

# Supporting Information

**Table S1.** A comparison of the luminescent properties of these phosphors.

Phosphor	PL Wavelength (nm)	Afterglow time (h)	Excitation source
Ba <sub>5</sub> Si <sub>8</sub> O <sub>21</sub> :Eu <sup>2+</sup> ,Dy <sup>3+</sup>	473	8	Sunlight
CaAl <sub>2</sub> O <sub>4</sub> :Eu <sup>2+</sup> ,Nd <sup>3+</sup>	442	/	Sunlight
SrAl <sub>2</sub> O <sub>4</sub> :Eu <sup>2+</sup> ,Dy <sup>3+</sup>	522	8	Sunlight
Ba <sub>2</sub> SiO <sub>4</sub> :Eu <sup>2+</sup> ,Ho <sup>3+</sup>	504	24	UV
BaSiO <sub>3</sub> :Eu <sup>2+</sup> ,Nd <sup>3+</sup> ,Tm <sup>3+</sup>	560	10	Sunlight
SrSc <sub>2</sub> O <sub>4</sub> :Pr <sup>3+</sup>	495, 545, 621, 630, 657	7.5	UV
BaZnGeO <sub>4</sub> :Bi <sup>3+</sup>	440, 595	3	UV
LiGaO <sub>2</sub> :Mn <sup>2+</sup>	550, 650	48	blue light
LiYGeO <sub>4</sub> :Eu <sup>3+</sup>	611	21	UV
MgGeO <sub>3</sub> :Mn <sup>2+</sup>	678	6	UV

**Table S2.** The results of fitting data of water absorption of blue luminescent coatings with different filler CaCO<sub>3</sub> content.

CaCO <sub>3</sub>	<i>a</i>	<i>n</i>
2%	0.51±0.09	0.49±0.02
2.5%	0.48±0.09	0.49±0.02
3%	0.46±0.09	0.49±0.02
3.5%	0.42±0.07	0.48±0.02
4%	0.46±0.09	0.49±0.02

**Table S3.** The blue channel values of afterglow decay images of luminescent coatings with different ratios of phosphor to emulsion (in RGB format).

Time (h)	1:3	1:2.5	1:2	1:1.5	1:1
0	184	215	217	241	225
1	127	160	176	202	188
2	38	50	55	87	66
3	28	39	47	70	50
4	17	30	40	59	48
5	15	28	34	38	35

**Table S4.** The blue channel values of afterglow decay images of luminescent coatings with different SiO<sub>2</sub> content (in RGB format).

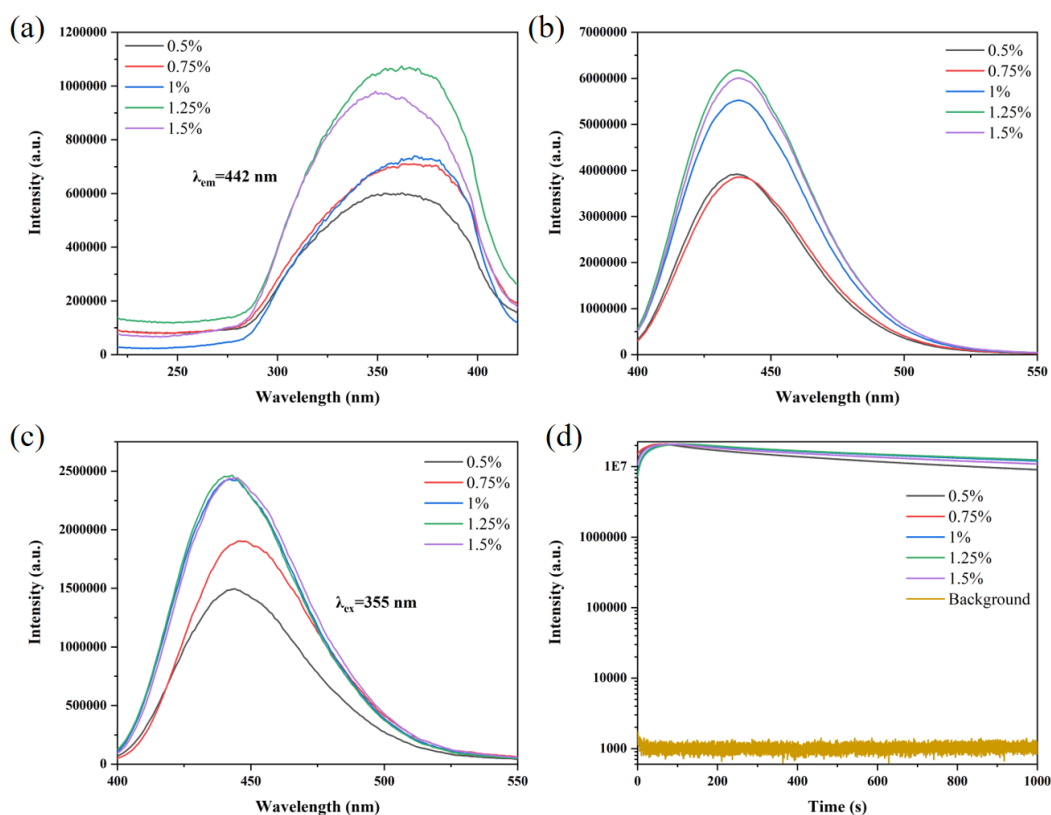
Time (h)	0.5%	0.75%	1%	1.25%	1.5%
0	221	226	230	249	235
1	144	160	188	215	197
2	57	70	84	109	95
3	40	62	69	76	70
4	33	49	55	68	61
5	21	30	39	51	41

