

## Supplementary Information

# Uncovering the Use of Fucoxanthin and Phycobiliproteins into Solid Matrices to Increase Their Emission Quantum Yield and Photostability

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function  $I(t) = I_1 e^{-(t-t_0)/\tau_1}$  ( $t_0 = 20$  ns, related to the excitation prompt). The respective residual plot is presented in (c).

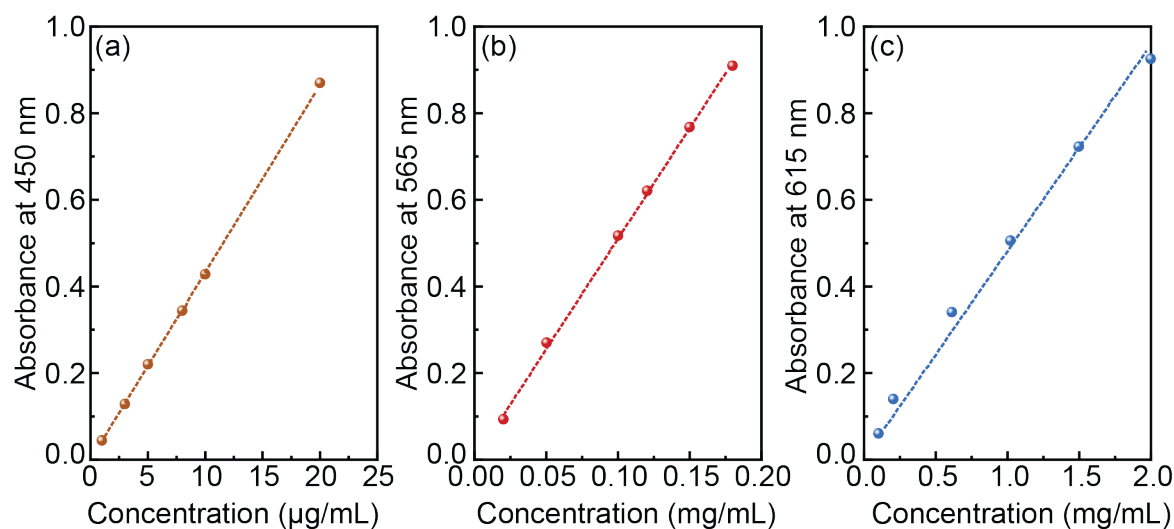
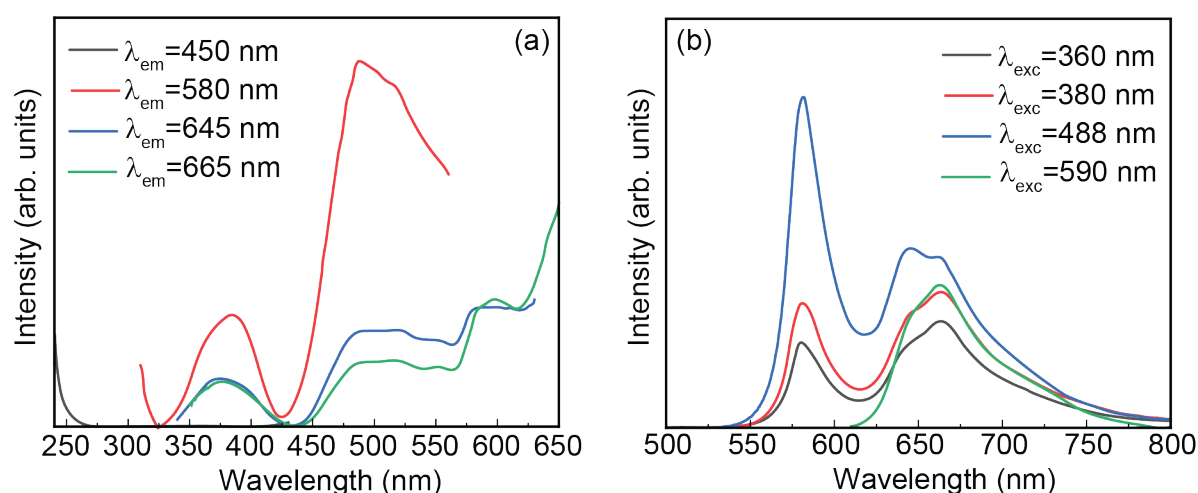
**Table S1.** Absolute emission quantum yield ( $\eta$ ) values of the as-prepared samples for the indicated excitation wavelengths ( $\lambda_{exc}$ , nm) and emission lifetime values ( $\tau$ ), are calculated from the best fit of the decay curves shown in Figures S9–S11.

