supplementary information

Bandgap trimming and optical property of Si_3N_4:Al microbelt phosphor for warm white light-emitting diodes

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Table 1 Calculation results for int Al and sub Al in Al-doped α-Si_3N_4

System	Formation heat (eV)	Formation heat per Al atom (eV)
Pure Si_3N_4	0	0
sub 1	1.541	1.541
sub 2	1.454	1.454
int 1	5.733	5.733
int 2	5.732	5.732
int 3	5.733	5.733
sub 1 + int 1	3.229	1.615
sub 1 + int 2	2.749	1.375
sub 1 + int 3	2.876	1.438
sub 2 + int 1	3.006	1.503
sub 2 + int 3	2.989	1.495
sub 1 + sub 2 (neighboring)	3.352	1.676
sub 1 + sub 2 (far apart)	3.162	1.581
sub 1 + sub 2 + int 1	2.526	0.842
sub 1 + sub 2 + int 2	1.964	0.655
sub 1 + sub 2 + int 3	2.008	0.669

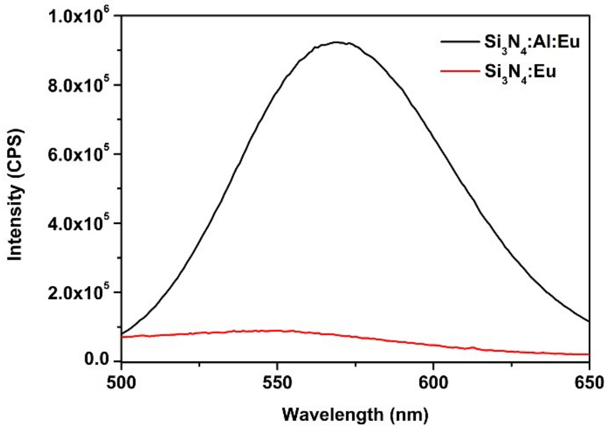

Fig. S1 PL spectrum of Si_3N_4:Al:Eu and Si_3N_4:Eu excited at 450 nm with the same slit width

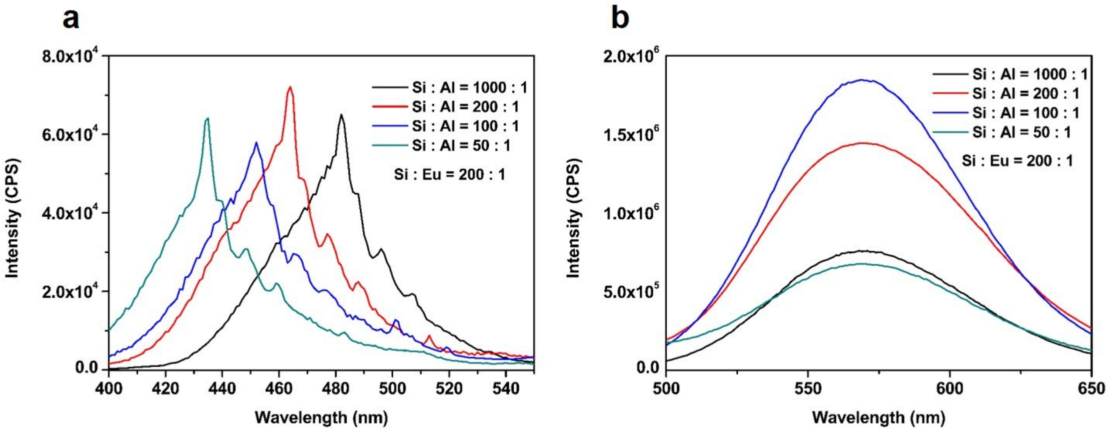

Fig. S2 The real PLE and PL spectra of as-produced Si_3N_4:Al:Eu yellow-orange phosphors

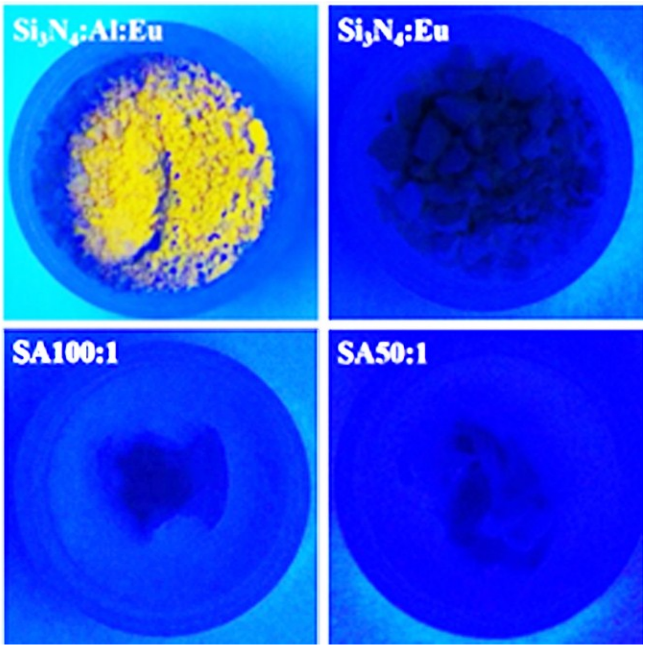

Fig. S3 Photographs of as-produced Si_3N_4:Al:Eu, Si_3N_4:Eu, SA100:1 and SA50:1 excited at 450 nm