Electronic Supplementary Information

Multivalent Supramolecular Assembly with Ultralong Organic Room Temperature Phosphorescence, High Transfer Efficiency and Ultrahigh Antenna Effect in Water

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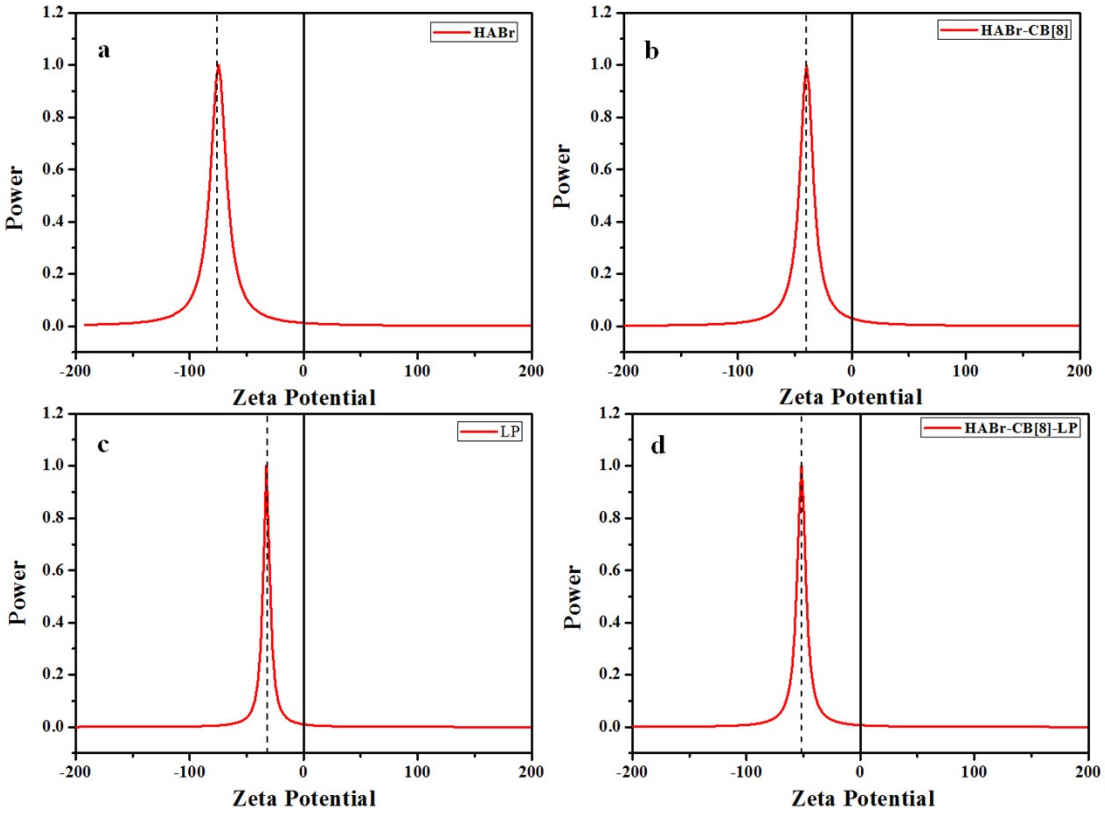
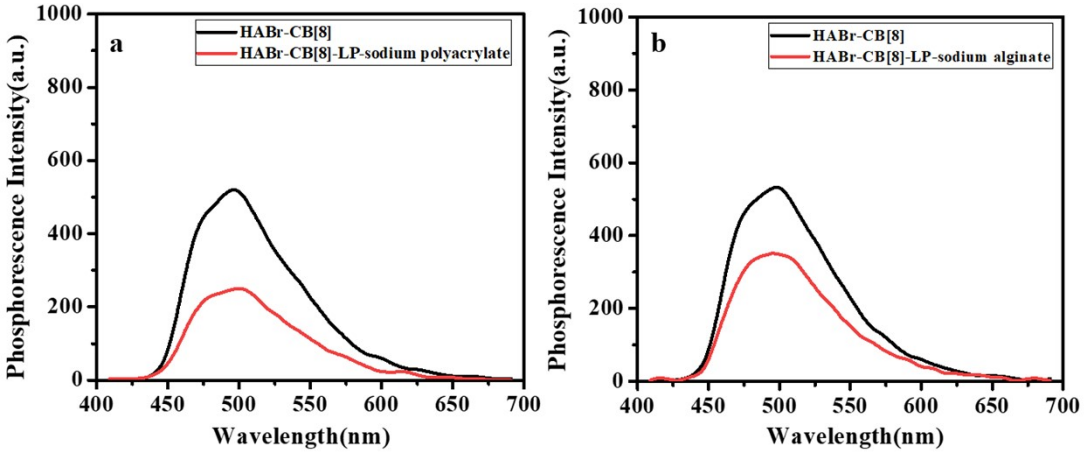


