

## Electronic Supplementary Information

### Luminescence declining behaviors in YAG:Ce transparent ceramics for high power laser lighting

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## 1. Supporting figures

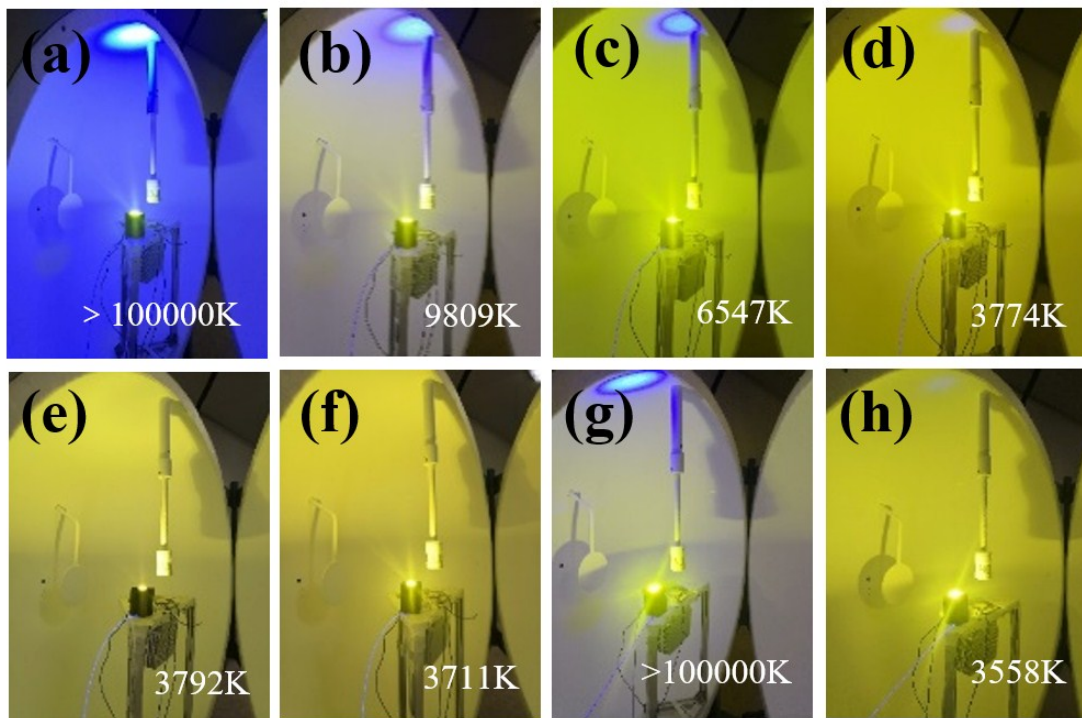


Fig. S1. The pictures of lighting effects (blue-laser spot) equipped with all samples under the lighting type in figure 2(b): (a):TC1; (b):TC2; (c):TC3; (d):TC4; (e):TC5; (f):TC6; (g):SC1; (h):SC2 (Input=2 W)

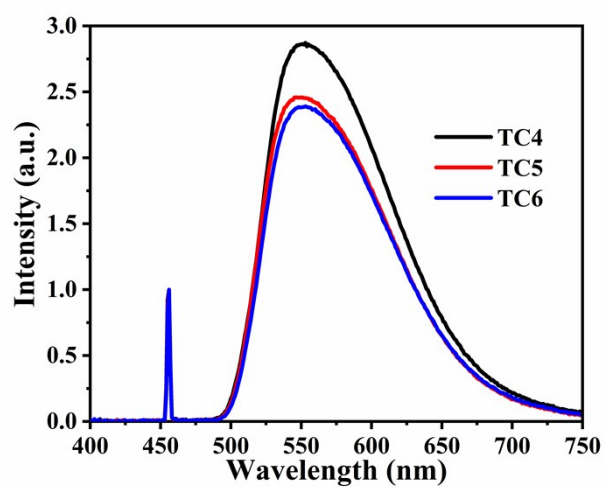


Fig. S2. Electroluminescence spectra of TC4, TC5 and TC6 under the lighting types in

Fig. 2(b). Running at a steady state (120 s).

