Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

Light Induced *in-situ* post-modification of clay-chromophore hybrids for multiple white light emissions

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A. General Methods.

1. **Optical spectroscopy:** UV/Vis absorption and fluorescence spectra were recorded on a Perkin-Elmer Lambda 750 and Perkin-Elmer LS 55 spectrometer respectively.

2. **Irradiation:** Irradiation was done in a 2x10 mm quartz cuvette. Lamp used was OSRAM puritec germicidal lamp HNS, 8W, G5 (G8T5/OF). In a general procedure the solution was placed inside the lamp chamber directly under the lamp.

3. **TCSPC:** Steady state PL spectra were collected using the 450 W xenon lamp as the source on the FLSP920 spectrometer, Edinburgh Instruments, while the lifetime measurements were carried out on an EPLED-380 (λ_{ex} = 380 nm) pico second pulsed Light emitting diode.

B. Supporting figures.

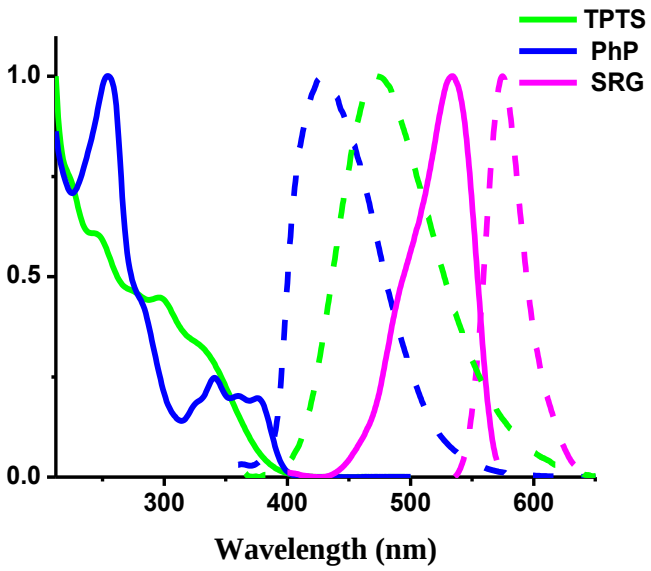

Fig. S1. Absorption (bold) and emission (dash) spectra of **TPTS**, **PhP** and **SRG**.

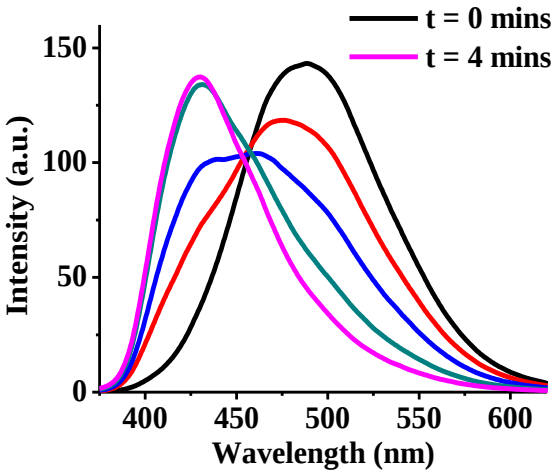

Fig. S2. Emission Spectra of 10^{-4}M **TPTS** with 0.4 wt% **AC** with varying times of 254 nm irradiation (λ_{exc} = 330 nm, *l* = 2 mm)

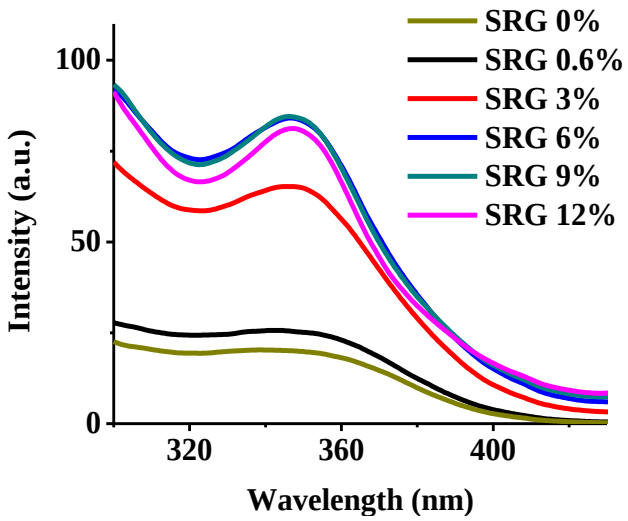

Fig. S3. Excitation Spectra of 10^{-4}M **TPTS** with 0.4 wt% **AC** with varying amounts of **SRG** (λ_{mon} = 570 nm, *l* = 2 mm)