Fig. S1 Zeta potential results of (a) HABr, (b) HABr/CB[8], (c) LP and (d) HABr/CB[8]/LP ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, [LP] = 0.02 wt %, 298 K).



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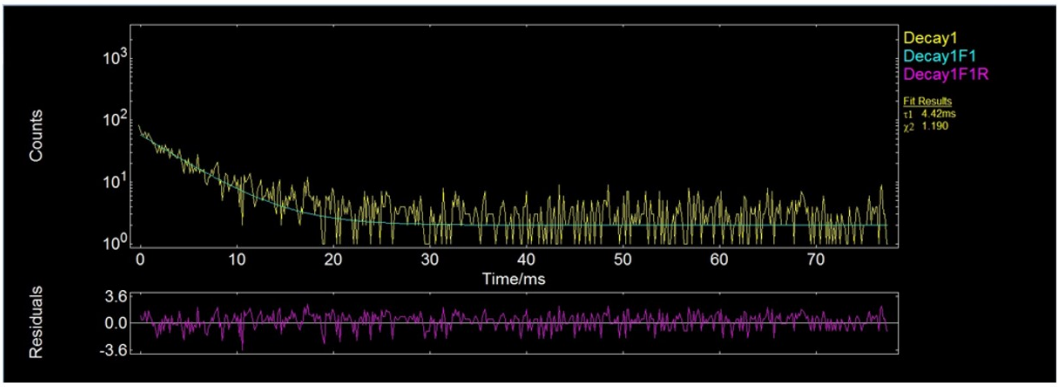
a



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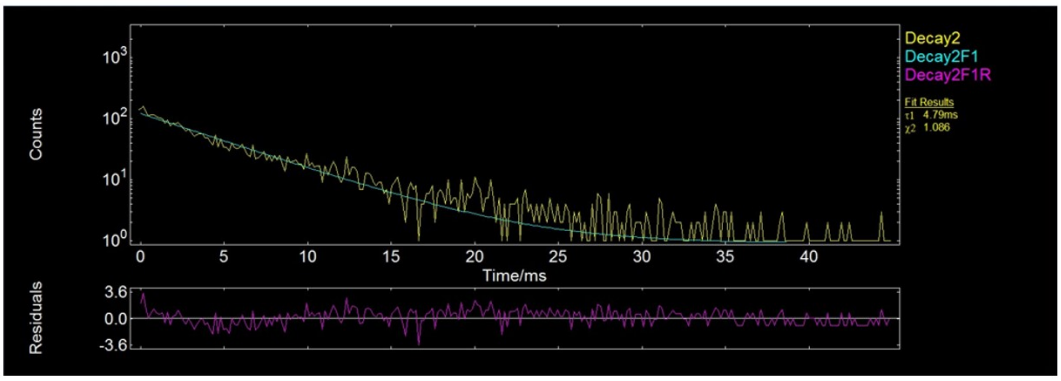

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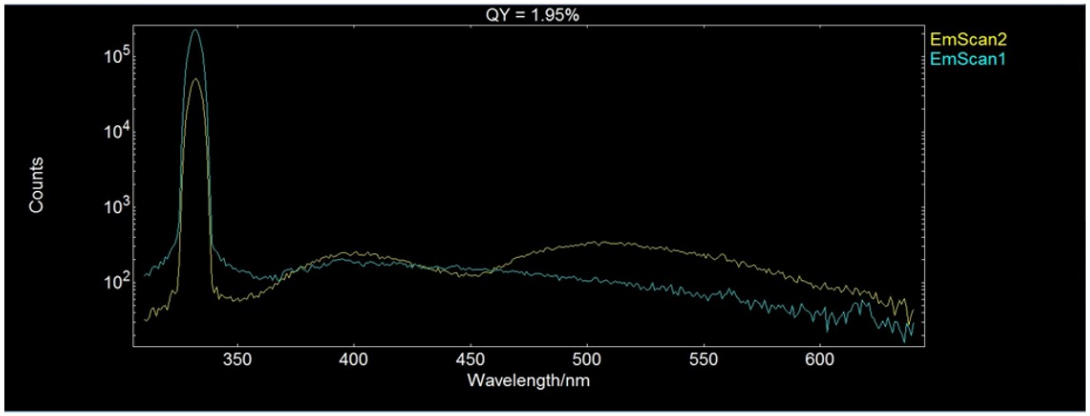
a



