Novel borate phosphors $Lu_5Ba_6B_9O_{27}:Ce^{3+}$ codoping Sr^{2+}/Tb^{3+} for NUV-white light emitting diodes application

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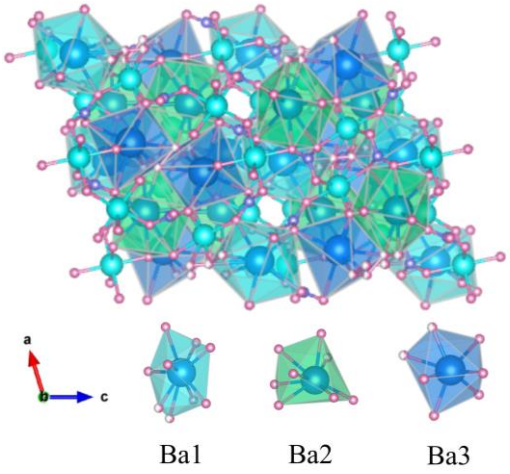

Fig S1. Crystal structure of LBB and the crystallographically independent cation coordination environment of Ba1, Ba2 and Ba3.

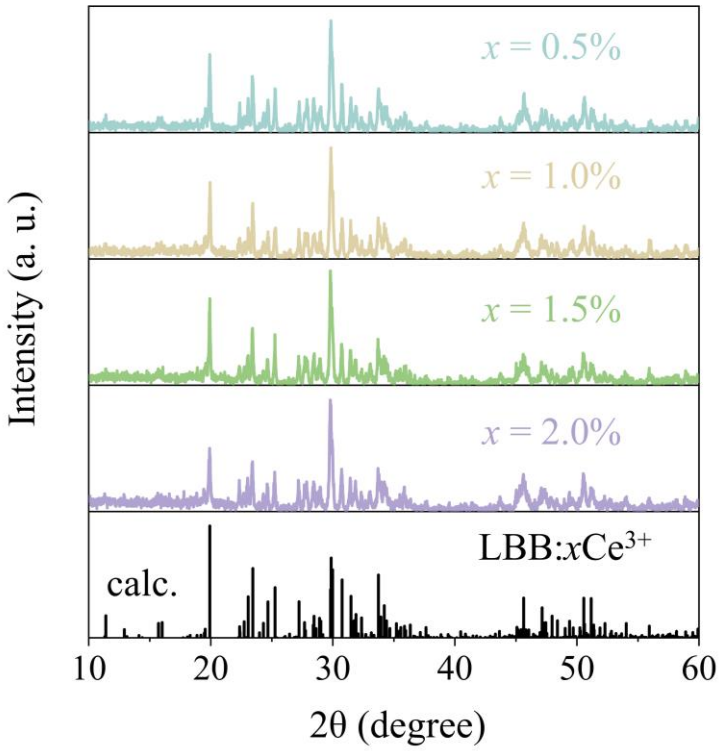

Fig S2. XRD patterns of LBB:xCe^{3+} (x = 0.5%, 1.0%, 1.5%, and 2.0%) phosphors.

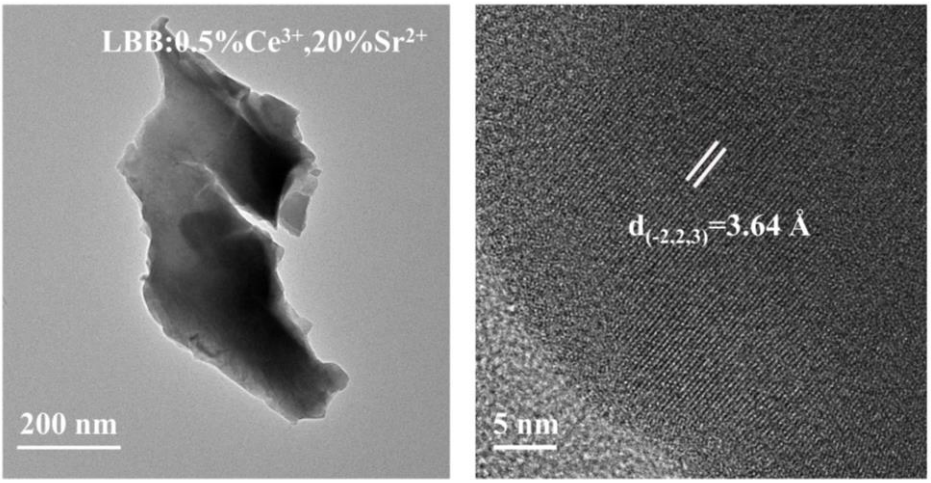

Fig S3. HRTEM image of LBB:0.5%Ce^{3+},20%Sr^{2+}.