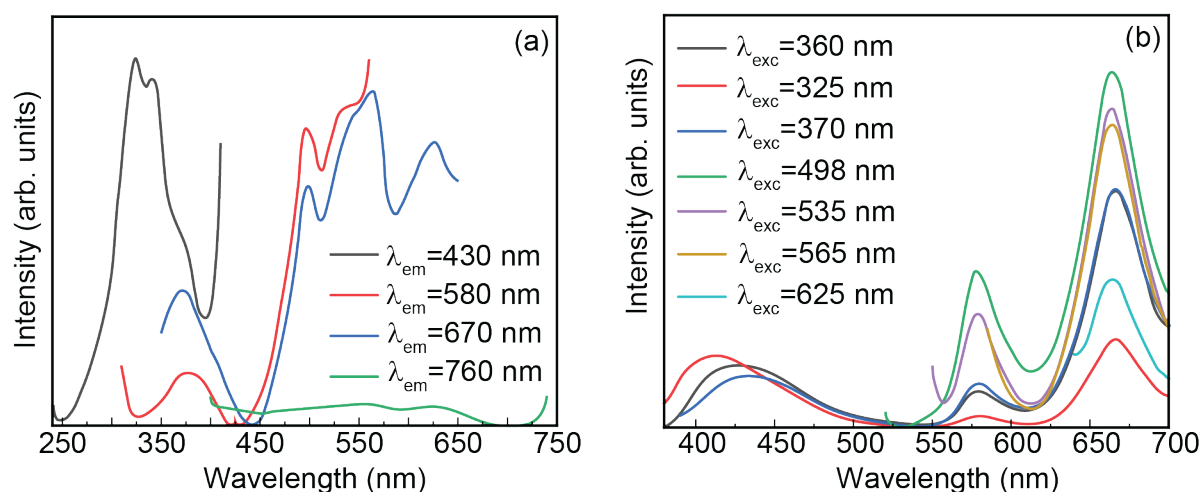
shown in Figures S9–S11.

Sample	$\lambda_{\text{exc}}$ (nm)	$H$	$\tau$ (ns)
R-PE in H <sub>2</sub> O	380	0.09	3.30 ± 0.01
	488	0.17	
	590	0.18	
R-PE/alginate	330	<0.01	5.59 ± 0.04
	360		
	375		
	405	0.02	
	498		
	565		
R-PE/PVA	330	0.04	3.74 ± 0.03
	360		
	375		
	498	0.11	
	535	0.10	
	565	0.11	
	625	0.12	
C-PC in H <sub>2</sub> O	370	0.09	3.09 ± 0.03
	410	0.08	
	550	0.17	
	590	0.20	
	660	0.18	
C-PC/PVA	275	0.01	4.30 ± 0.04
	310	0.02	
	360	0.04	
	370	0.05	
	400	0.07	
	580	0.09	
	630	0.10	
FX in ethanol	350	0.03	6.96 ± 0.01
	390	0.04	
	410		
	510	0.03	
	540	0.05	
	610	0.08	
	665	0.07	
FX/PVA	270	<0.01	6.68 ± 0.02
	360	0.05	
	405	0.07	
	505	0.03	
	535	0.04	
	560	0.06	
	610	0.10	
	665	0.09	

