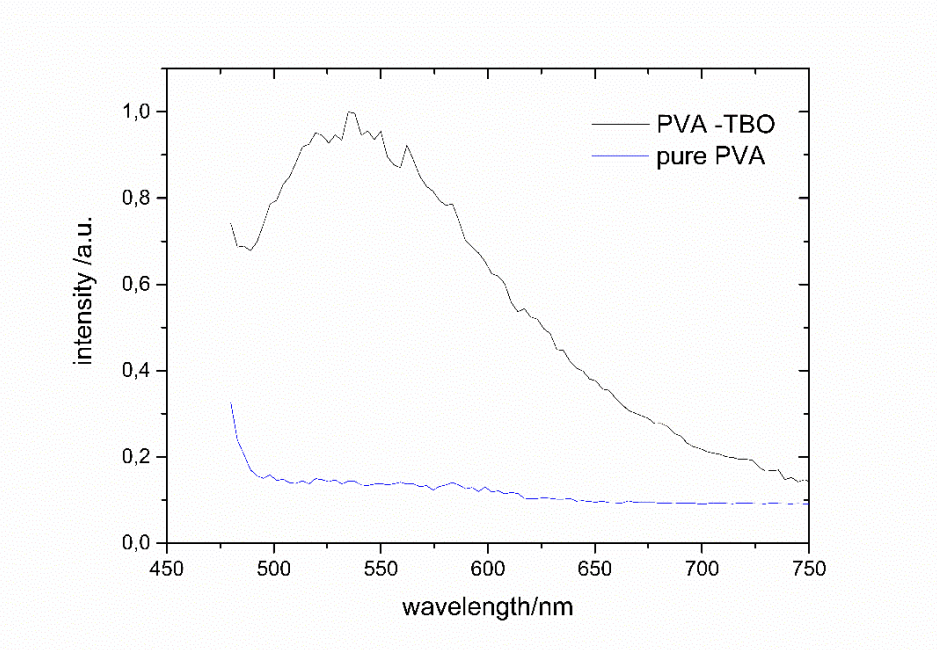

Fig. S9 Emission spectra of PVA and PVA-TBO membranes (excitation wavelength: 458 nm).

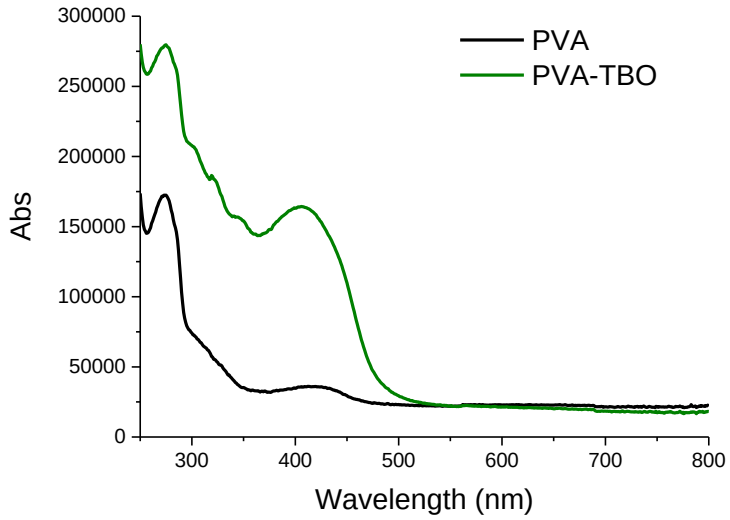

Fig. S10 UV/Vis absorption spectra of PVA and PVA-TBO membranes.

