UV-A and UV-B excitation region broadened novel green color-emitting $CaGd_2ZnO_5$: Tb^{3+} nanophosphors

G. Seeta Rama Raju, E. Pavitra, Goli Nagaraju, Xiang-Yu Guan and Jae Su Yu*

Department of Electronics and Radio Engineering, Institute for Laser Engineering, Kyung Hee University, 1 Seocheon-dong, Giheung-gu, Yongin-si, Gyeonggi-do 446-701 Republic of Korea.

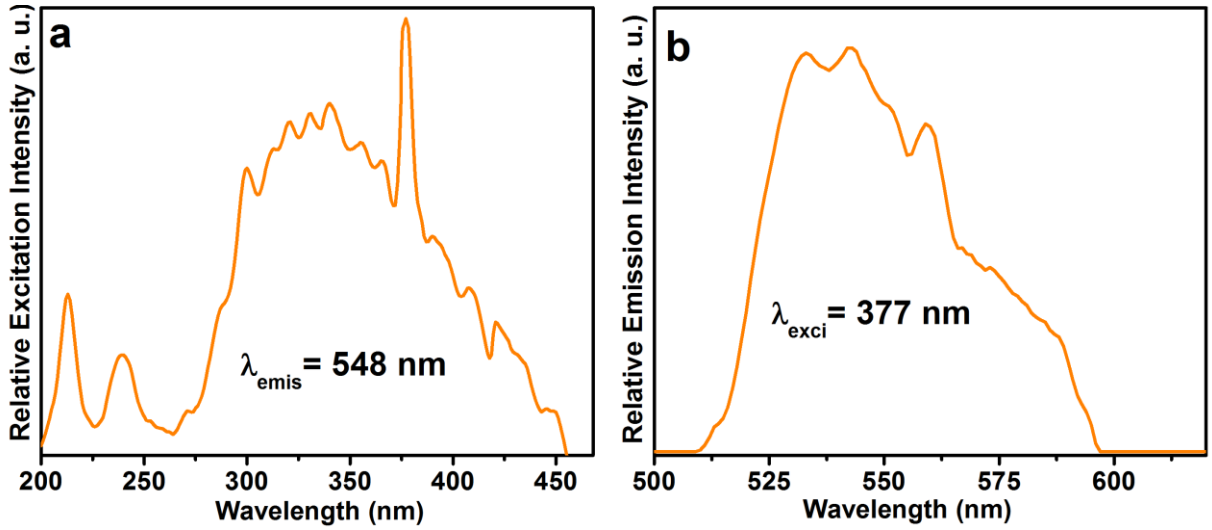

Fig. S1: (a) PLE and (b) PL spectra of CGZO host lattice.

Figure S1. Shows the PLE and PL spectra of CGZO host lattice which exhibited the broad excitation and emission bands due to the surface states and oxygen deficiency related defects.

CIE chromaticity coordinates calculations:

The 1931 CIE (x, y) chromaticity coordinates are calculated from the spectral power distribution (SPD) of the light source and the CIE color-matching functions (Figure S2). The numerical values of these color-matching functions are tabulated in Table S1.

The $\bar{x}$, $\bar{y}$, $\bar{z}$ color-matching functions give the tristimulus value X, Y and Z:

$$X=\int p\bar{x}\ d\lambda,\quad Y=\int p\bar{y}\ d\lambda,\quad Z=\int p\bar{z}\ d\lambda,$$

where p is the SPD of the light source. From X, Y and Z, the chromaticity coordinates x, y, z can be obtained as follows:

