Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

Superior Stable and High Quantum Yield Phosphor $Na_2BaSr(PO_4)_2$: Eu^{2+} for Plant Growth LEDs

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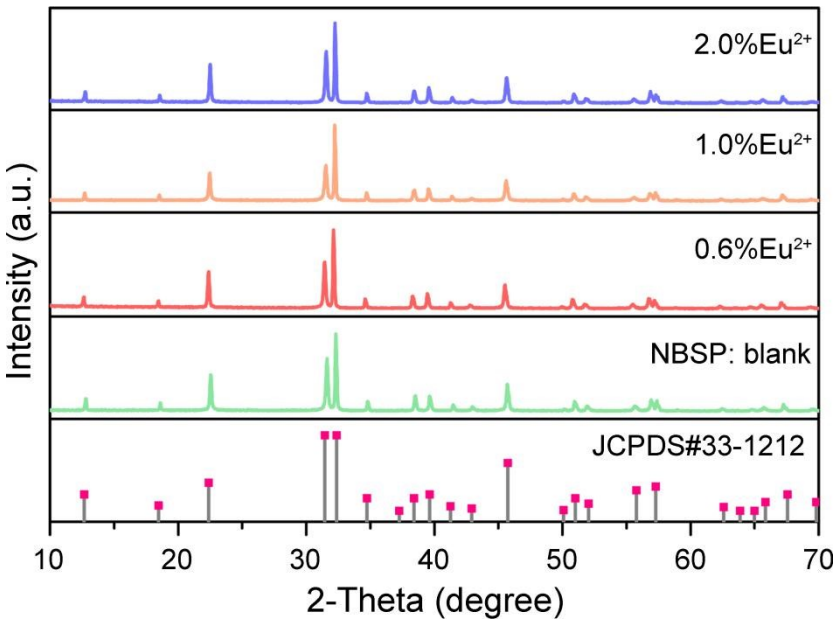

Figure S1. Powder XRD patterns of NBSP: x%Eu^{2+} (x = 0, 0.6, 1.0, 2.0) together with standard profile of NBSP host (JCPDS#33-1212).

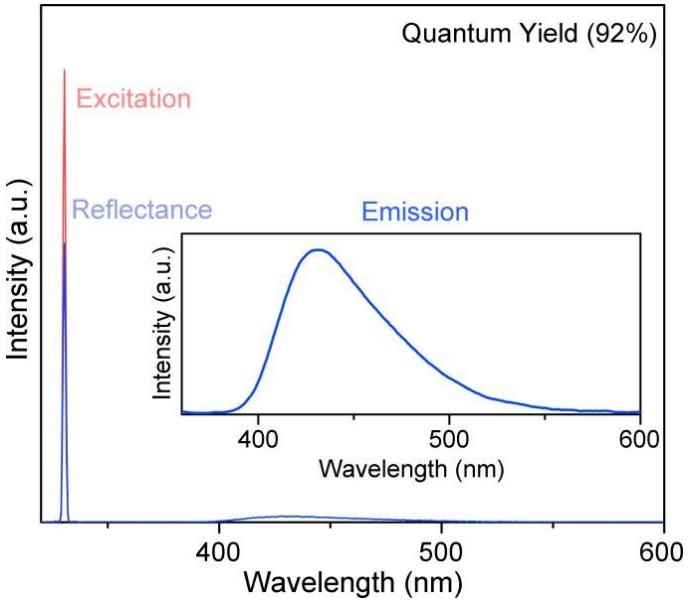

Figure S2. The quantum yield of NBSP: 1%Eu^{2+}.

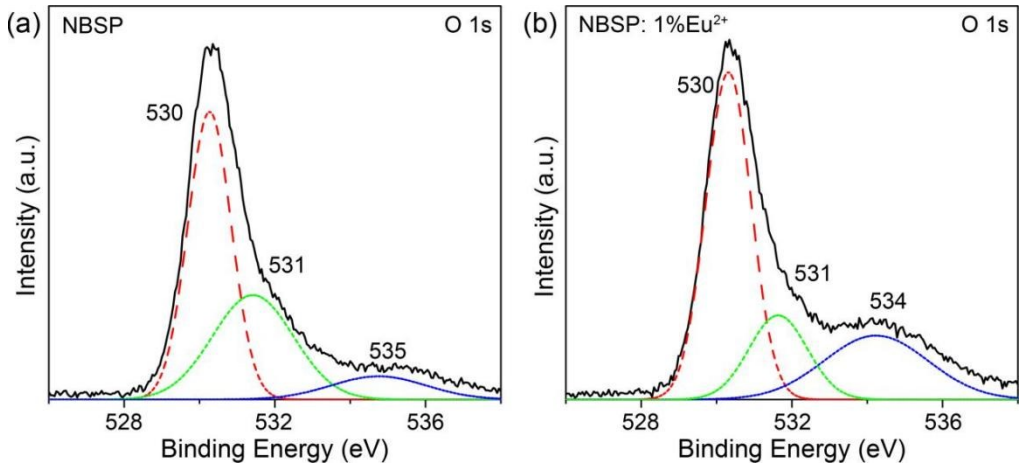

Figure S3. The high resolution XPS of O1s in NBSP and NBSP: 1%Eu^{2+}.

