

Supplementary Information

α -(Y,Gd)FS:Ce³⁺: A Novel Red-Emitting Fluorosulfide Phosphor for Solid-State Lighting

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Table S1. Structural Parameters of α -(Y_{0.99}Ce_{0.01})FS from Rietveld refinement on Powder XRD Data at Room Temperature.

α -Y _{0.99} Ce _{0.01} FS						
Atoms	Wyckoff site	<i>x/a</i>	<i>y/b</i>	<i>z/c</i>	Occupancy	<i>U</i> _{iso} (Å ²)
Y	2 <i>c</i>	0.25	0.25	0.2265(2)	0.99	0.00026(2)
S	2 <i>c</i>	0.25	0.25	0.6471(4)	1	0.00257(6)
F	2 <i>a</i>	0.75	0.25	0	1	0.00104(4)
Ce	2 <i>c</i>	0.25	0.25	0.2265(2)	0.01	0.02526(4)

Table S2. Selected bond distances and bond angles of α -Y_{0.99}Ce_{0.01}FS at room temperature.

α -Y _{0.99} Ce _{0.01} FS	
Bond distance (Å)	
(Y/Ce)-S	2.8587(4) (4×)
(Y/Ce)-S	2.7958(2) (1×)
(Y/Ce)-F	2.4313(1) (4×)

α -Y _{0.99} Ce _{0.01} FS	
Bond Angle (degree)	
S-(Y/Ce)-S	72.09(1) (4×)
S-(Y/Ce)-S	84.574(1) (4×)
S-(Y/Ce)-S	144.181(1) (2×)
F-(Y/Ce)-S	70.989(4) (4×)
F-(Y/Ce)-S	135.676(4) (7×)
F-(Y/Ce)-S	129.313(2) (4×)
F-(Y/Ce)-F	66.335(2) (4×)
F-(Y/Ce)-F	101.374(2) (2×)

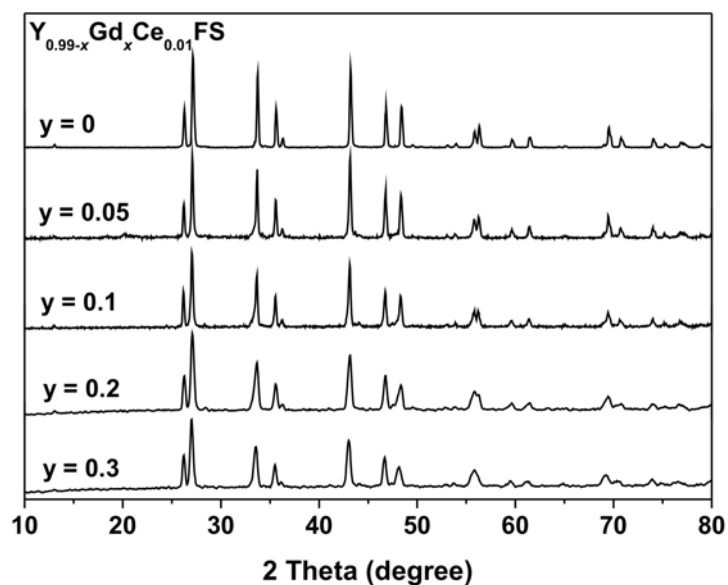


Figure S1. Comparison of the XRD patterns of $\alpha\text{-(Y}_{0.99-y}\text{Ce}_{0.01}\text{Gd}_y\text{)FS}$ ($y = 0, 0.005, 0.01, 0.02$ and 0.03) phosphors.

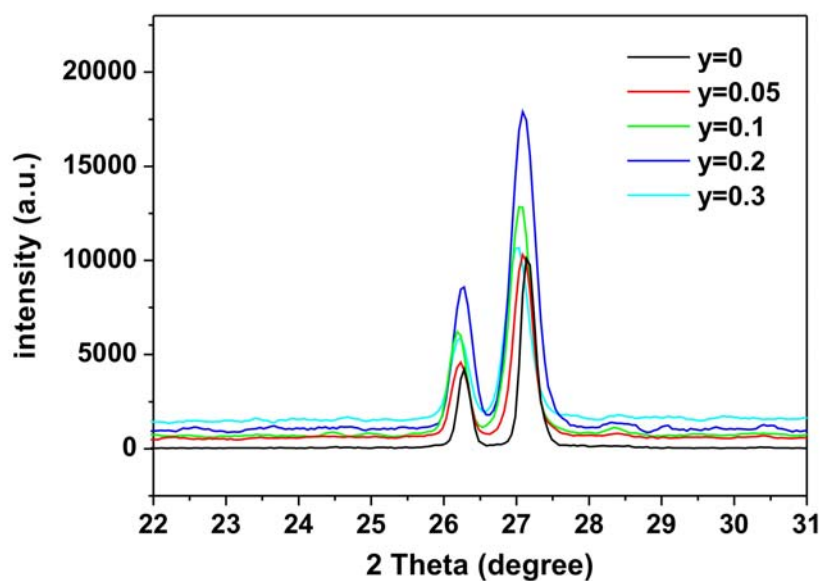


Figure S2. Comparison of the PL spectra of $\alpha\text{-(Y}_{0.99-y}\text{Ce}_{0.01}\text{Gd}_y\text{)FS}$ ($y = 0, 0.005, 0.01, 0.02$ and 0.03) phosphors.