$$x=\frac{X}{X+Y+Z}\qquad y=\frac{Y}{X+Y+Z}$$

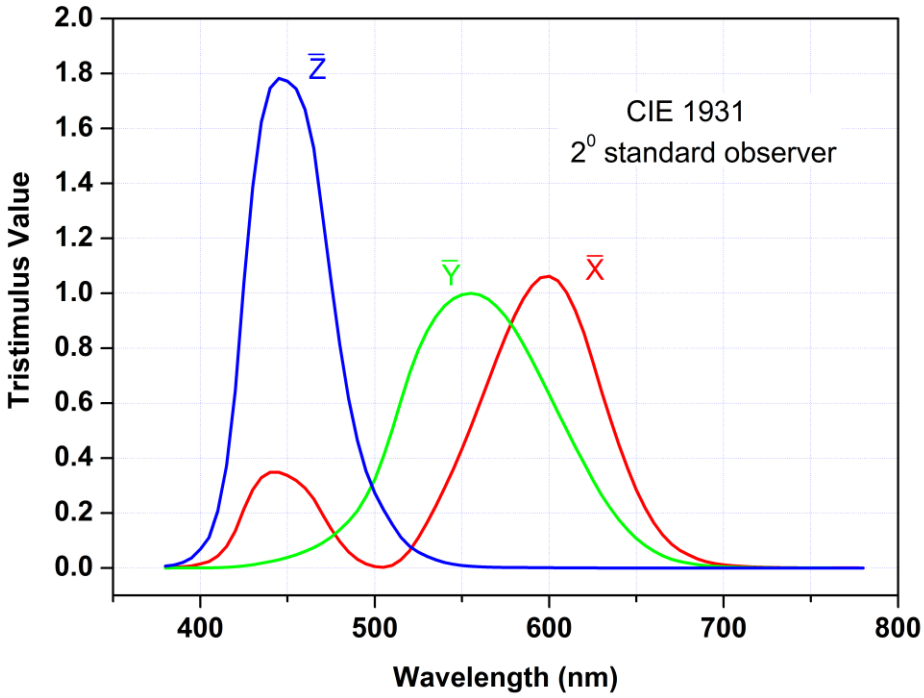

Fig. S2: CIE color matching functions

Table S1: CIE 1931 two-degree color-matching functions

λ/nm	Spectral tristimulus values		
	$\bar{x}(\lambda)$ red	$\bar{y}(\lambda)$ green	$\bar{z}(\lambda)$ blue
380	0.0014	0.0000	0.0065
385	0.0022	0.0001	0.0105
390	0.0042	0.0001	0.0201
395	0.0076	0.0002	0.0362
400	0.0143	0.0004	0.0679
405	0.0232	0.0006	0.1102
410	0.0435	0.0012	0.2074
415	0.0776	0.0022	0.3713
420	0.1344	0.0040	0.6456
425	0.2148	0.0073	1.0391
430	0.2839	0.0116	1.3856
435	0.3285	0.0168	1.6230
440	0.3483	0.0230	1.7471
445	0.3481	0.0298	1.7826
450	0.3362	0.0380	1.7721
455	0.3187	0.0480	1.7441
460	0.2908	0.0600	1.6692
465	0.2511	0.0739	1.5281
470	0.1954	0.0910	1.2876
475	0.1421	0.1126	1.0419

480	0.0956	0.1390	0.8130
485	0.0580	0.1693	0.6162
490	0.0320	0.2080	0.4652
495	0.0147	0.2586	0.3533
500	0.0049	0.3230	0.2720
505	0.0024	0.4073	0.2123
510	0.0093	0.5030	0.1582
515	0.0291	0.6082	0.1117
520	0.0633	0.7100	0.0782
525	0.1096	0.7932	0.0573
530	0.1655	0.8620	0.0422
535	0.2257	0.9149	0.0298
540	0.2904	0.9540	0.0203
545	0.3597	0.9803	0.0134
550	0.4334	0.9950	0.0087
555	0.5121	1.0000	0.0057
560	0.5945	0.9950	0.0039
565	0.6784	0.9786	0.0027
570	0.7621	0.9520	0.0021
575	0.8425	0.9154	0.0018
580	0.9163	0.8700	0.0017
585	0.9786	0.8163	0.0014
590	1.0263	0.7570	0.0011
595	1.0567	0.6949	0.0010
600	1.0622	0.6310	0.0008
605	1.0456	0.5668	0.0006
610	1.0026	0.5030	0.0003
615	0.9384	0.4412	0.0002

620	0.8544	0.3810	0.0002
625	0.7514	0.3210	0.0001
630	0.6424	0.2650	0.0000
635	0.5419	0.2170	0.0000
640	0.4479	0.1750	0.0000
645	0.3608	0.1382	0.0000
650	0.2835	0.1070	0.0000
655	0.2187	0.0816	0.0000
660	0.1649	0.0610	0.0000
665	0.1212	0.0446	0.0000
670	0.0874	0.0320	0.0000
675	0.0636	0.0232	0.0000
680	0.0468	0.0170	0.0000
685	0.0329	0.0119	0.0000
690	0.0227	0.0082	0.0000
695	0.0158	0.0057	0.0000
700	0.0114	0.0041	0.0000
705	0.0081	0.0029	0.0000
750	0.0003	0.0001	0.0000
755	0.0002	0.0001	0.0000
760	0.0002	0.0001	0.0000
765	0.0001	0.0000	0.0000
770	0.0001	0.0000	0.0000
775	0.0001	0.0000	0.0000
780	0.0000	0.0000	0.0000