**Table S5.** The blue channel values of afterglow decay images of luminescent coatings with different CaCO<sub>3</sub> contents (in RGB format).

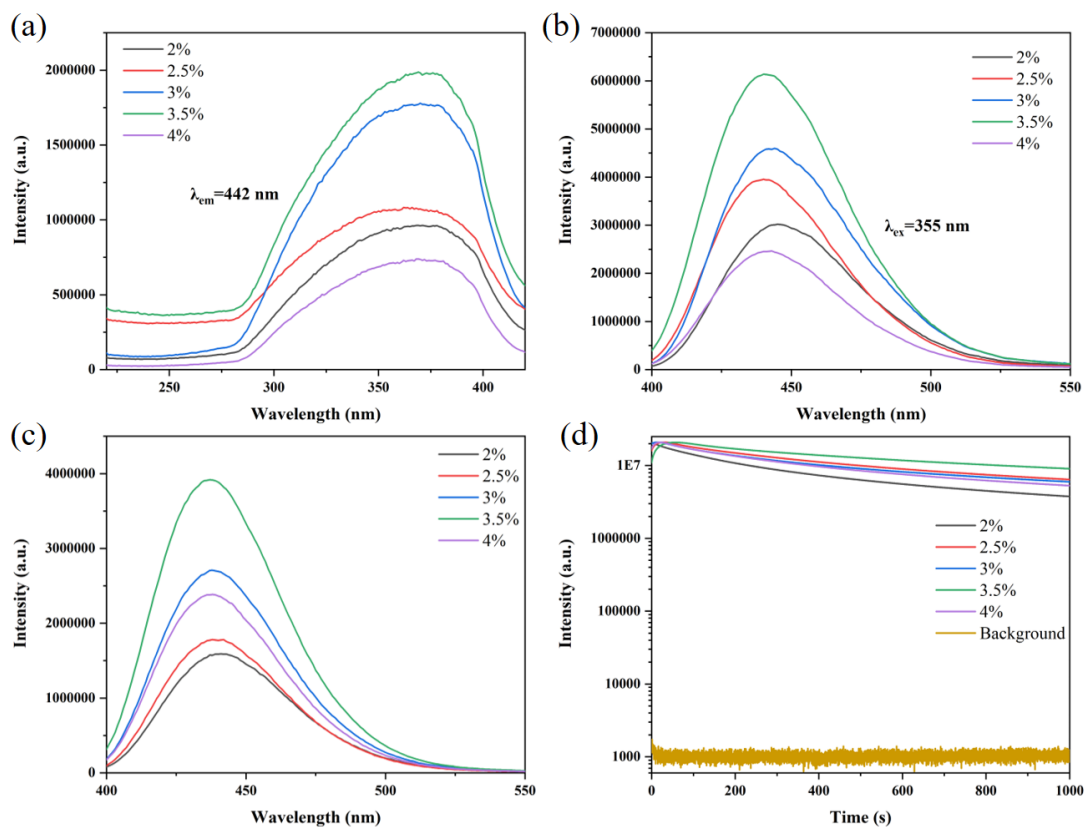
Time (h)	2%	2.5%	3%	3.5%	4%
0	224	228	236	251	230
1	158	175	194	221	177
2	88	94	108	124	101
3	64	77	80	104	78
4	49	59	61	75	59
5	33	36	44	54	42