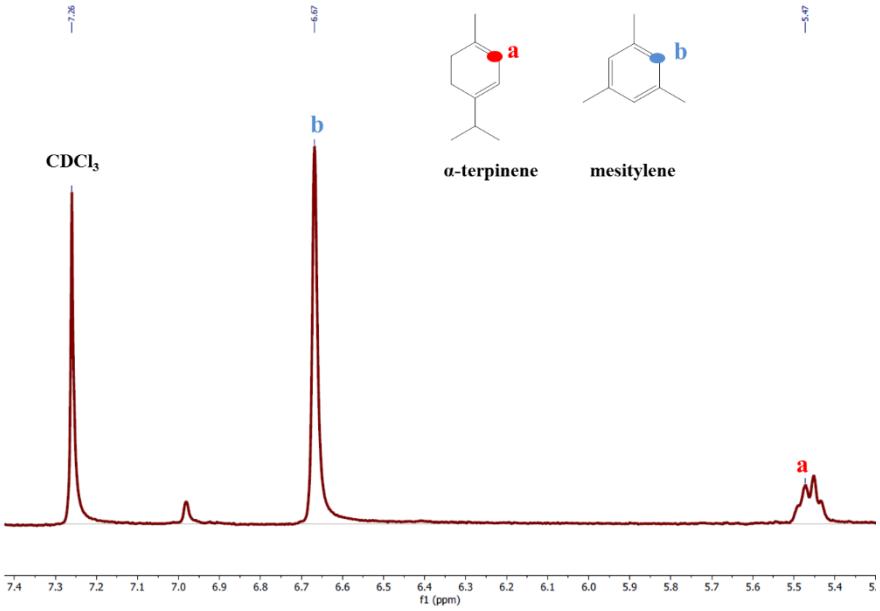

Fig. S11 ^{1}H NMR spectrum of internal standard mesitylene and the starting compound α-terpinene in $CDCl_3$, before light irradiation. ^{1}H NMR (250 MHz, $CDCl_3$): δ 6.67 (s, 3H, mesitylene), 5.49–5.41 (m, 1H, α-terpinene).

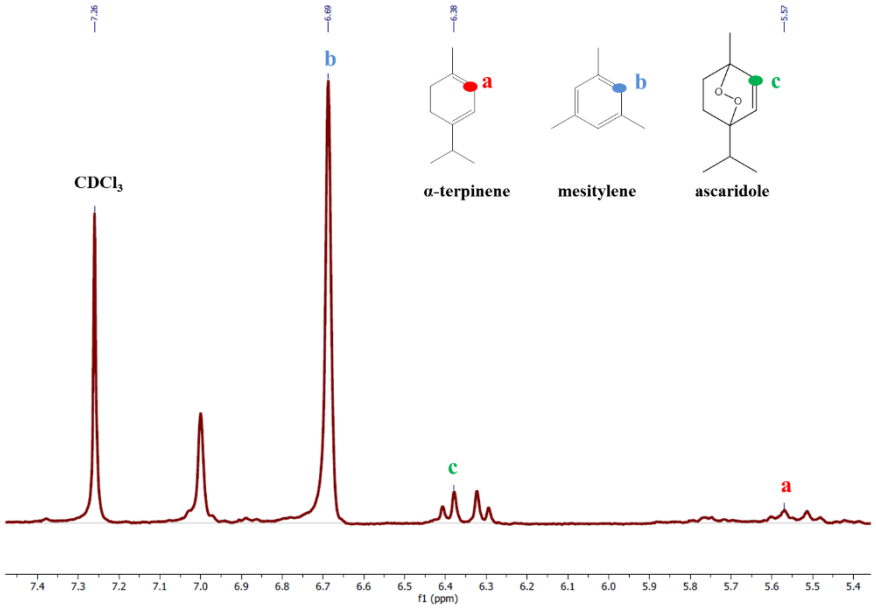

Fig. S12 ^{1}H NMR spectrum of internal standard mesitylene, the starting compound α-terpinene and the product ascaridole in $CDCl_3$, using TBO NPs as photocatalyst for 24 h of irradiation. ^{1}H NMR (250 MHz, $CDCl_3$): δ 6.38 (s, 3H, mesitylene), 5.57–5.48 (m, 1H, α-terpinene), and 6.49 (d, 1H, ascaridole).