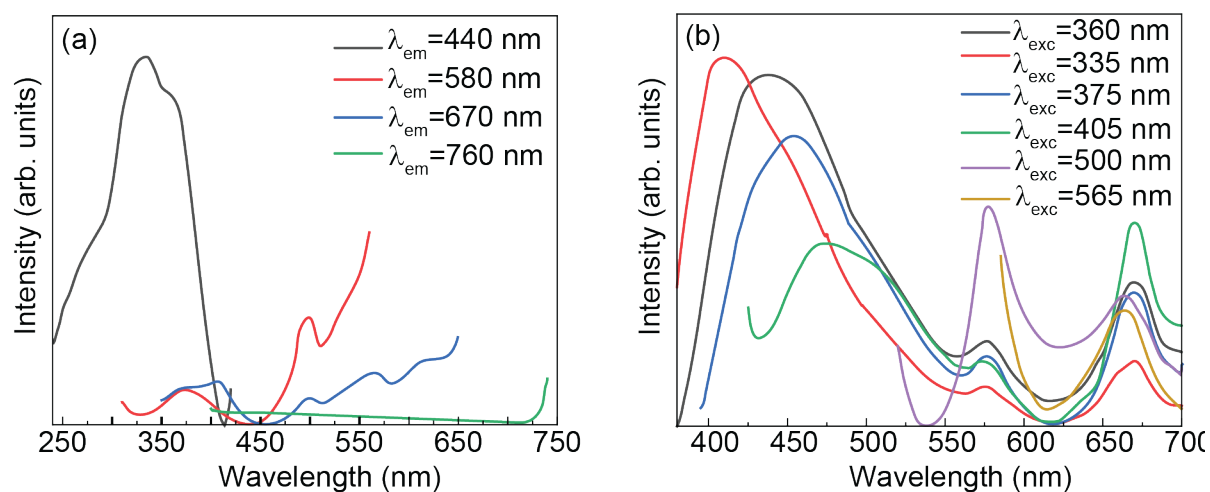
**Table S2.** Absolute emission quantum yield ( $\eta$ ) values of the samples after continuous exposition to AM1.5G radiation ( $t$ ) for the indicated excitation wavelengths ( $\lambda_{\text{exc}}$ , nm).

Sample	$\lambda_{\text{exc}}$ (nm)	$\eta$ ( $\pm 0.01$ )			
		t=0	t=120 minutes	t=540 minutes	t=960 minutes
R-PE/PVA	498	0.10	0.05	0.04	0.04
C-PC/PVA	580	0.08	0.04	0.03	<0.01
FX/PVA	610	0.12	0.10	0.09	0.08

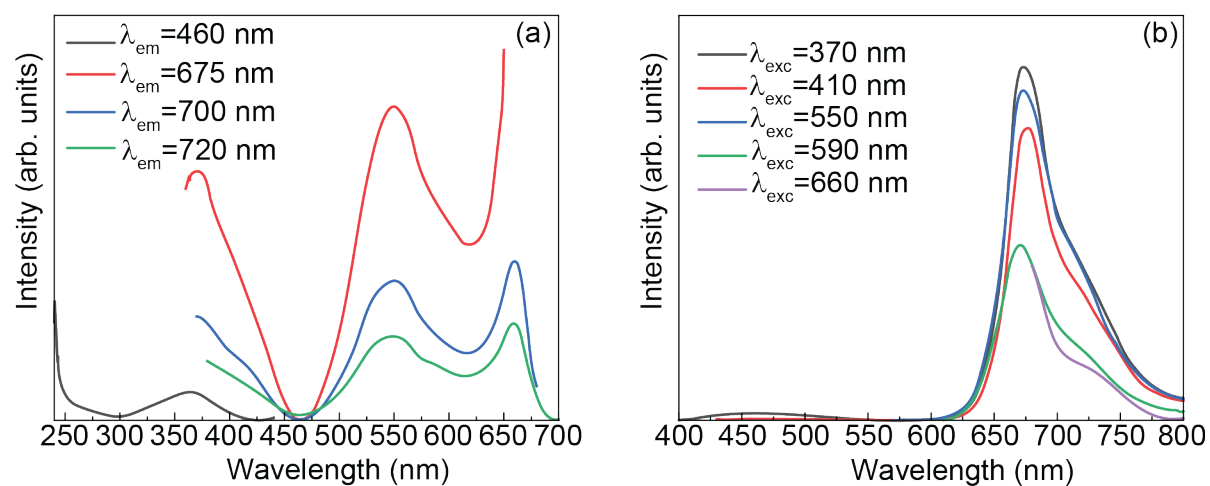
**Figure S1.** Calibration curves were used to the determination of the concentration of each one of the extracts studied: (a) FX in ethanol, (b) R-PE in H<sub>2</sub>O, and (c) C-PC in H<sub>2</sub>O.**Figure S2.** Room-temperature (a) excitation and (b) emission spectra of R-PE in H<sub>2</sub>O.