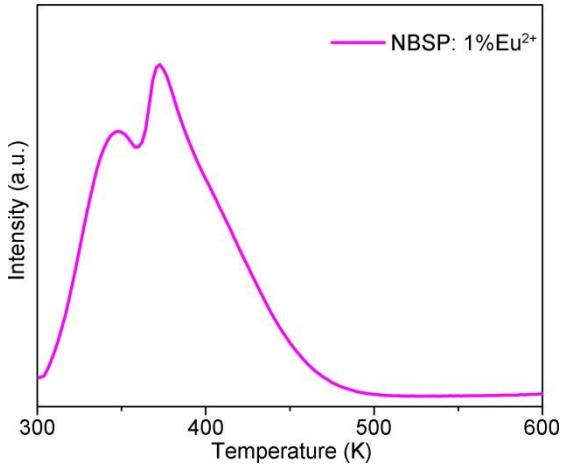

Figure S4. (a) The thermoluminescence (TL) spectrum of the 1%Eu^{2+}-doped NBSP.

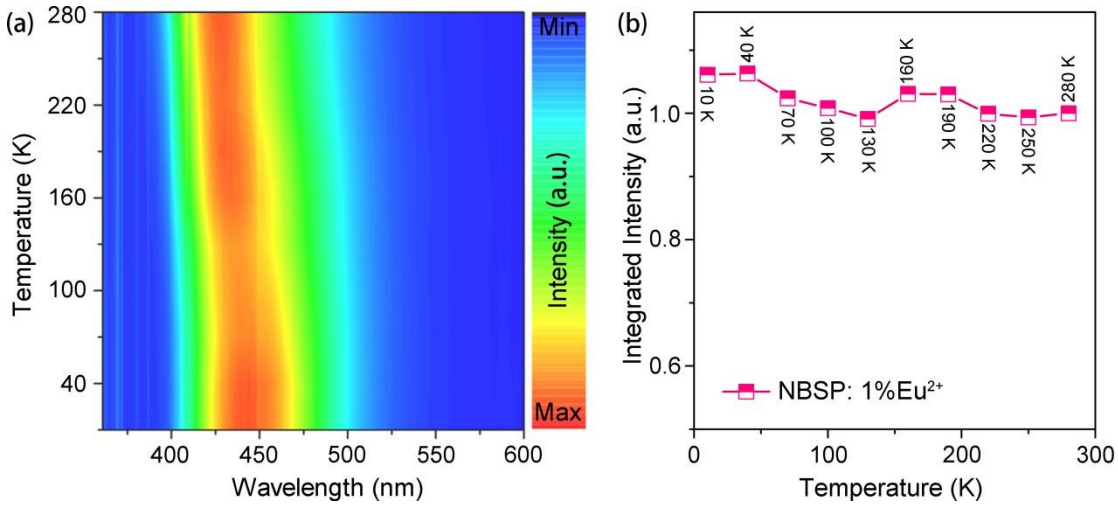

Figure S5. The two-dimension temperature-dependent emission spectrum from 10 to 280 K of 1%Eu^{2+} doped NBSP.

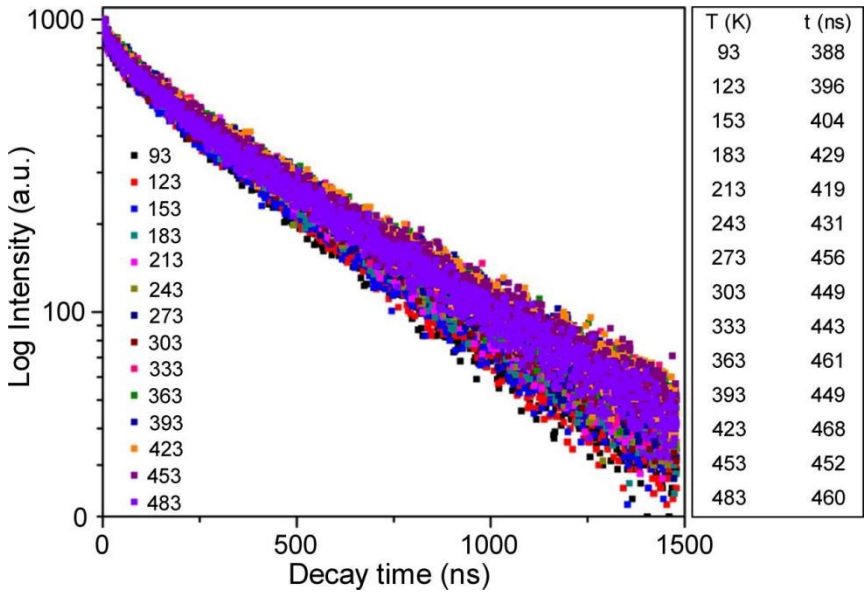

Figure S6. The temperature-dependent decay curves and lifetime of the 1%Eu^{2+}-doped NBSP.

Table S1. The ionic radius (r) of the Ba^{2+}, Sr^{2+}, Na^{+} and Eu^{2+} atoms with different coordination numbers (CN).

Ionic	CN	r (Å)
Ba^{2+}	6	1.35
Sr^{2+}	6	1.18
	7	1.21
	10	1.36
Na^{+}	6	1.02
	7	1.12
	9	1.24
Eu^{2+}	6	1.17
	7	1.20
	10	1.35

Table S2. The sites and their chemical composition in NBSP.

Site	**Chemical Composition**
Ba/Sr1	Ba: 0.480; Sr: 0.520
Sr2/Na1	Sr: 0.580; Na: 0.420
Sr3/Na2	Sr: 0.190; Na: 0.810
Na3	Na: 1.000
P1/vacancy	P: 0.760; vacancy: 0.240
P2	P: 1.000
O1/vacancy	O: 0.800; vacancy: 0.200
O2	O: 1.000
O3/vacancy	O: 0.800; vacancy: 0.200
O4	O: 1.000