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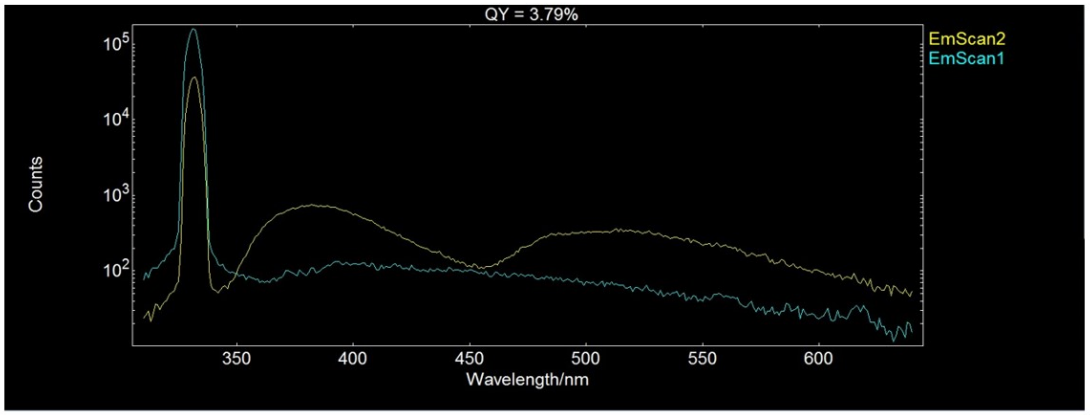


Fig. S4 The quantum yield of (a) HABr/CB[8] and (b) HABr/CB[8]/LP in aqueous solution ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, LP = 0.02 wt %).