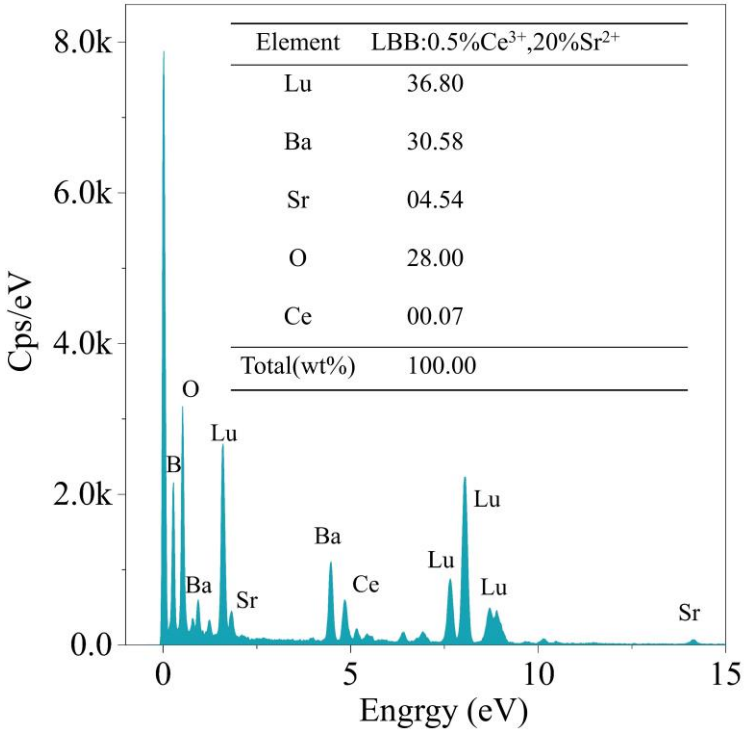

Fig. S4 EDS spectrum of LBB:0.5%Ce^{3+},20%Sr^{2+}.