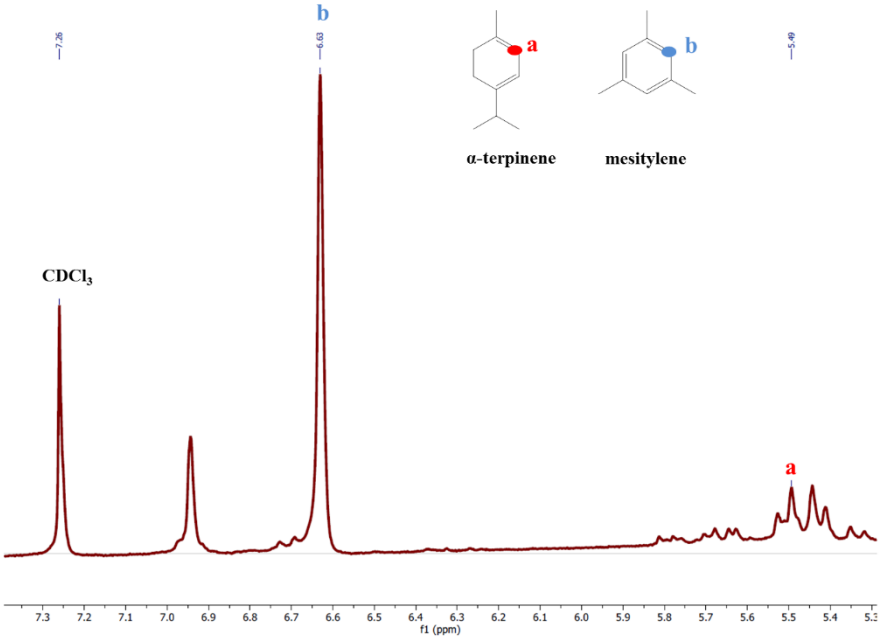

Fig. S13 ^{1}H NMR spectrum of mesitylene, the starting compound α-terpinene in $CDCl_3$, using PVA-TBO 2X (1 mg/mL) as photocatalyst for 24 h of irradiation. ^{1}H NMR (250 MHz, $CDCl^3$): δ 6.63 (s, 3H, mesitylene), 5.51–5.44 (m, 1H, α-terpinene).

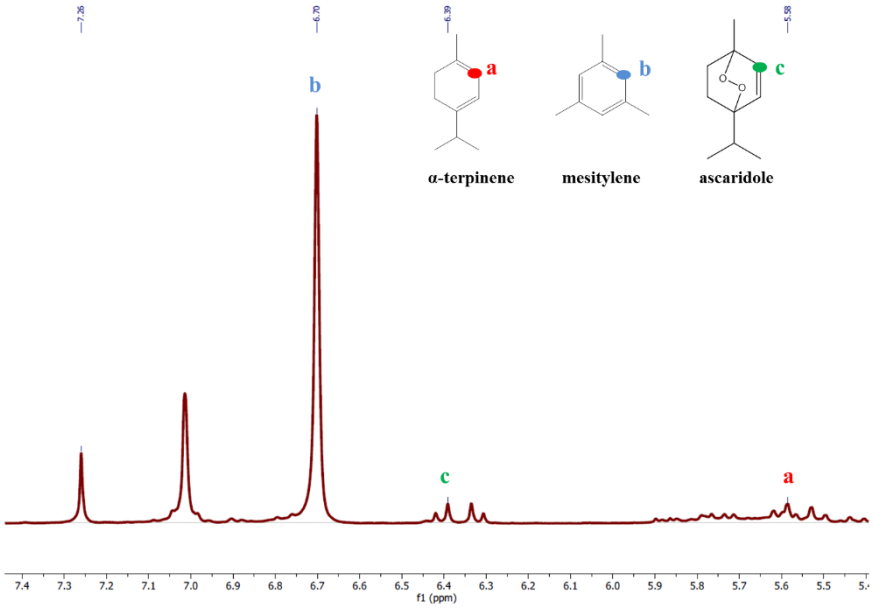

Fig. S14 ^{1}H NMR spectrum of mesitylene, the starting compound α-terpinene in $CDCl_3$, using PVA-TBO 2X (2.5 mg/mL) as photocatalyst for 24 h of irradiation. ^{1}H NMR (250 MHz, $CDCl_3$): δ 6.70 (s, 3H, mesitylene), 5.60–5.55 (m, 1H, α-terpinene) and 6.39 (d, 1H, ascaridole).