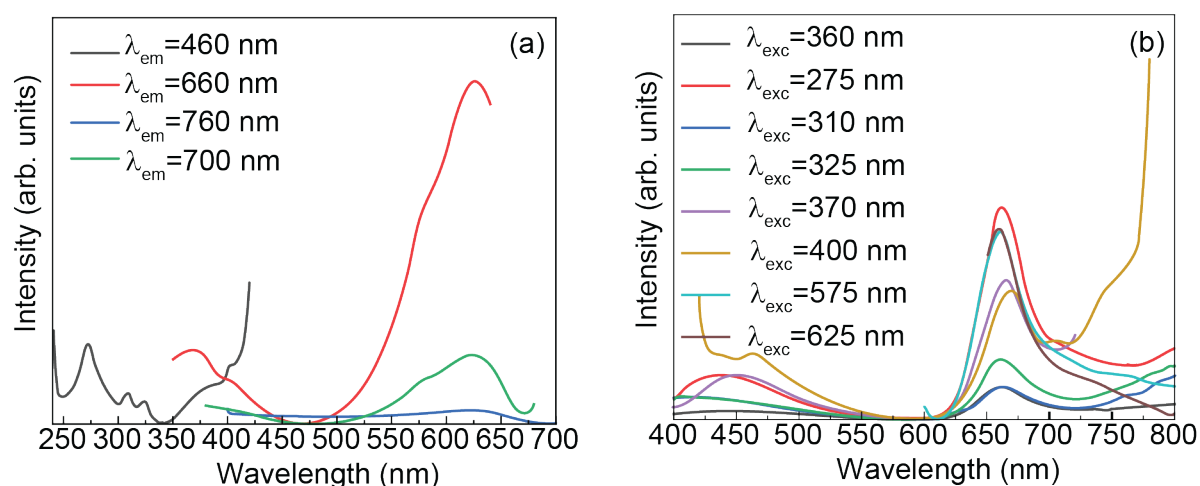
**Figure S3.** Room-temperature (a) excitation and (b) emission spectra of R-PE/PVA sample.



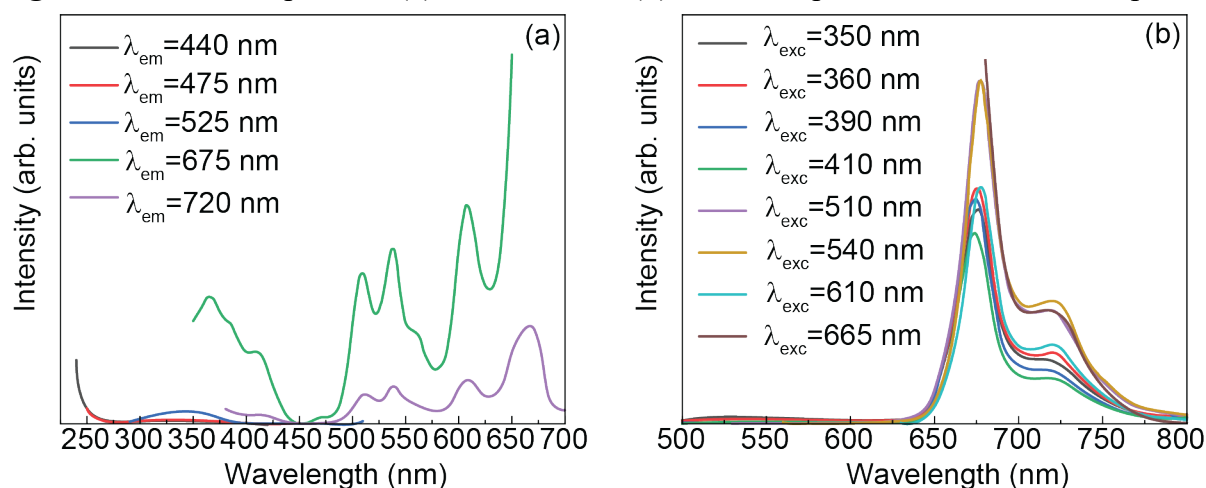
**Figure S4.** Room-temperature (a) excitation and (b) emission spectra of R-PE/alginate.