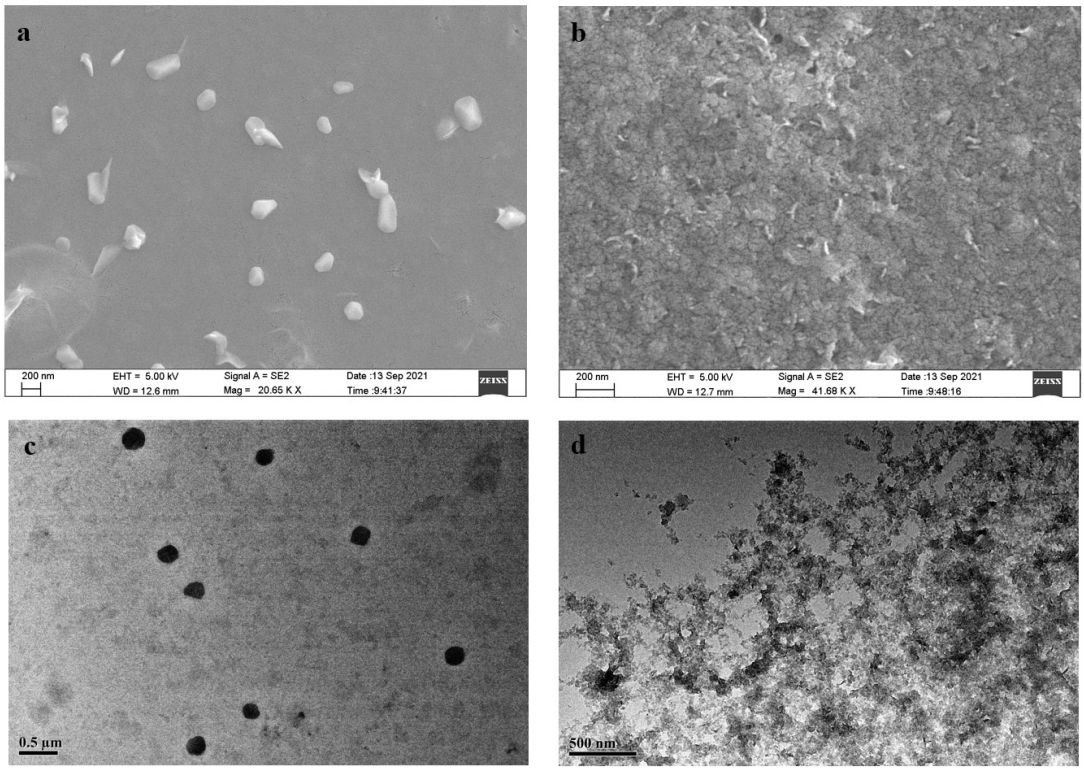


Fig. S5 SEM image of (a) HABr/CB[8], (b) HABr/CB[8]/LP and TEM image of (c) HABr/CB[8], (d) HABr/CB[8]/LP.

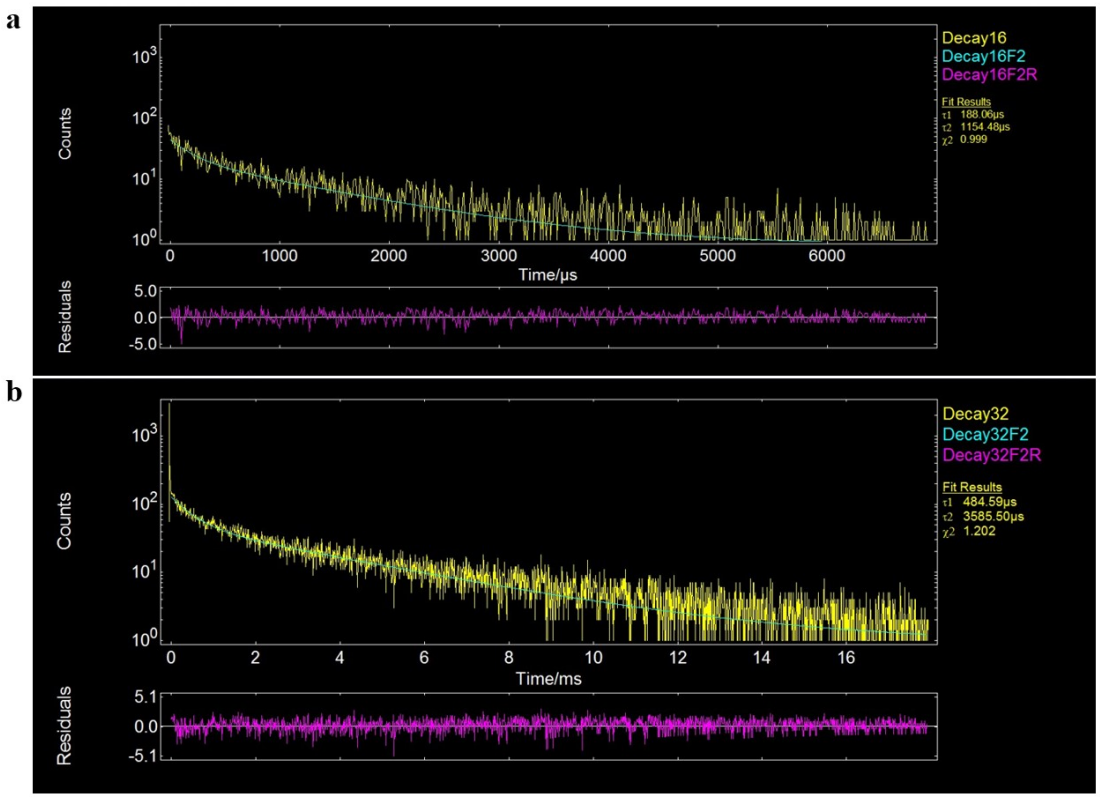


Fig. S6 Phosphorescence lifetime decay fitting curve of (a) HABr/CB[8]/LP/RhB measured for 500 nm at 298 K and (b) HABr/CB[8]/LP/SR101 measured for 500 nm at 298 K. ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, LP = 0.02 wt %, [RhB] = 4.0×10^{-6} M, [SR101] = 1.3×10^{-6} M).