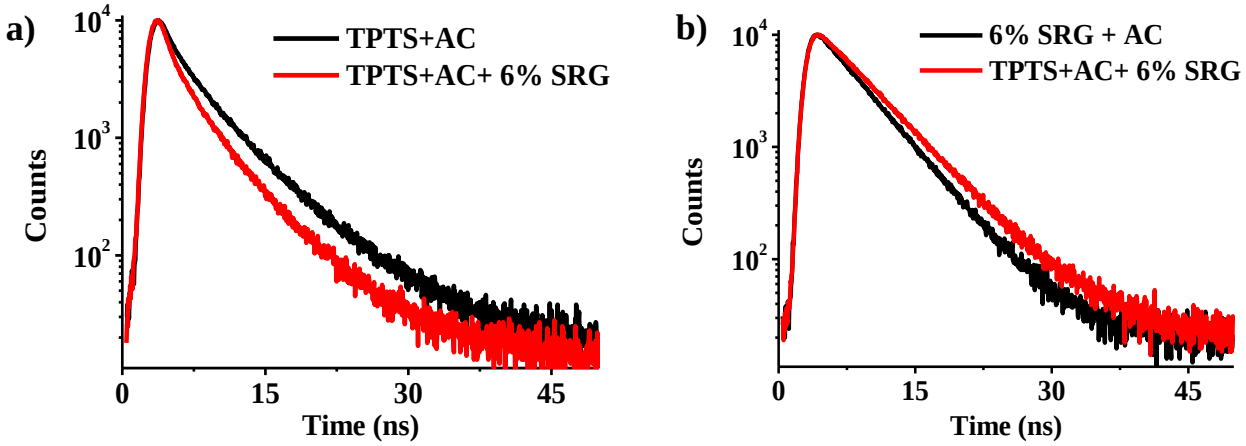

Fig. S4. TCSPC decay profiles of (a) 10^{-4}M **TPTS** with 0.4 wt% **AC** compared with 10^{-4}M **TPTS** with 0.4 wt% **AC** and 6% **SRG** and (b) 6% **SRG** with 0.4 wt% **AC** compared with 10^{-4}M **TPTS** with 0.4 wt% **AC** and 6% **SRG** (λ_{mon} = 474 and 570 nm respectively, λ_{exc} = 380 nm). Energy transfer efficiency calculated from lifetime is 12.24%

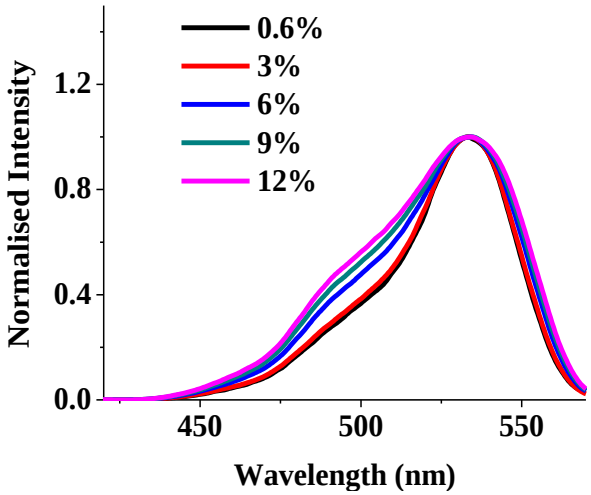

Fig. S5. Excitation Spectra of 0.4 wt% **AC** with varying amounts of **SRG** (λ_{mon} = 570 nm, *l* = 2 mm)