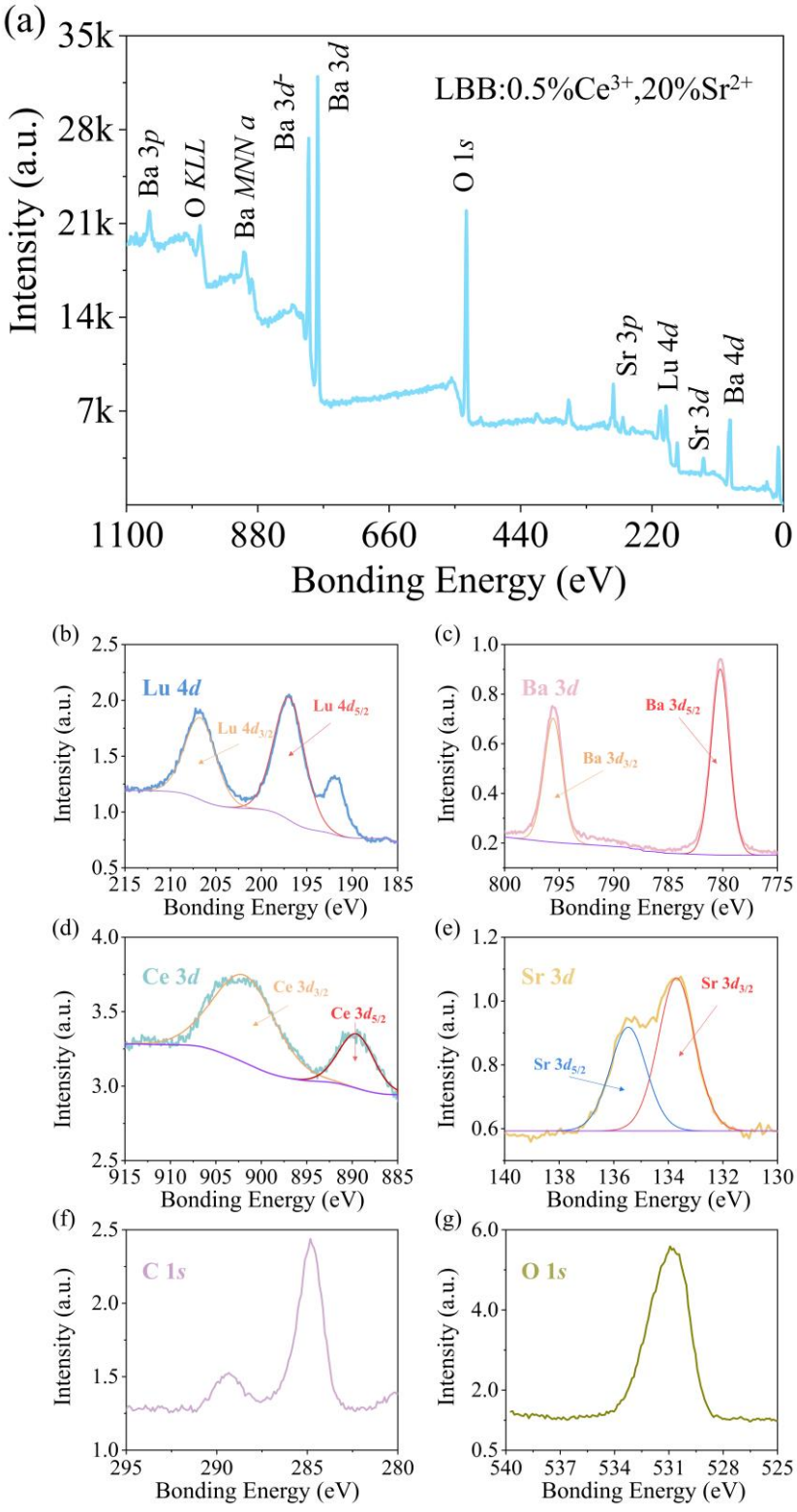

Fig. S5 XPS spectra of LBB:0.5%Ce^{3+},20%Sr^{2+}.

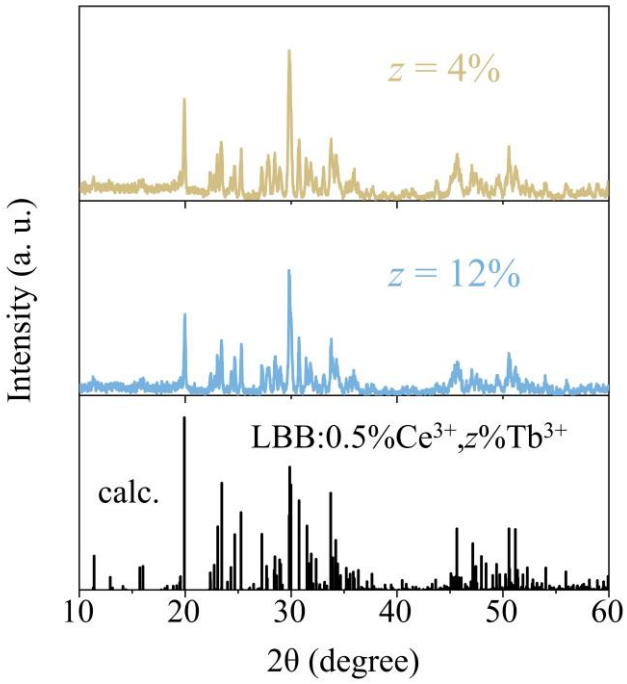

Fig. S6 XRD patterns of LBB:0.5%Ce^{3+},zTb^{3+} (z = 4% and 12%)