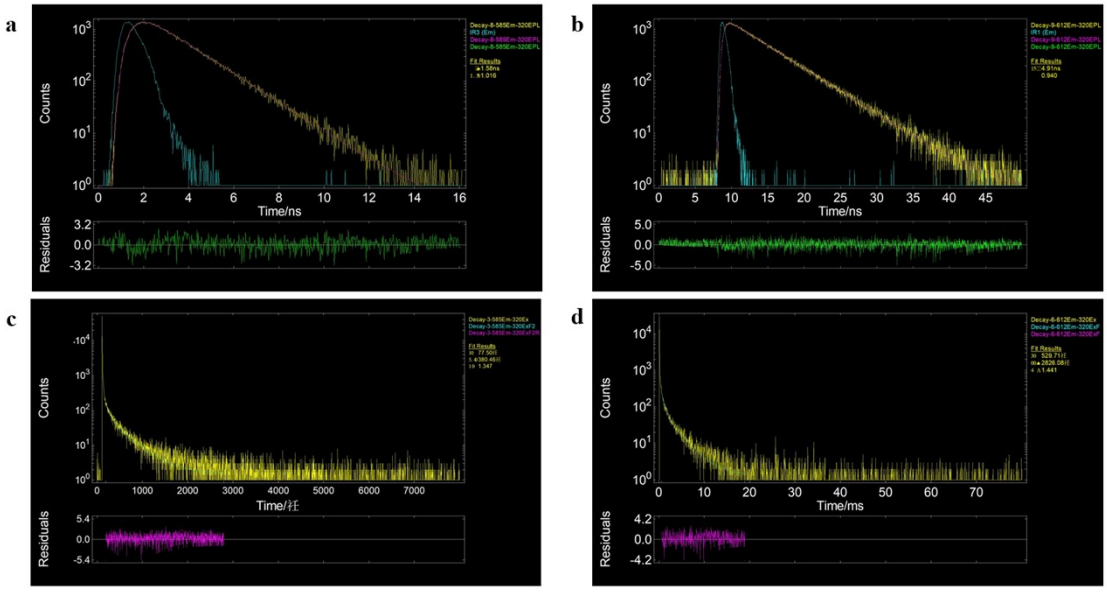


Fig. S7 Fluorescence lifetime decay fitting curve of (a) RhB, (b) SR101. Phosphorescence lifetime decay fitting curve of (c) HABr/CB[8]/LP/RhB measured for 585 nm at 298 K, (d) HABr/CB[8]/LP/SR101 measured for 612 nm at 298 K. ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, LP = 0.02 wt %, [RhB] = 4.0×10^{-6} M, [SR101] = 1.3×10^{-6} M).