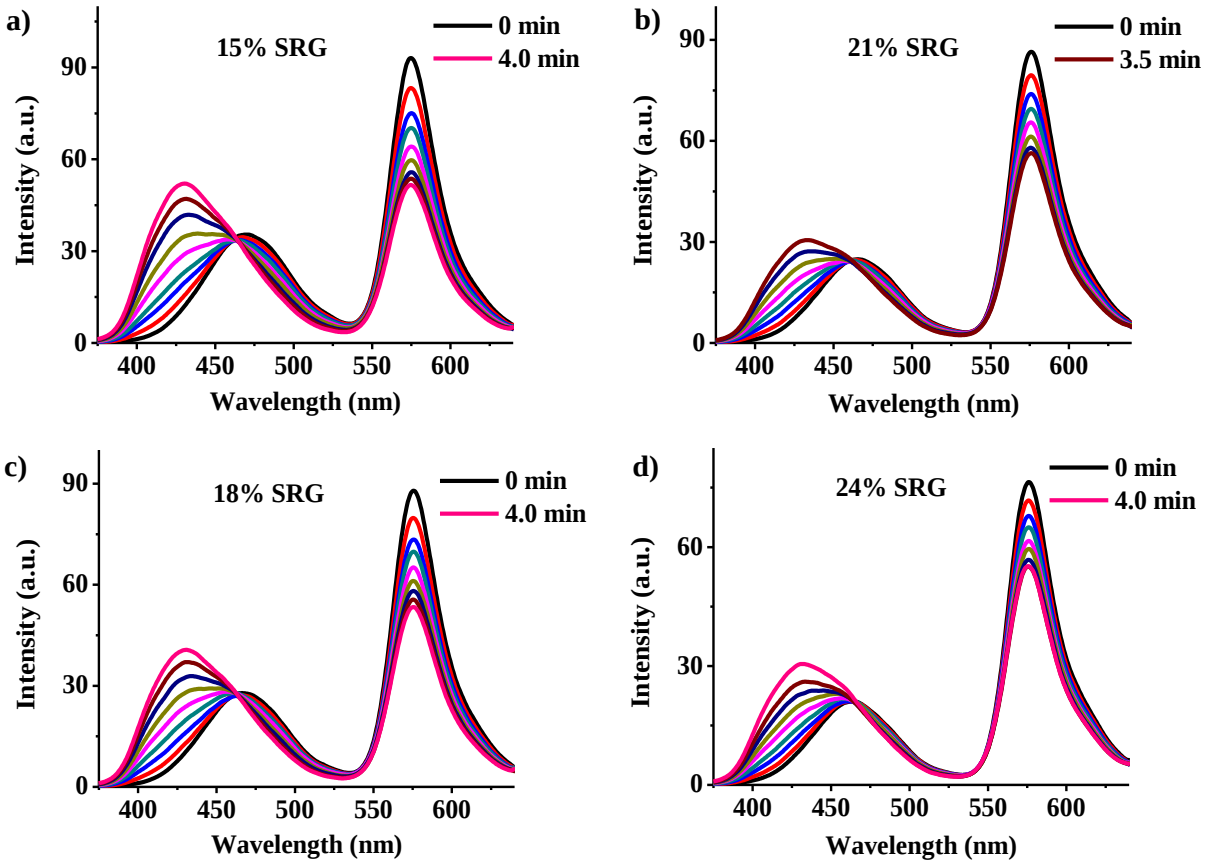

Fig. S6. (a)-(d) Emission Spectra of 10^{-4}M **TPTS** + 0.4 wt% **AC** with varying amounts of **SRG** under varying times of 254 nm irradiation (λ_{exc} = 330 nm, *l* = 2 mm)

