Electronic Supplementary Information

Color Tuning of $(K_{1-x},Na_x)SrPO_4$:0.005Eu^{2+}, yTb^{3+} Blue-emitting Phosphors via Crystal Field Modulation and Energy Transfer

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Experimental details of quantum efficiency measurements.

The quantum yields (QYs) of $(K_{1-x},Na_x)SrPO_4:0.005Eu^{2+}$ phosphors were measured with a commercial quantum-efficiency measurement system (C9920-02, Hamamatsu Photonics) equipped with a 150 W Xe arc lamp, a monochromator, an Ø84 mm integrating sphere, a multichannel detector, and a computer. A 10 mm path length quartz cuvette for samples is set in the integrating sphere. A monochromatic light source was used as the excitation light source, which mounted a xenon lamp with a lamp rating of 150 W. The excitation light was introduced into the integrating sphere by an optical fiber. The system was calibrated with standard rhodamine b solutions. As we are interested in the phosphors for near ultraviolet excitation, the QYs were measured under 385 nm. To make sense, a commercial phosphor (Japan, LMS-540), $(Ba,Sr)_2SiO_4;Eu^{2+}$, was also measured using the system under the same conditions, with a QY value of 85%.

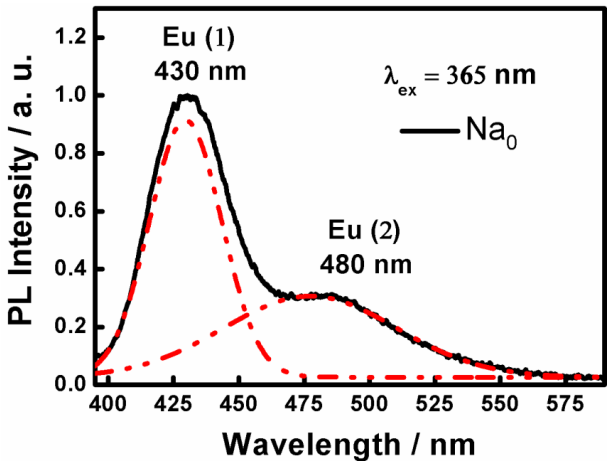

Figure S1. The emission spectrum of $KSrPO_4:Eu^{2+}$ under excitation at 365 nm. The emission of Eu^{2+} is fitted by two Gaussian functions (dash lines), the corresponding wavelengths are centered at 430 nm for Eu(1) and at 480 nm for Eu (2) band, respectively.

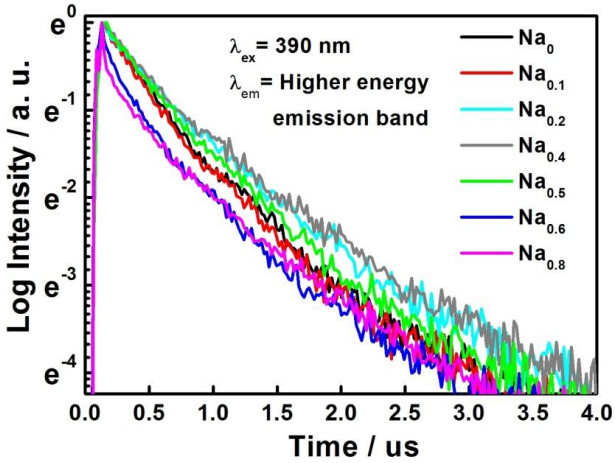

Figure S2. Luminescence decay curves of Eu^{2+} in $K_{0.4}Na_{0.6}Sr_{0.995}PO_4:0.005Eu^{2+}$, yTb^{3+} phosphors under excitation at 390 nm by monitoring the emission peaks located at 430, 434, 437, 440, 444, 452, 452 nm, respectively.

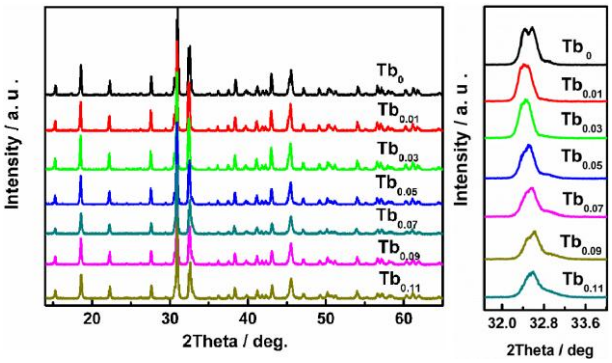

Figure S3. XRD patterns of $K_{1-x}Na_xSr_{0.995}PO_4:0.005Eu^{2+}$, Tb^{3+} phosphor as a function of Tb concentration. (b) Magnified XRD patterns in the region between 30 degree and 34 degree for $K_{1-x}Na_xSr_{0.995}PO_4:0.005Eu^{2+}$ phosphor (x = 0, 0.01, 0.03, 0.05, 0.07, 0.09, 0.11).