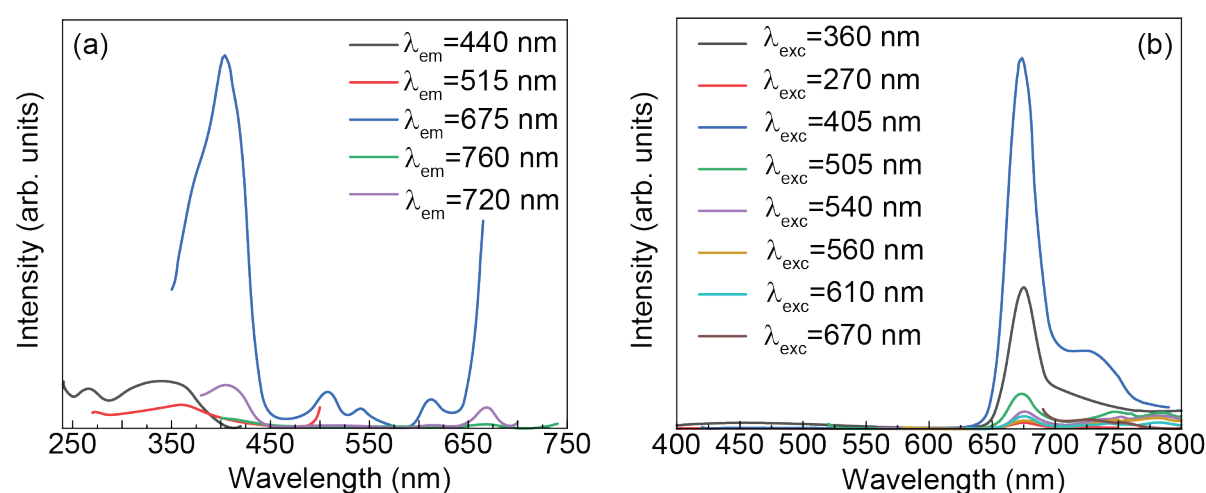
**Figure S5.** Room-temperature (a) excitation and (b) emission spectra of C-PC in H<sub>2</sub>O.



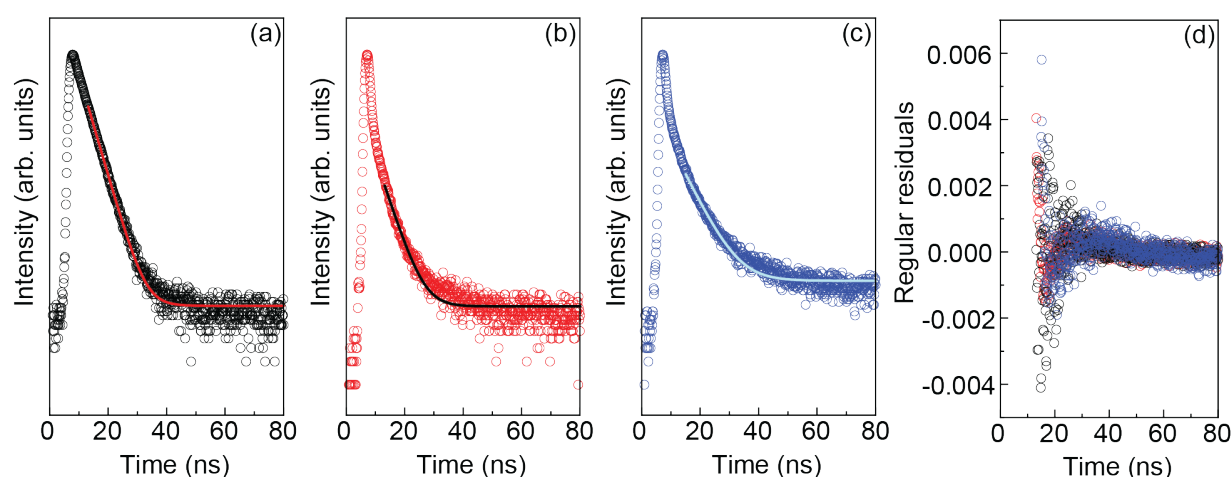
**Figure S6.** Room-temperature (a) excitation and (b) emission spectra of C-PC/PVA sample.