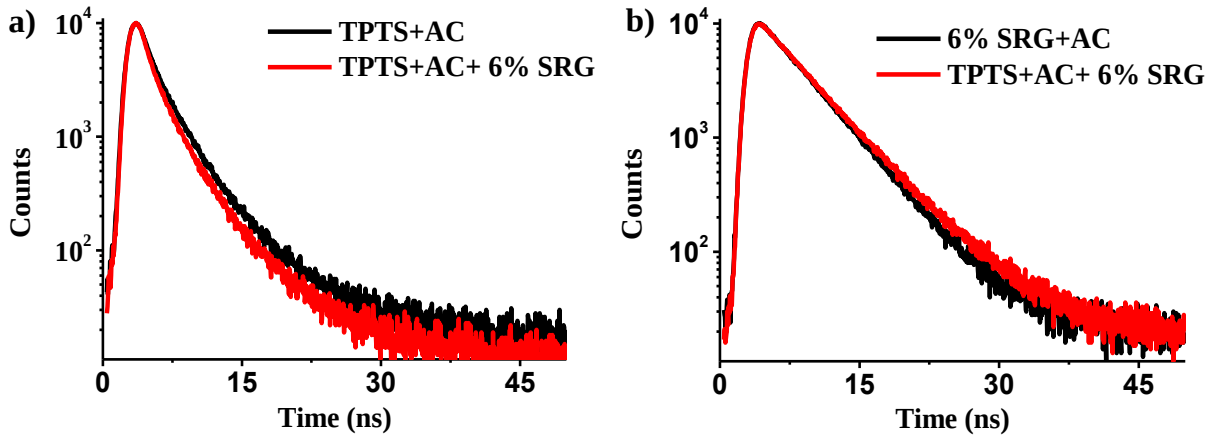

Fig. S7. TCSPC decay profiles of (a) 10^{-4}M **TPTS** with 0.4 wt% **AC** (after 4 min of 254 irradiation) compared with 10^{-4}M **TPTS** with 0.4 wt% **AC** and 6% **SRG** (after 4 min of 254 irradiation) and (b) 6% **SRG** with 0.4 wt% **AC** compared with 10^{-4}M **TPTS** with 0.4 wt% **AC** and 6% **SRG** (after 4 min of 254 irradiation) (λ_{mon} = 410 and 570 nm respectively, λ_{exc} = 380 nm)