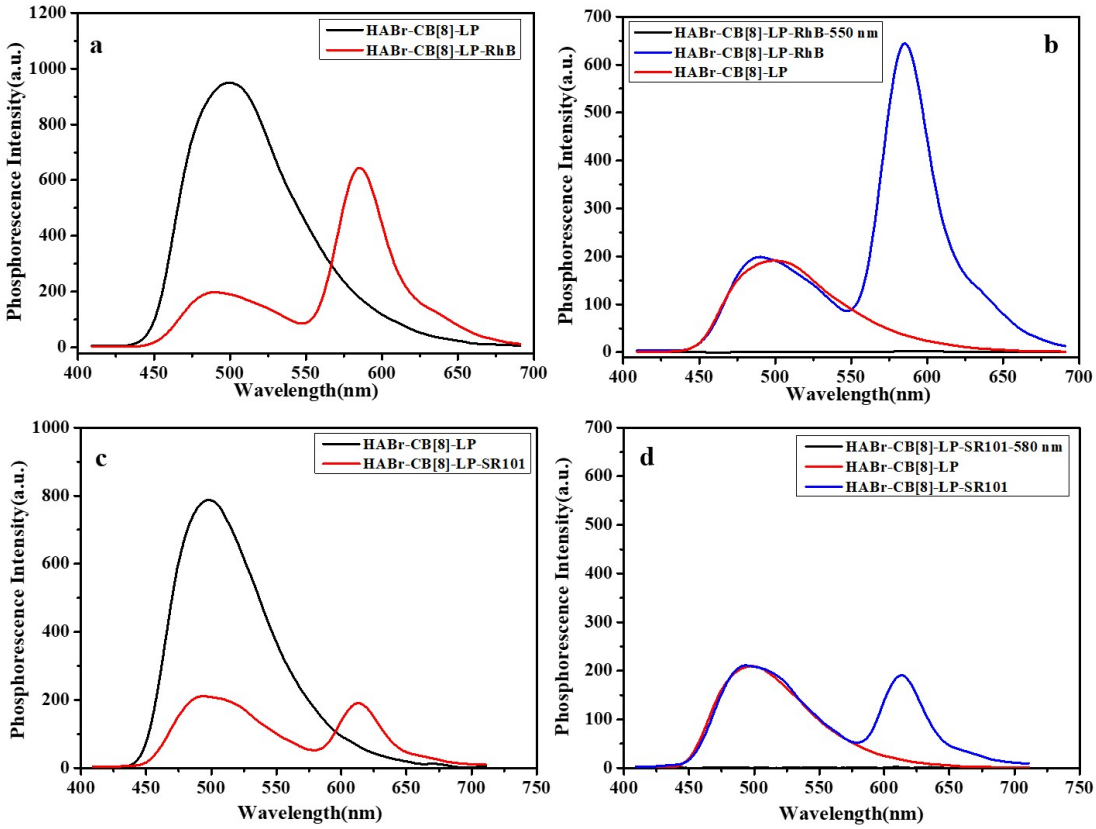


Fig. S8 Phosphorescence spectra of (a) HABr/CB[8]/LP and HABr/CB[8]/LP/RhB; (c) HABr/CB[8]/LP and HABr/CB[8]/LP/SR101 in water (λ_{ex} = 300 nm). The normalized phosphorescence spectra of (b) HABr/CB[8]/LP (red line, λ_{ex} = 300 nm), HABr/CB[8]/LP/RhB (blue line, λ_{ex} = 300 nm), HABr/CB[8]/LP/RhB (black line, λ_{ex} = 550 nm) and (d) HABr/CB[8]/LP (red line, λ_{ex} = 300 nm), HABr/CB[8]/LP/SR101 (blue line, λ_{ex} = 300 nm), HABr/CB[8]/LP/SR101 (black line, λ_{ex} = 580 nm) in water. ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, LP = 0.02 wt %, [RhB] = 4.0×10^{-6} M, [SR101] = 1.3×10^{-6} M).

Table S1. Energy transfer efficiency (Φ_{ET}) and antenna effect of RTP reported in the literature.

name	Φ_{ET} Antenna Effect	morphology	τ (dye)	literature
(IPA@EosinY)/LDH	99.7%, -	Solid	0.95 ms	Ref.23
BTA-ME-1	81.13%, -	co-crystals	1.0 ms	Ref.24
BTA-ME-2	78.97%, -		0.7 ms	
CD-PY@CB[8]@RhB	84%, 36.42%	water	0.28 ms	Ref.15
SR101-doped CS-PVA	81%, -	Solid films	490 ms	Ref.21a
SRG-doped CS-PVA	70%, -	Solid films	750 ms	
CPthBr-LP/SRG	32%, -	water	163.5 μs	Ref.19
CPthBr-LP/SR101	60%, -		60.4 μs	
HABr/CB[8]/LP/RhB	80.0%, 361.6	water	0.31 ms	This work
HABr/CB[8]/LP/SR101	73.4%, 307.5		2.10 ms	