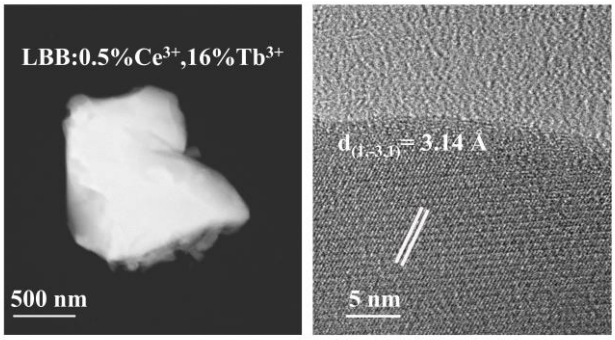

Fig S7. HRTEM image of LBB:0.5%Ce^{3+},16%Tb^{3+}

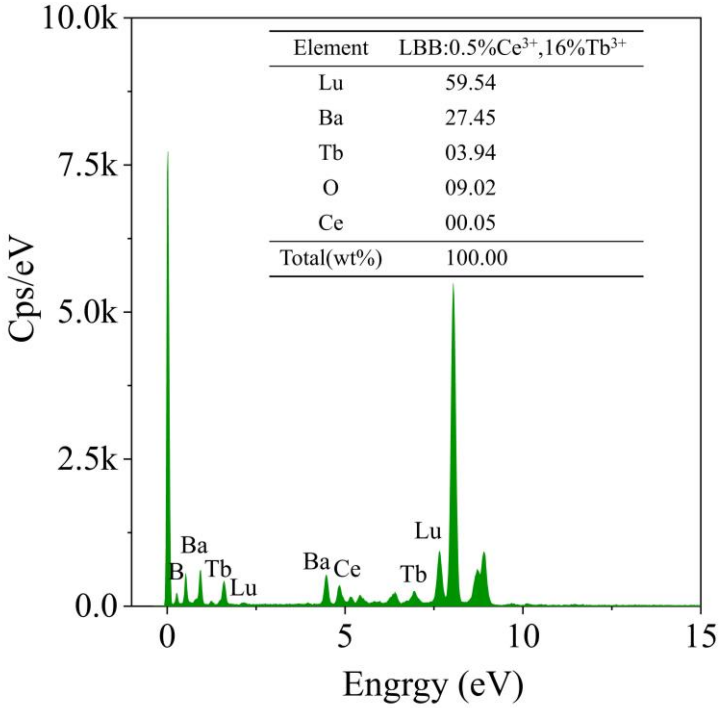

Fig. S8 EDS spectrum of LBB:0.5%Ce^{3+},16%Tb^{3+}

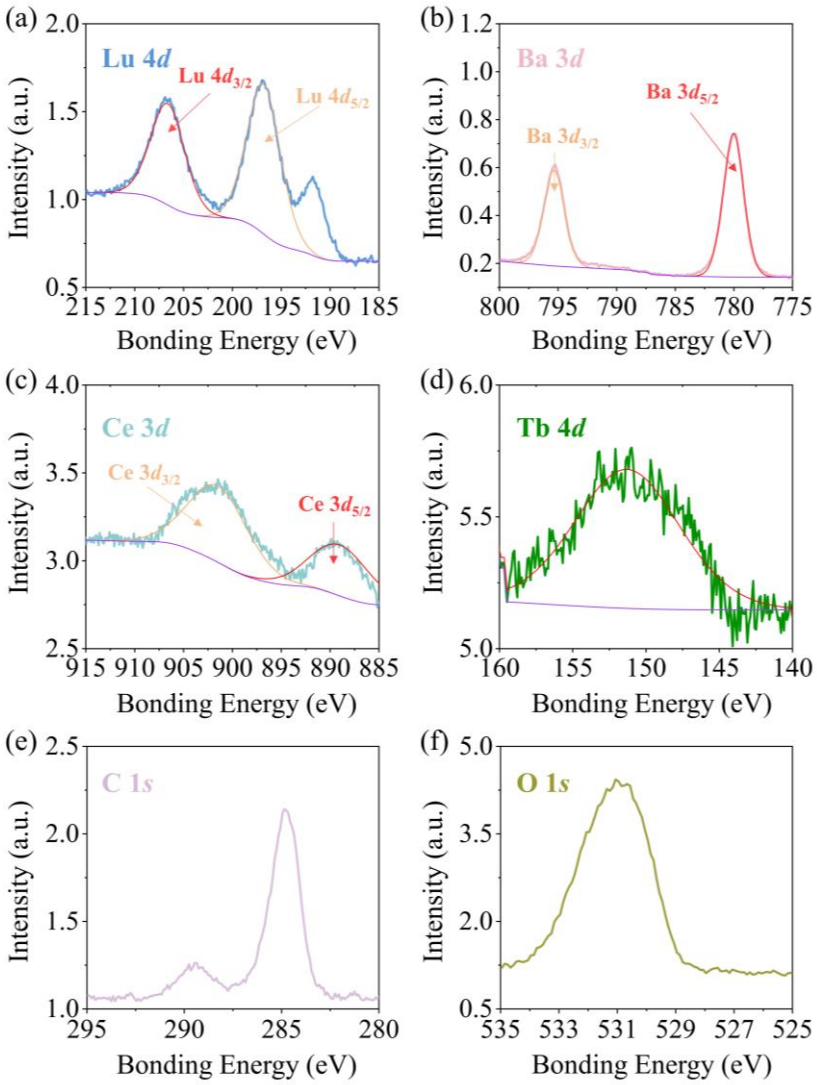

Fig S9. XPS spectra of LBB:0.5%Ce^{3+},16%Tb^{3+}

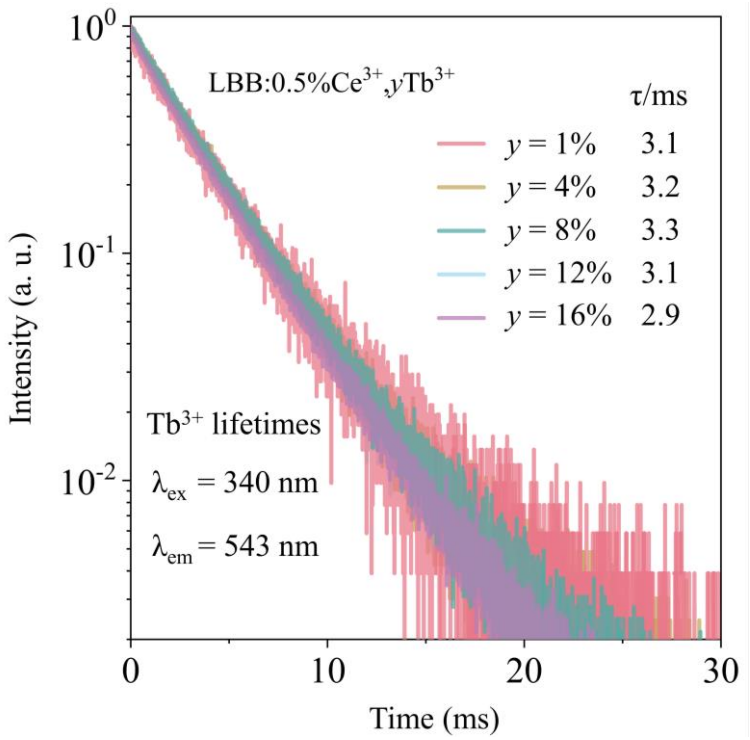

Fig S10. Fluorescence decay curves of Tb^{3+} in LBB:0.5%Ce^{3+},$z$$Tb^{3+}$ (0% ≤ z ≤ 16%)