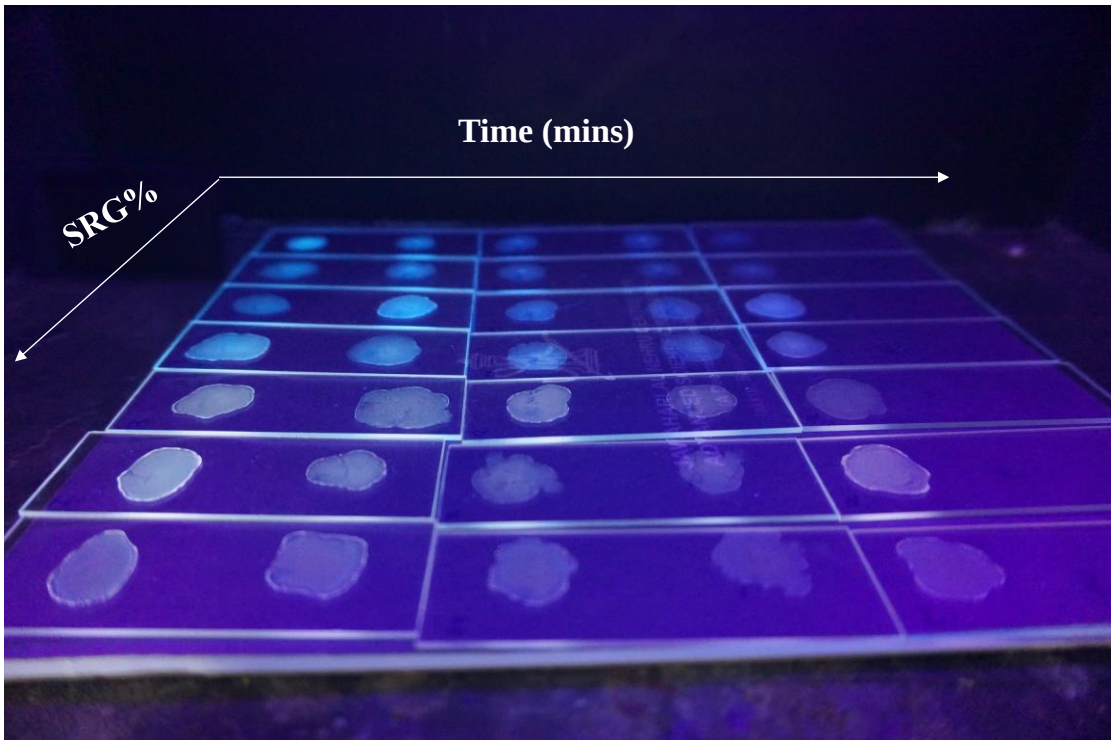

Fig. S8. Photographs under 365 nm illuminations of drop casted films of 10^{-4}M **TPTS** + 0.4 wt% **AC** with varying amounts of **SRG** under varying 254 nm irradiation.

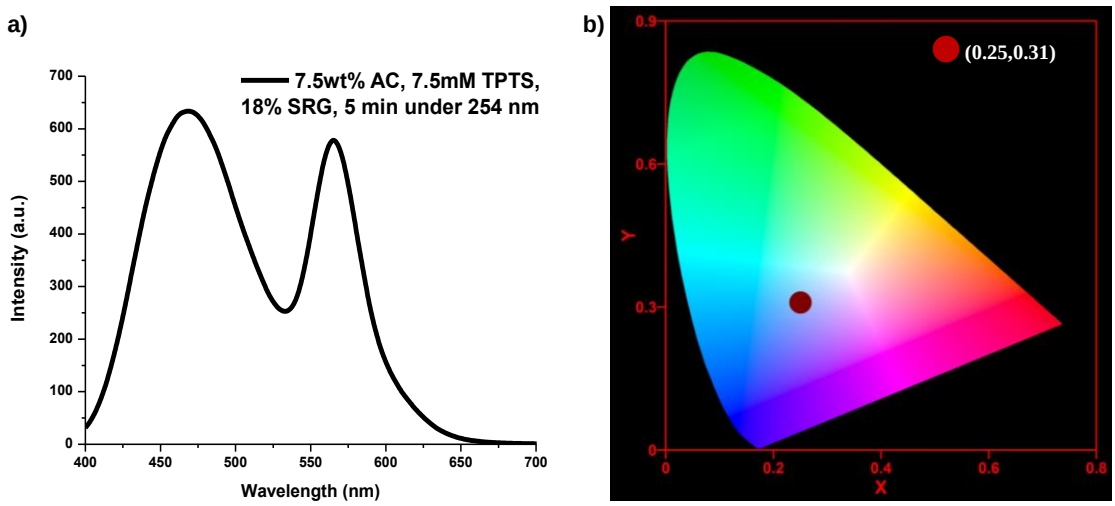

Fig. S9. (a) Emission spectra of a film (7.5 wt% AC, 7.5 mM **TPTS**, 18% **SRG**, 5 min under 254 nm) and (b) the respective CIE co-ordinates**.** It is worth noting that the two chromophores (**TPTS**, **SRG**) are of opposite nature as **TPTS** increase emission on aggregating and **SRG** decreases (Ref 8a main text). Therefore while making films CIE co-ordinates are not conserved and tend to shift towards the blue. Furthermore a complete reconfiguration of ingredients is required to achieve anything closer to white light. From the many conditions we tried the above mentioned composition and CIE co-ordinates are the closest we could get to a white light. We believe that though the applicability of the general concept is irrefutable, the present set of chromophores is limited by their application on films.

a)

SRG % →

Blank	0.6%	3%	6%
0.17,0.33	0.18,0.33	0.26,0.35	0.31,0.36

b)

