*Electronic supporting information for：*

**Ultralong $Ca_2B_2O_5 \cdot H_2O$ nanowires: Water-bath precursed eco-friendly hydrothermal synthesis, optical and rare earth doped photoluminescence properties**

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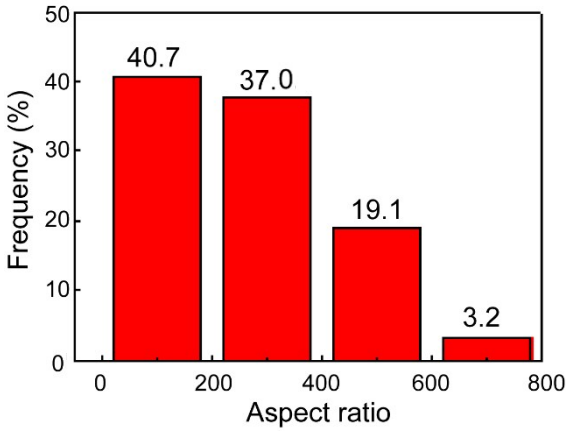


**Fig. S1.** Aspect ratio distribution of the $Ca_2B_2O_5 \cdot H_2O$ nanowires hydrothermally synthesized at 180 ºC for 12.0 h with molar ratio of $Ca^{2+}$:$H_3BO_3$:$OH^-$ as 1.000:4.625:14.375.

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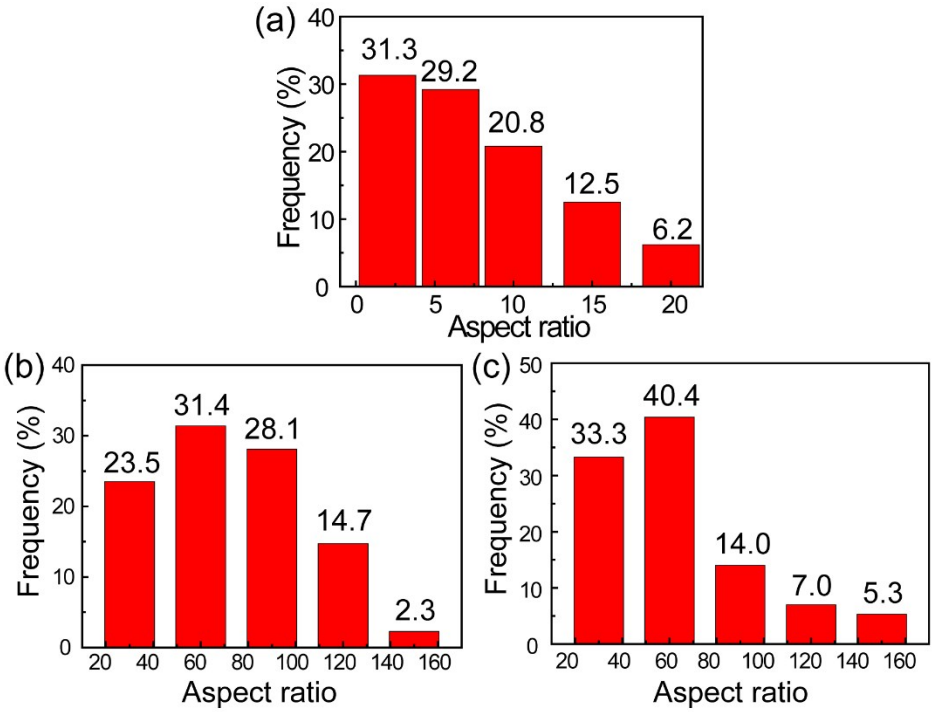


**Fig S2.** The aspect ratio distributions of the hydrothermal products prepared at 180 ºC for 12.0 h with different initial $OH^-$ concentrations (mol $L^{-1}$): (a) 0.287; (b) 0.575; (c) 2.300, while keeping the molar ratio of $Ca^{2+}$:$H_3BO_3$:$OH^-$ as 1.000:4.625:14.375.