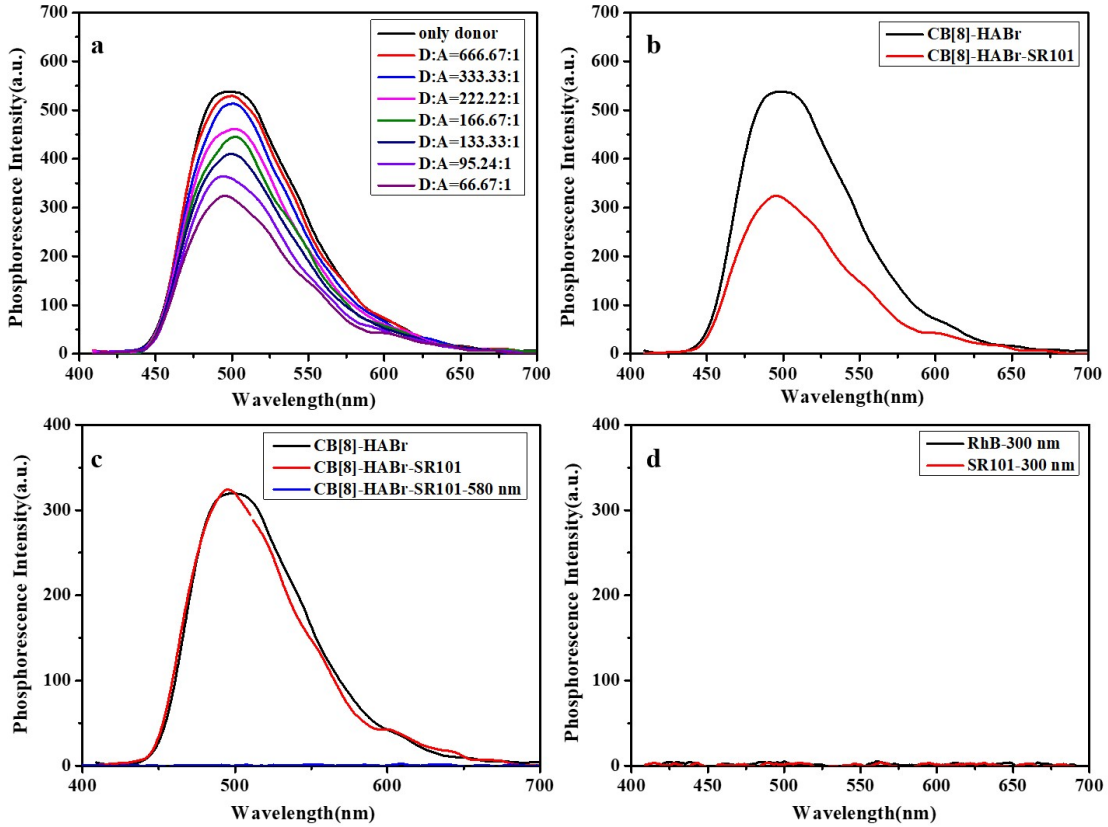
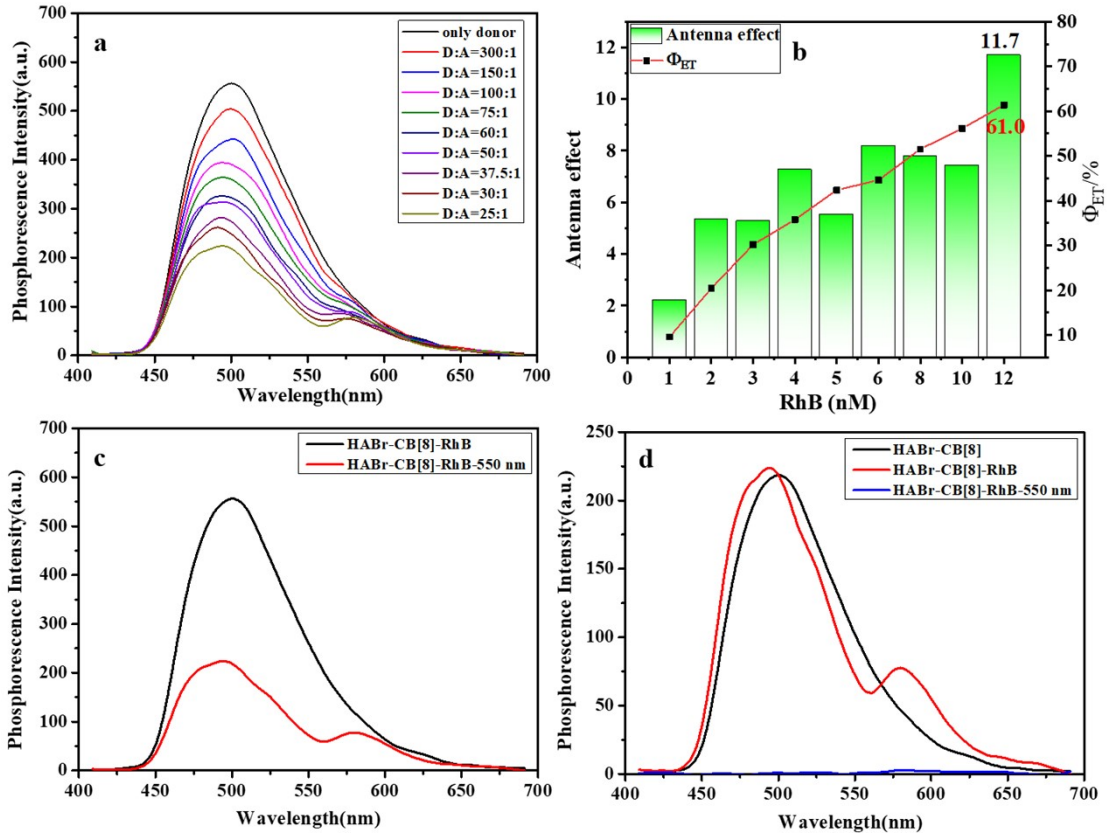