Time exposure to 254 nm in mins →

SRG % ↓

	0	0.5	1.0	1.5	2.0	2.5
9%	0.34,0.36 D50 (21.3)	0.33,0.34 D55 (10)	0.32,0.32 ~D65 (8.4)	0.31,0.30	0.30,0.29	0.29,0.27
12%	0.36,0.36	0.35,0.35 ~F10,B (8.9)	0.34,0.33 ~E (8.6)	0.33,0.32 ~E (8.4)	0.32,0.30	0.31,0.28
15%	0.38,0.37 ~F11 (7.9)	0.37,0.35	0.36,0.34	0.35,0.32	0.34,0.31	0.32,0.29
18%	0.4,0.37 ~F3 (7.8)	0.39,0.36	0.38,0.35	0.37,0.33	0.36,0.32	0.35,0.30

c)

D50	D55	D65	B	E	F3	F8	F10	F11
0.345,0.358	0.332,0.347	0.31, 0.32	0.348,0.351	0.33,0.33	0.409,0.394	0.345,0.358	0.346,0.359	0.380,0.377

Fig. S10. (a) and (b) 1931 CIE coordinates of 10^{-4}M **TPTS** + 0.4 wt% **AC** with varying amounts of **SRG** under varying 254 nm irradiation (c) Actual 1931 CIE co-ordinates of white light standards. The numbers in parentheses represent fluorescence quantum yield in percentage.

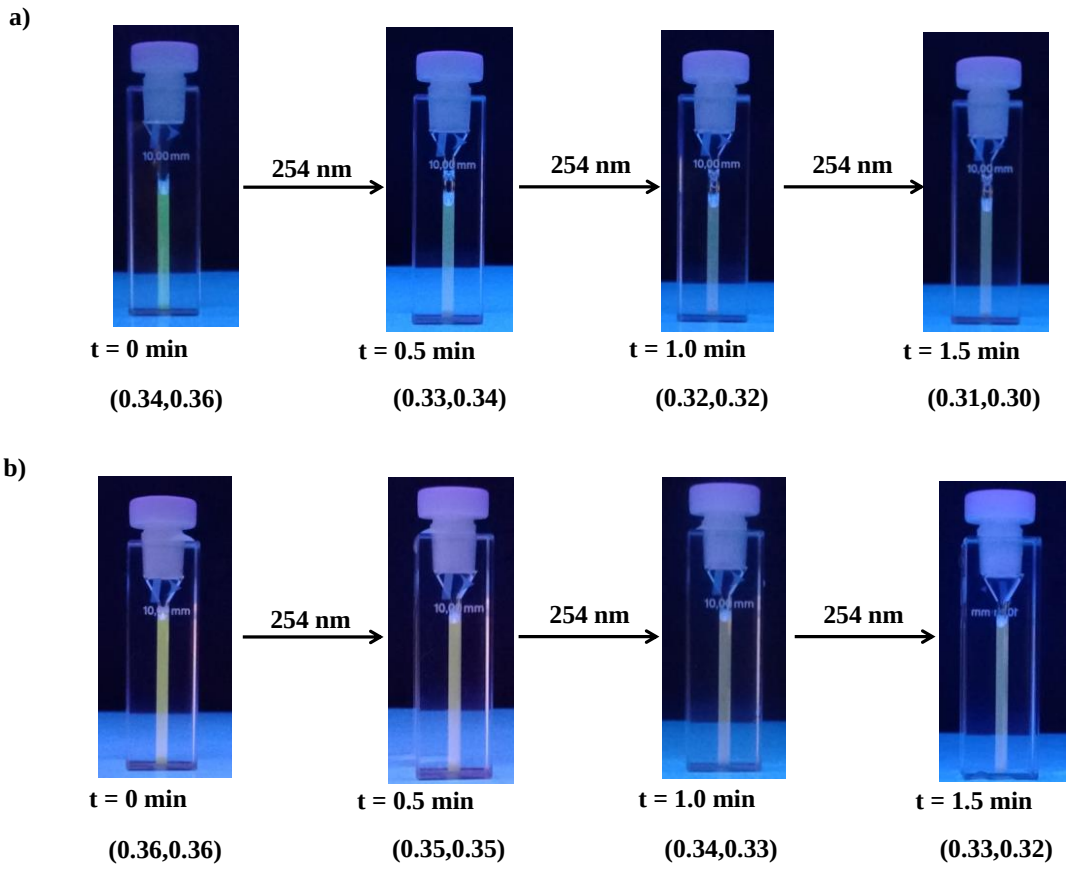

Fig. S11 (a) and (b) Photographs under 365 nm illumination of 254 nm irradiation progression over time of **TPTS**+**AC** hybrid containing 9% and 12% **SRG** respectively. The 1931 CIE coordinates of the hybrids are mentioned in parentheses