Table S1 Quantification of the $^{1}O_2$ generation rate

Catalyst	Terpinene concentration (M)	Mesitylene concentration (M)	Reaction time (s)	Catalyst mass (g)	n(product) (mmol)	Rate of $^{1}O_2$ generation (mmol g^{-1} s^{-1})
TBO NPs	0.1	0.1	86400	0.01	0.25	$2.89*10^{-4}$
PVA-TBO 2X-1	0.1	0.1	86400	0.01	n.d	n.d
PVA-TBO 2X-2	0.1	0.1	86400	0.025	0.14	$6.48*10^{-5}$

n mesitylene (n_{IS}) = 1 mmol

n ascaridole = $\frac{I\,p}{I_{IS}} * 3n_{IS}$

$I\,p$ = Peak area of the product

I_{Is} = Peak area of the internal standard

The integration for the two peaks should take into consideration the same amount of hydrogen. Here, the peak of mesitylene (b) corresponds to 3H, whereas the peak for the product corresponds to ^{1}H. Therefore the integration value of the mesitylene peak should be divided by 3.

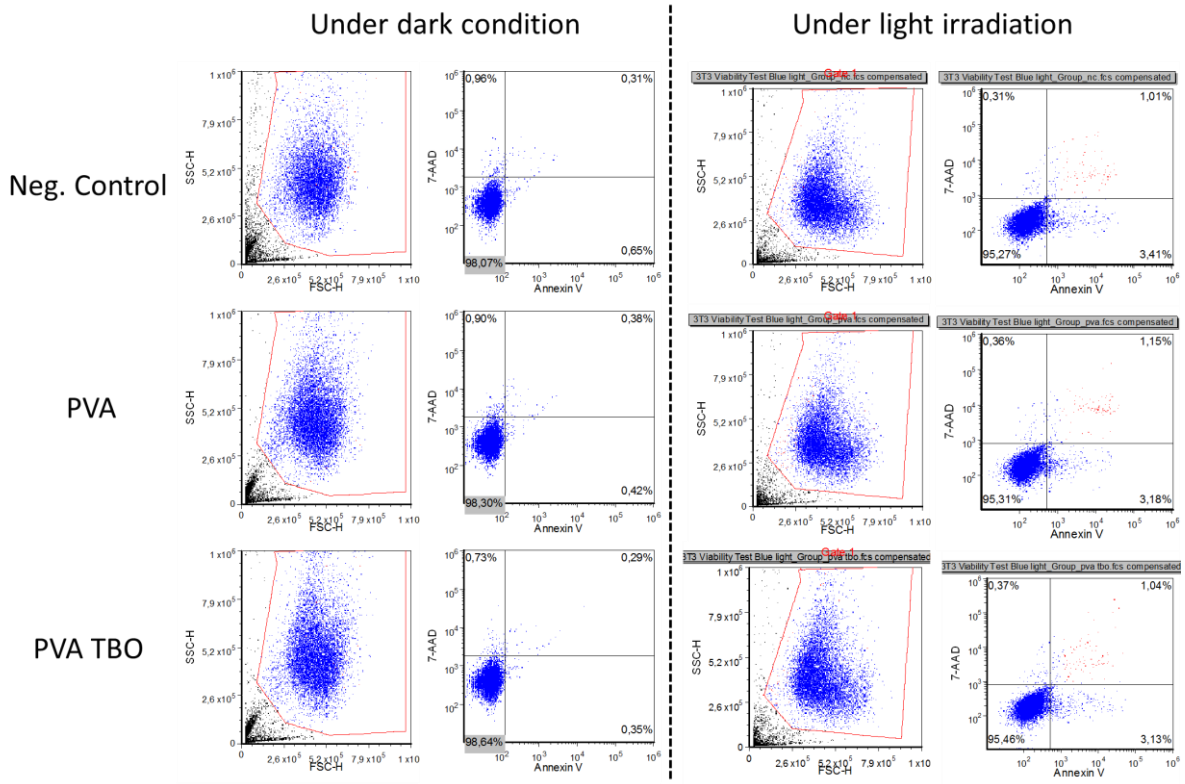

Fig. S15 Viability of NIH 3T3 fibroblast cells incubated with PVA and PVA-TBO membranes analyzed by flow cytometry.