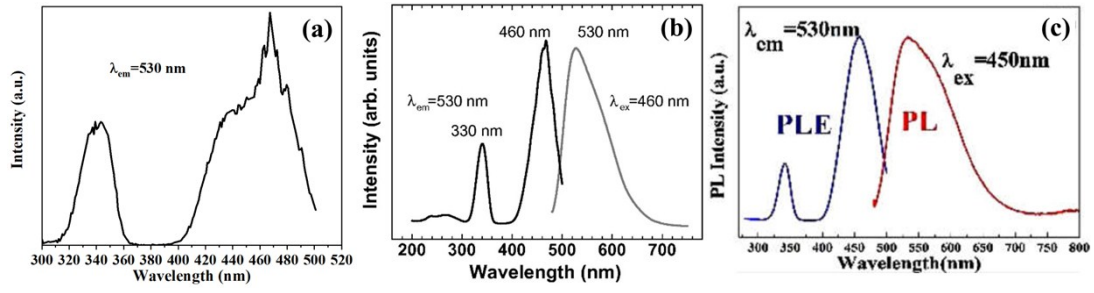


Fig. S3. PLE of transparent YAG:Ce ceramic: (a) our result (before fitting),

(b) Ref [53] and (c) Ref [54]

## 2 Supporting tables

Table S1. Luminous efficiencies based on YAG:Ce transparent ceramic in previous work

Year	Power density	Luminous efficiency	Reference
2019	1W mm <sup>-2</sup>	125 lm/W	1
	16 W mm <sup>-2</sup>	80 lm/W	
2019	1W mm <sup>-2</sup>	152 lm/W	2
	16 W mm <sup>-2</sup>	147 lm/W	
2018	-----	116 lm/W	3
2018	7 W mm <sup>-2</sup>	140 lm/W	4
	16 W mm <sup>-2</sup>	133 lm/w	
2018	-----	176 lm/w	5
2018	40 W mm <sup>-2</sup>	33 lm/W	6
2018	3 W mm <sup>-2</sup>	95 lm/W	7
	8 W mm <sup>-2</sup>	70 lm/W	
	4 W mm <sup>-2</sup>	175 lm/W	
2017	10 W mm <sup>-2</sup>	133 lm/W	8
	1W mm <sup>-2</sup>	121 lm/W	
2017	13 W mm <sup>-2</sup>	45 lm/W	9
	-----	44 lm/W	
2016	-----	44 lm/W	10

Table S2. Luminous efficiency (LE) of TLMs (without the phenomenon of blue-laser spot)

under the lighting types in Figure 2(b) (Input=2 W)

Sample	TC4	TC5	TC6	SC2
LE (lm/W)	52	49	47	71

Table S3. CCT and LE under different the lighting types in Fig. 2(a, c) (Laser/LED on)

Sample	Excited source	CCT (K)	LE (lm/W)
TC4	LED	4317	248.5
	<b>LD</b>	<b>4575</b>	<b>173.4</b>
TC5	LED	4642	236.4
	<b>LD</b>	<b>4190</b>	<b>170.0</b>
TC6	LED	4469	226.9
	<b>LD</b>	<b>4007</b>	<b>170.8</b>
SC2	LED	4053	269.2
	<b>LD</b>	<b>4366</b>	<b>184.2</b>

Table S4. The absorption intensity of YAG: Ce ceramic according to Fig. S3

Wavelength	Absorption intensity		
	Our Results	Ref [46]	Ref [47]
445	0.60	0.86	0.86
<b>450</b>	<b>0.63</b>	<b>0.93</b>	<b>0.94</b>
455	0.64	0.97	0.98
<b>460</b>	<b>0.70</b>	<b>1</b>	<b>1</b>
465	<b>0.83</b>	0.98	0.95
<b>470</b>	<b>0.88</b>	<b>0.8</b>	<b>0.88</b>



### 3 References in ESI

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