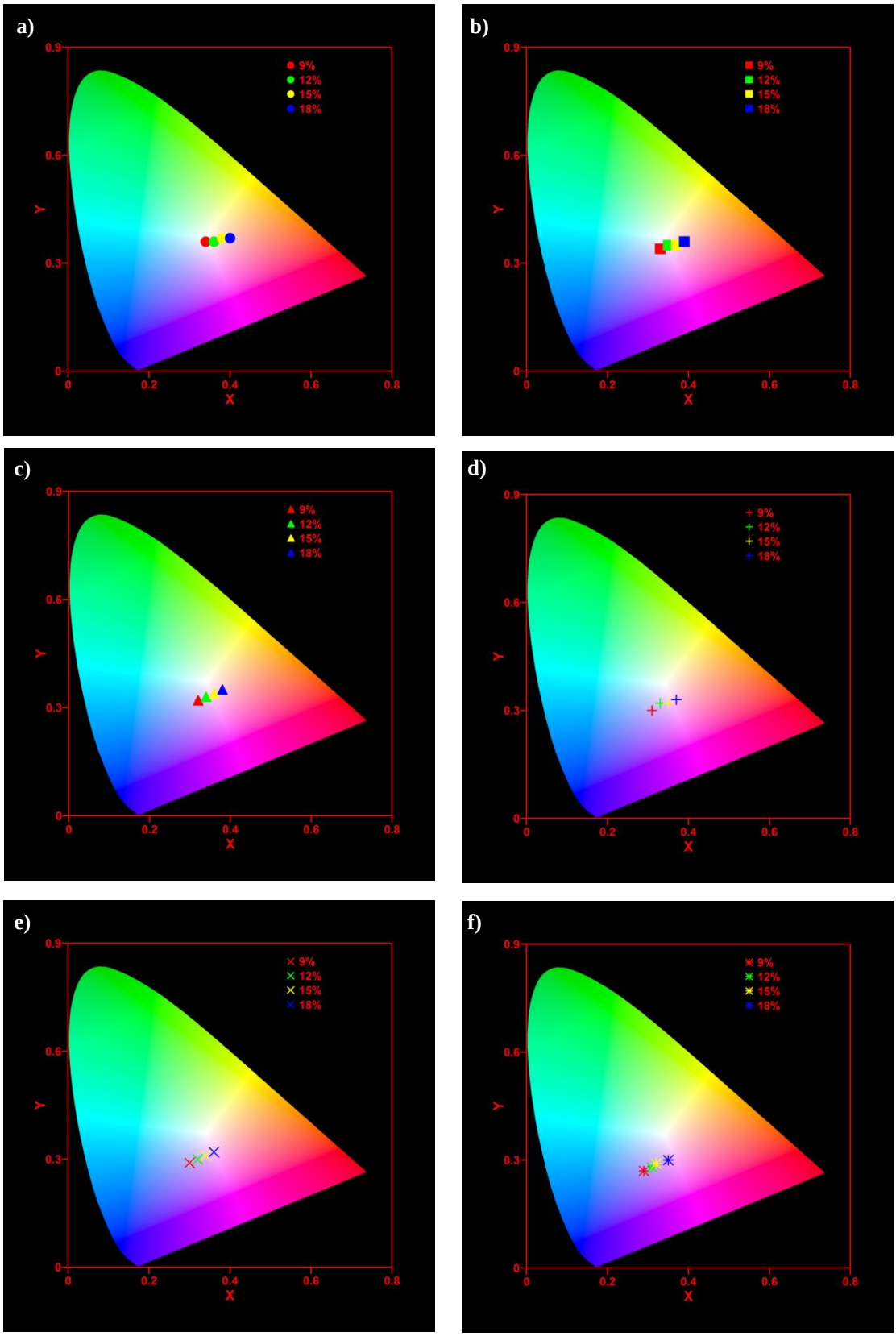

Fig. S12. (a) - (f) 1931 CIE coordinates of 10^{-4}M **TPTS** + 0.4 wt% **AC** with varying amounts of **SRG** under varying 254 nm irradiation (0, 0.5, 1.0, 1.5, 2.0 and 2.5 minutes respectively)

