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Supporting Information

Color tunable emission and energy transfer in $LaSi_3N_5:Ce^{3+},Tb^{3+}$ phosphors for UV white LEDs

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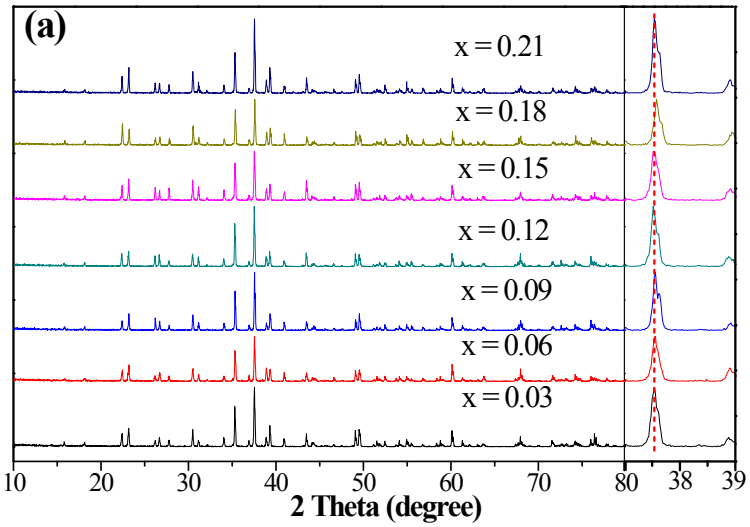
1.1 Crystal structure

The XRD patterns of $La_{1-x}Si_3N_5:xCe^{3+}$(x=0.03-0.21) and $La_{1-y}Si_3N_5:yTb^{3+}$(y=0.02-0.14) phosphors are shown in detail in Figures S1. The diffraction peaks shift to higher angle with Ce^{3+} content increases, ascribing to substitution of the smaller ionic radii of Ce^{3+} (0.103 nm) ion by the larger La^{3+} (0.106 nm) ion. The similar results are also appeared in $La_{1-y}Si_3N_5:yTb^{3+}$ (y=0.02-0.14) samples. As seen in Figure S1(b), there is no impure peaks and the diffraction peaks shift to higher angle with the increase of Tb^{3+} concentration. It was recognized that the smaller ionic radii of Tb^{3+} (0.092 nm) ion by the larger La^{3+} (0.106 nm) ion. The result indicates that $La_{1-y}Si_3N_5:yTb^{3+}$ (y=0.02-0.14) retains a single phase with increasing y. It is obvious that the no other phase or impurity can be detected with differernt Ce^{3+} and Tb^{3+} doping content.



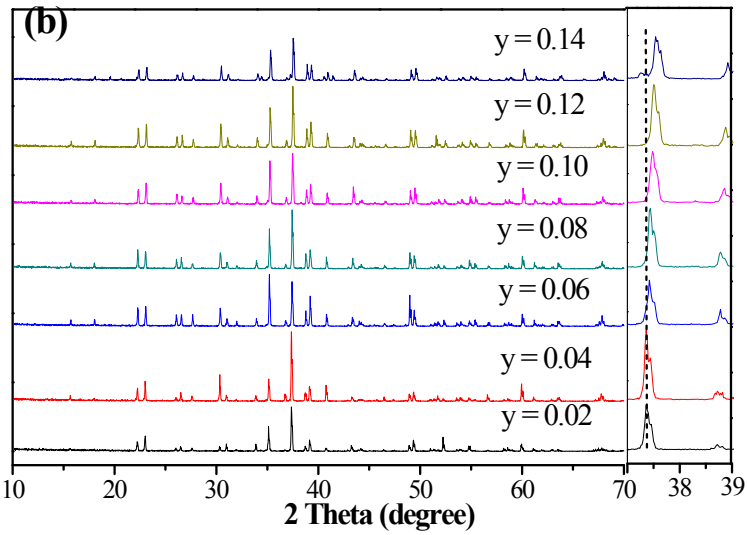


Fig. S1. XRD patterns of $La_{1-x}Si_3N_5:xCe^{3+}$(x=0.03, 0.06, 0.09, 0.12, 0.15, 0.18, 0.21) samples (a) and $La_{1-y}Si_3N_5:yCe^{3+}$(y=0.02, 0.04, 0.06, 0.08, 0.10, 0.12, 0.14) samples (b).

1.2 Energy transfer in $LaSi_3N_5:Ce^{3+},Tb^{3+}$ materials.

Fig. S2 illustrates the energy level model for the energy transfer processes of Ce^{3+}-Tb^{3+} in $LaSi_3N_5$ host. As seen in Figure S2, Ce^{3+} ions can strongly absorb UV light from the ground state (2F5/2) to the excited states, and then efficiently transfer the energy to the $^5D_3$ level of Tb3+ ions;

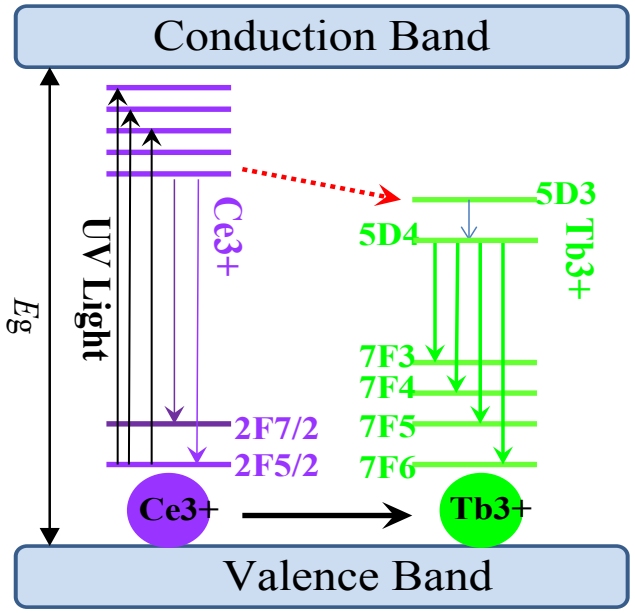


Fig. S2. Illustration of the ET models for Ce^{3+}–Tb^{3+} in the $LaSi_3N_5$ host.