Supplementary Information

Hydrothermal Conversion of Layered Hydroxide Nanosheets into 
\((Y_{0.95}Eu_{0.05})PO_4\) and \((Y_{0.96-x}Tb_{0.04}Eu_x)PO_4\) (\(x = 0-0.10\)) Nanocrystals for 
Red and Color-Tailorable Emissions

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Fig. S1 TG profiles of samples S1, S4 and S6.

Fig. S2 XRD patterns of S6 and its products calcined at (a) 800, (b) 900 and (c) 1000 °C for 2 h under O₂ gas flowing at 200 mL min⁻¹.
Fig. S3 Fluorescence decay curves (red) and the results of exponential fitting (black) for the 593-nm emission of S6 (a) and the products calcined from S6 at (b) 800, (c) 900 and (d) 1000 °C.

Fig. S4 Fluorescence decay curves (red) and the results of exponential fitting (black) for the 618-nm emission of S6 (a) and the products calcined from S6 at (b) 800, (c) 900 and (d) 1000 °C.
Fig. S5 CIE chromaticity diagram for the $(Y_{0.95}Eu_{0.05})PO_4$ phosphors.

Fig. S6 XRD patterns of the $(Y_{0.96-x}Tb_{0.04}Eu_x)PO_4$ phosphors calcined at 900 °C for 2 h under flowing $H_2$ (200 mL min$^{-1}$), with (a) $x = 0$, (b) $x = 0.02$, (c) $x = 0.04$, (d) $x = 0.06$, (e) $x = 0.08$ and (f) $x = 0.10$. 
Fig. S7 PLE (a) and PL (b) spectra of the (Y\textsubscript{0.96}Tb\textsubscript{0.04})PO\textsubscript{4} phosphor calcined at 900 °C. The inset in (a) is an amplified show of the Tb\textsuperscript{3+} transitions in the 250-400 nm region.
Fig. S8 Photoluminescence excitation (PLE) spectra of the (Y$_{0.96}$,Tb$_{0.04}$Eu$_x$)PO$_4$ phosphors calcined at 900 °C, with (a) and (b) for the 618 nm red emission of Eu$^{3+}$ and the 546 nm green emission of Tb$^{3+}$, respectively.
Fig. S9 A schematic model for the energy transfer from Tb$^{3+}$ to Eu$^{3+}$.

Table S1 lattice constants $a$ and $c$ and cell volume $V$ of the (Y$_{0.96-x}$Tb$_{0.04}Eu_x$)PO$_4$ solid solutions calcined at 900 °C.

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>0.02</th>
<th>0.04</th>
<th>0.06</th>
<th>0.08</th>
<th>0.10</th>
</tr>
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<tbody>
<tr>
<td>2θ for 200/°</td>
<td>25.80</td>
<td>25.78</td>
<td>25.75</td>
<td>25.73</td>
<td>25.72</td>
<td>25.70</td>
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<tr>
<td>2θ for 101/°</td>
<td>19.51</td>
<td>19.50</td>
<td>19.47</td>
<td>19.46</td>
<td>19.46</td>
<td>19.44</td>
</tr>
<tr>
<td>$V/10^{-3}$ nm$^3$</td>
<td>287.83</td>
<td>288.30</td>
<td>289.44</td>
<td>289.92</td>
<td>290.22</td>
<td>290.97</td>
</tr>
</tbody>
</table>
Fig. S10 Fluorescence decay kinetics (red) and the results of exponential fitting (black) for the 546-nm emission of Tb\textsuperscript{3+} in (Y\textsubscript{0.96-x}Tb\textsubscript{x}Eu\textsubscript{x})PO\textsubscript{4}, with (a) x = 0, (b) x = 0.02, (c) x = 0.04, (d) x = 0.06, (e) x = 0.08 and (f) x = 0.10.

Fig. S11 Fluorescence decay kinetics (red) and the results of exponential fitting (black) for the 618-nm emission of Eu\textsuperscript{3+} in (Y\textsubscript{0.96-x}Tb\textsubscript{x}Eu\textsubscript{x})PO\textsubscript{4}, with (a) x = 0.02, (b) x = 0.04, (c) x = 0.06, (d) x = 0.08 and (e) x = 0.10.