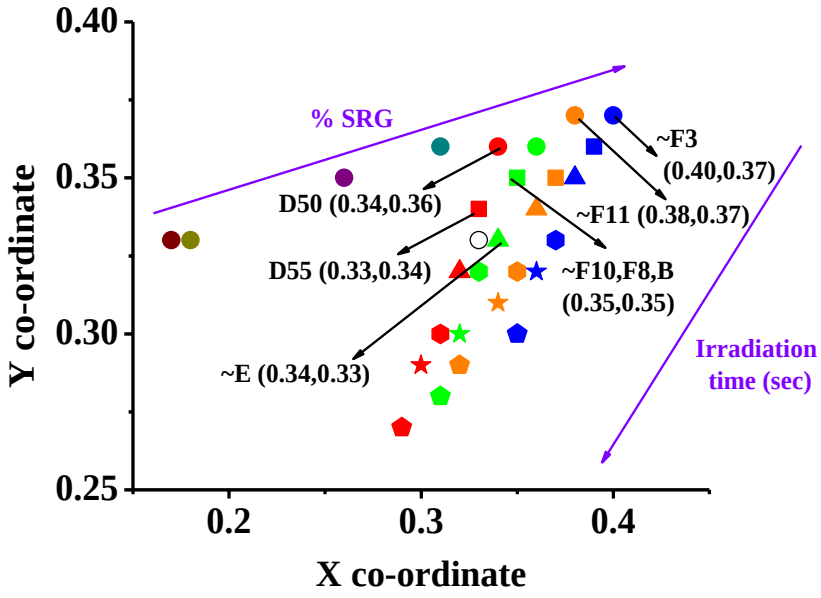

Fig. S13. 1931 CIE coordinates of 10^{-4}M **TPTS** + 0.4 wt% **AC** with varying amounts of **SRG** under varying 254 nm irradiation (0, 0.5, 1.0, 1.5, 2.0 and 2.5 minutes respectively) (same shape of represents same time of irradiation and same color represents same % of **SRG**)

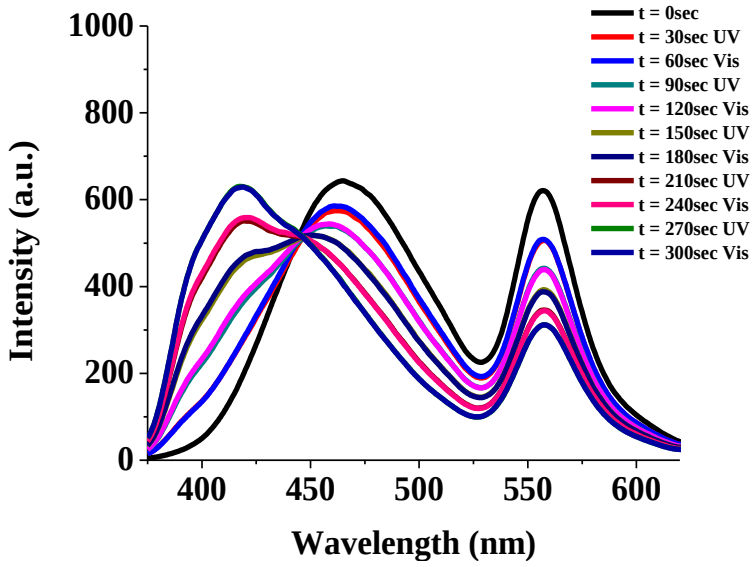

Fig. S14. Emission spectra of 9% **SRG** with 10^{-4}M **TPTS** and 0.4 wt% **AC** with alternate short UV and visible illumination for 30 secs each