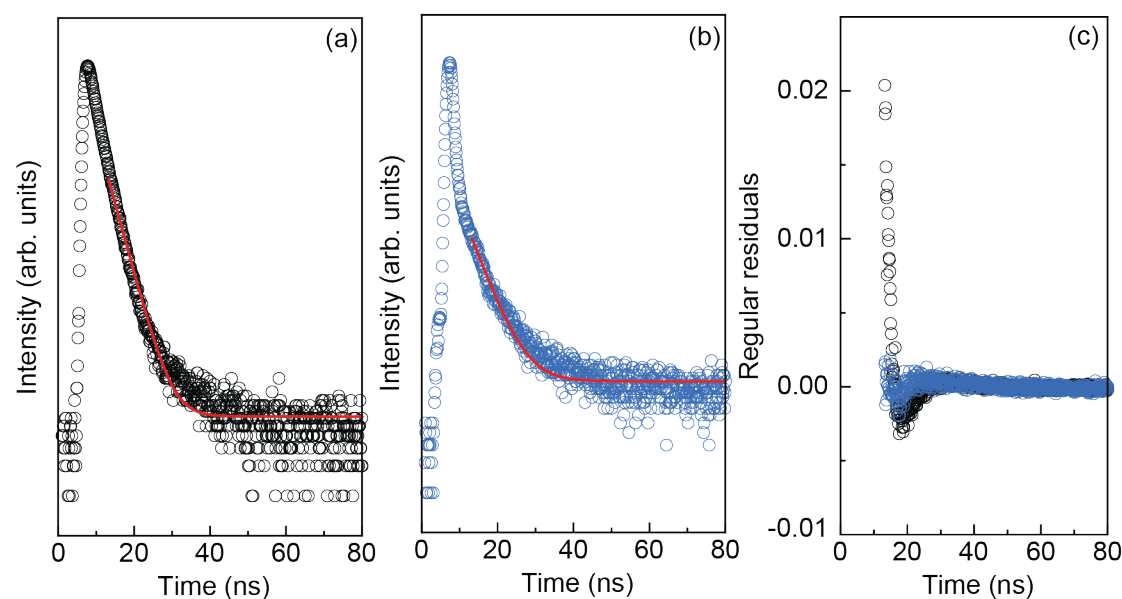
**Figure S7.** Room-temperature (a) excitation and (b) emission spectra of FX in ethanol.



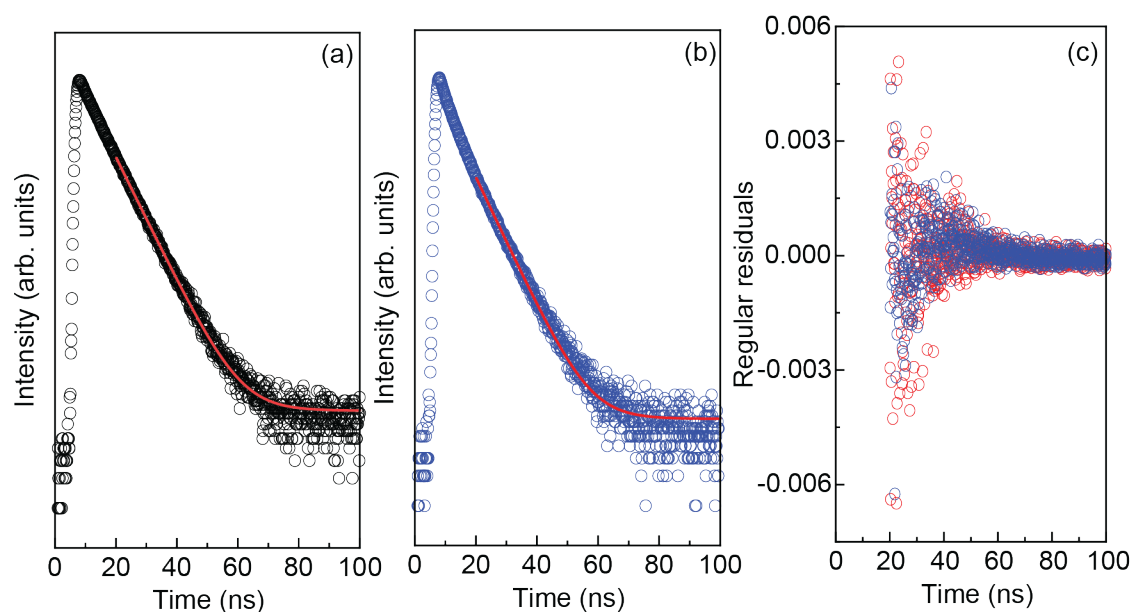
**Figure S8.** Room-temperature (a) excitation and (b) emission spectra of FX/PVA.



**Figure S9.** Room-temperature emission decay curve of (a) R-PE in H<sub>2</sub>O, (b) R-PE/PVA and (c) R-PE/alginate excited at 388 nm and monitored at 580 nm. The solid lines represent the data best fit ( $R^2 > 0.99$ ), using a single-exponential function  $I(t) = I_1 e^{-(t-t_0)/\tau_1}$  ( $t_0 = 13$  ns, related to the excitation prompt). The respective residual plot is presented in (d).



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