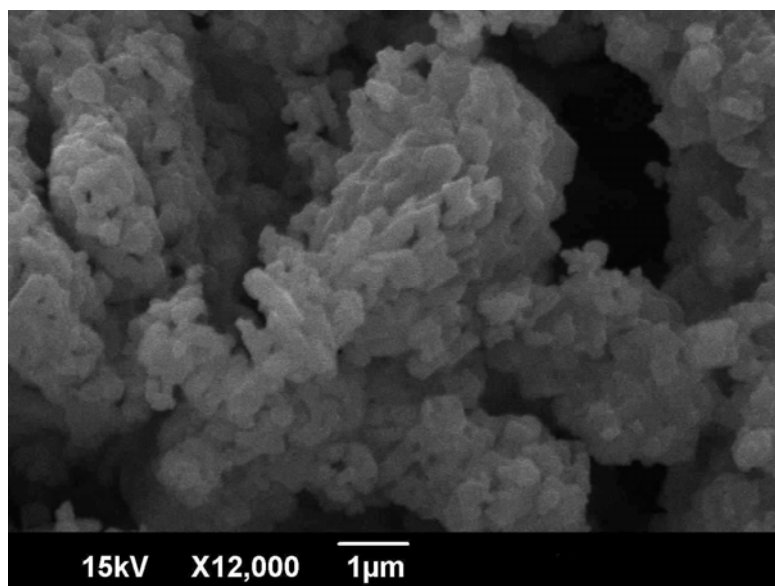


Figure S3. The SEM micrographs of the α -(Y_{0.99}Ce_{0.01})FS phosphors.

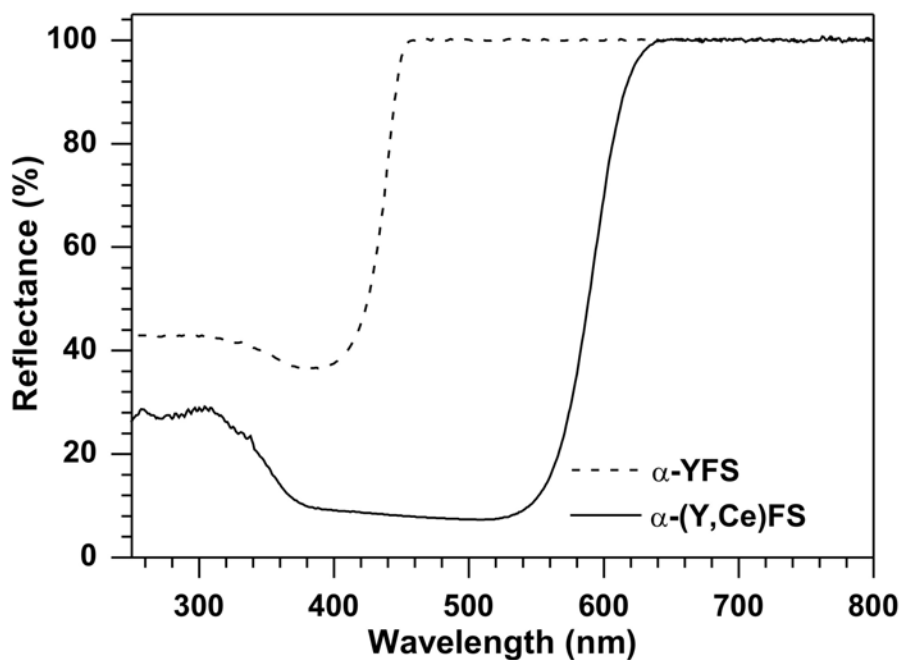


Figure S4. The diffuse reflectance spectra of α -YFS and α -(Y, Ce)FS.

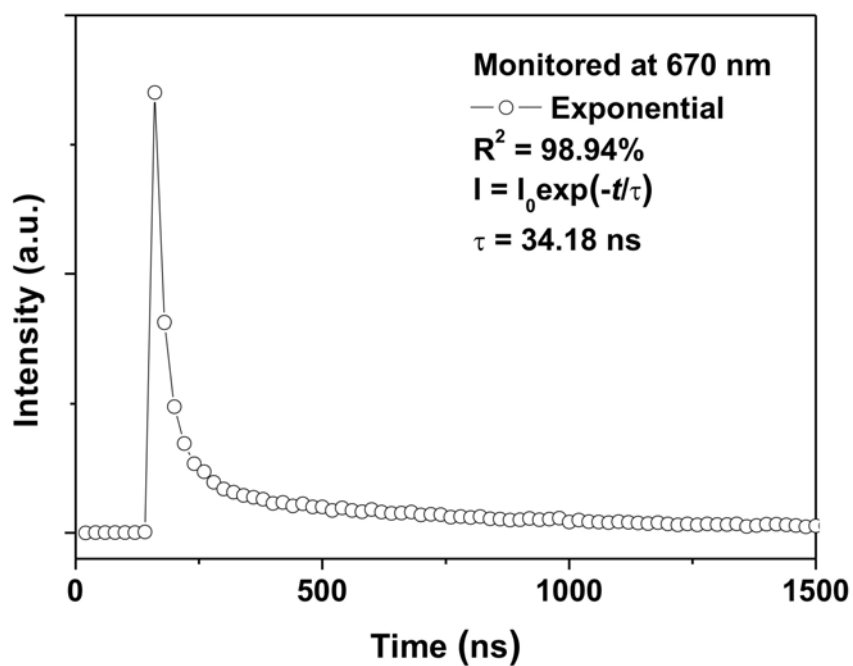


Figure S5. The decay lifetime of the α -(Y_{0.79}Ce_{0.01}Gd_{0.2})FS phosphors.