**Table S6.** The blue channel values of afterglow decay images of luminescent coatings (in RGB format).

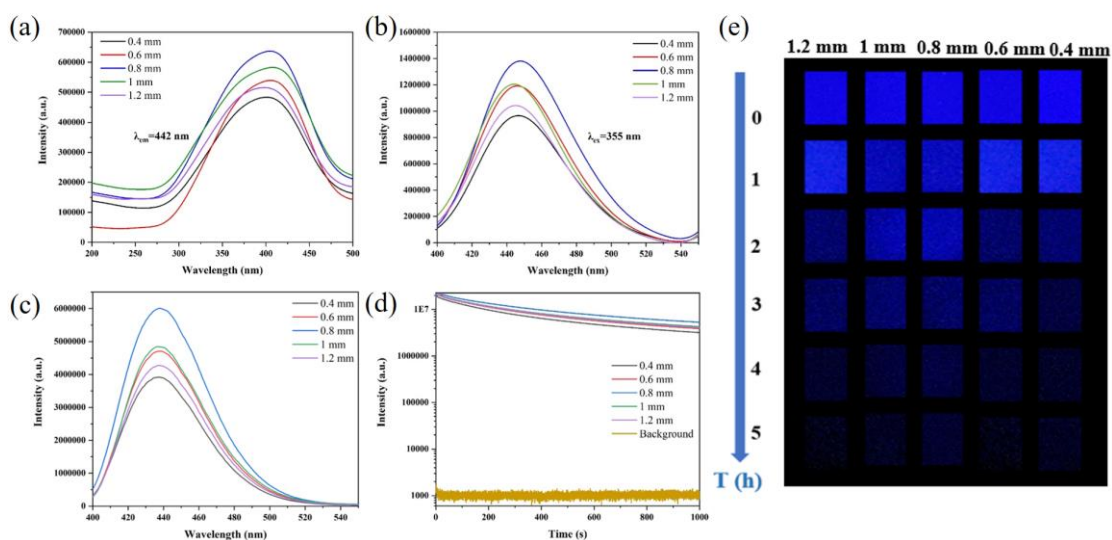
	0 h	1h	2 h	3 h	4 h	5 h
Sunday	254	230	192	99	82	48
Cloudy	250	224	183	94	71	43
Rainy	231	219	175	89	69	41



**Figure S1.** (a) PLE spectra, and (b) PL spectra of luminescent coatings with different SiO<sub>2</sub> contents. (c) Afterglow spectra, and (d) Afterglow decay curves of luminescent coatings with different SiO<sub>2</sub> contents obtained after 5 min illumination with 365 nm UV light.



**Figure S2.** (a) PLE spectra, and (b) PL spectra of luminescent coatings with different  $\text{CaCO}_3$  contents. (c) Afterglow spectra, and (d) Afterglow decay curves of luminescent coatings with different  $\text{CaCO}_3$  contents obtained after 5 min illumination with 365 nm UV light.



**Figure S3.** (a) PLE spectra, and (b) PL spectra of luminescent coatings with different thickness. (c) Afterglow spectra, and (d) Afterglow decay curves of luminescent coatings with different thickness obtained after 5 min illumination with 365 nm UV light. (e) Afterglow images of luminescent coatings taken after sunlight excitation for 2 h, with different thickness.