Fig. S9 (a) Phosphorescence spectrum (delayed 0.2 ms) of HABr/CB[8] in aqueous solution with different concentrations of SR101. Phosphorescence spectra of (b) HABr/CB[8] and HABr/CB[8]/SR101. The normalized phosphorescence spectra of (c) HABr/CB[8] (red line, λ_{ex} = 300 nm), HABr/CB[8]/SR101 (red line, λ_{ex} = 300 nm), HABr/CB[8]/SR101 (black line, λ_{ex} = 580 nm). (d) Phosphorescence spectrum (delayed 0.2 ms) of RhB and SR101 in aqueous solution. ([HABr] = 0.1 mM, [CB[8]] = 0.05 mM, [SR101] = 1.3×10^{-6} M, λ_{ex} = 300 nm, 298 K).



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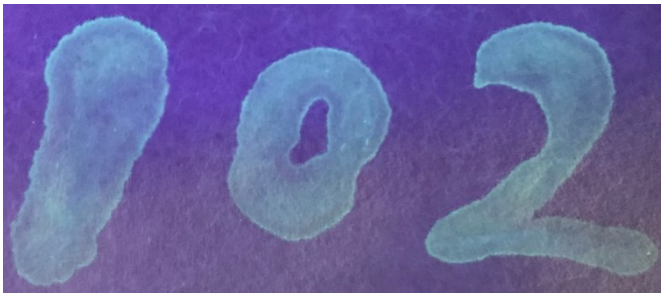

Fig. S11 The photographs writing “102” with HABr/CB[8]/0.005SR101 on the filter paper under UV light.

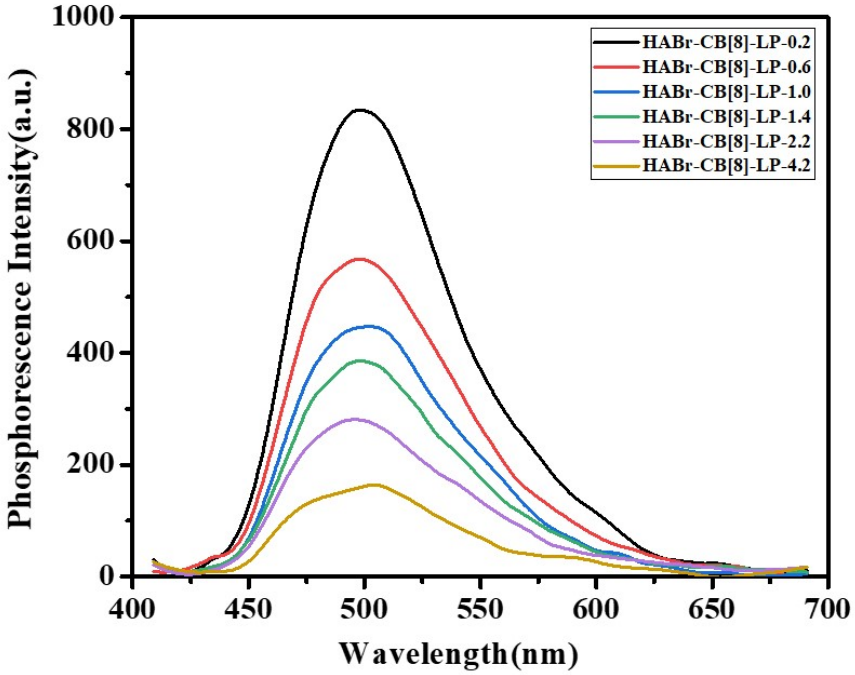

Fig. S12 Phosphorescence spectra of HABr/CB[8]/LP at different delay times for 0.2 ms, 0.6 ms, 1.0 ms, 1.4 ms, 2.2 ms, 4.2 ms, respectively in water at 298 K (Ex. Slit = 5 nm, Em. Slit = 10 nm, [HABr] = 0.1 mM, [CB[8]] = 0.05 mM, [LP] = 0.02 wt %, λ_{ex} = 300 nm).