Table S1. The energy transfer efficiency (η_T) results of LBB:0.5%Ce^{3+},$z$$Tb^{3+}$ (0% ≤ z ≤ 16%) using Eqs. (7) and (8):

LBB: 0.5%Ce^{3+},z%Tb^{3+}	$\eta_{ET} = 1 - \frac{I_S}{I_{S0}}$	$\eta_{ET} = 1 - \frac{\tau_S}{\tau_{S0}}$
z = 1%	10.3%	8.1%
z = 4%	35.8%	9.4%
z = 8%	51.1%	16.2%
z = 12%	67.0%	30.2%
z = 16%	77.2%	39.6%

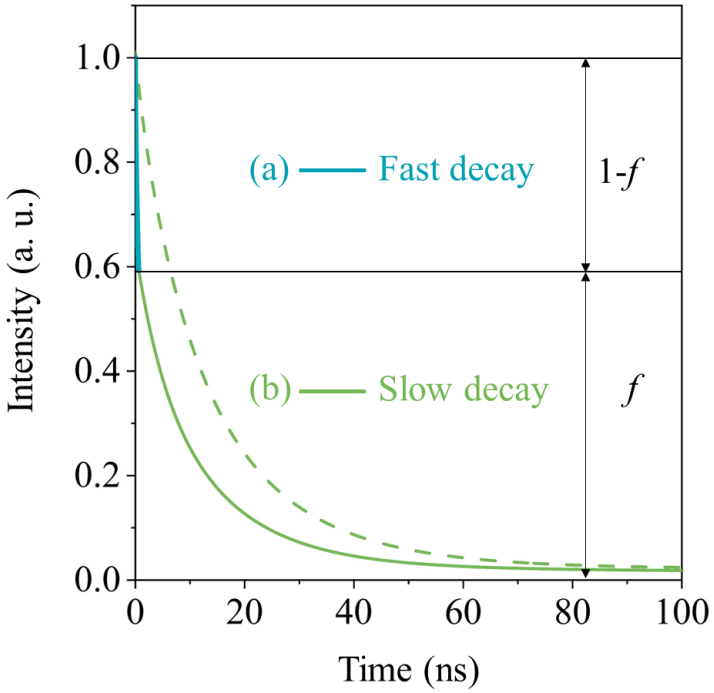

Fig S11. Schematic diagram for the fast (a); and slow (b) decay curves.