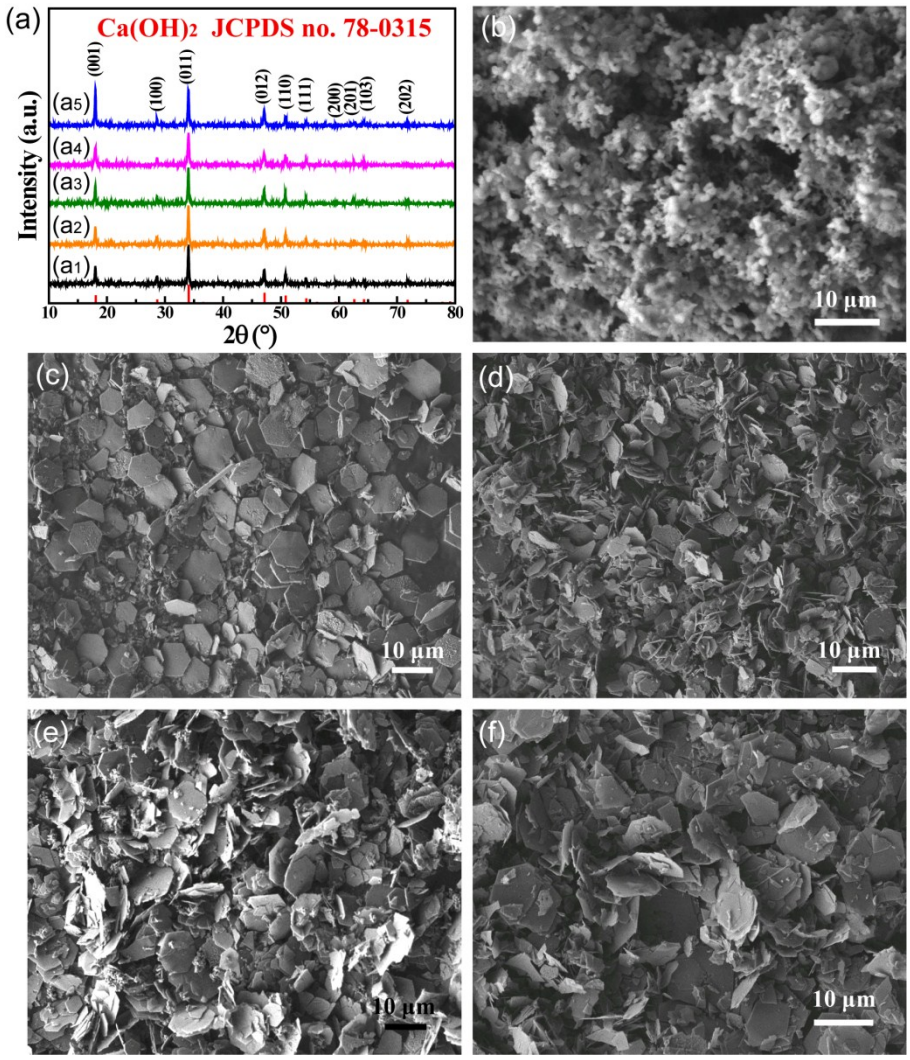


**Fig. S3.** XRD patterns (a) and SEM images (b-f) of the hydrothermal precursors obtained without ($a_1$, b) and after treatment at various pre-treatment temperatures ($a_2$- $a_5$, c-f) for 30 min. Temperature (ºC): ($a_2$, c)-room temperature, ($a_3$, d)-40, ($a_4$, e)-60, ($a_5$, f)-80. The red vertical lines in (a) indicate the standard pattern of $Ca(OH)_2$ (JCPDS no. 78-0315).

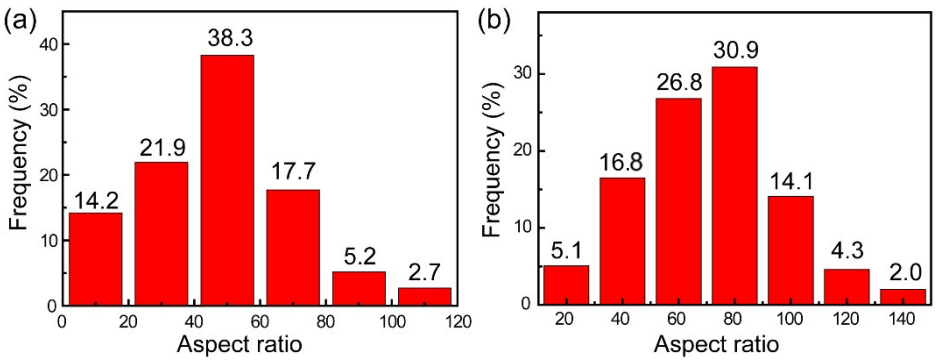


**Fig. S4.** Aspect ratio distribution of the hydrothermal products obtained at various temperatures for 12.0 h. Temperature (ºC): (a)-120, (b)-150.

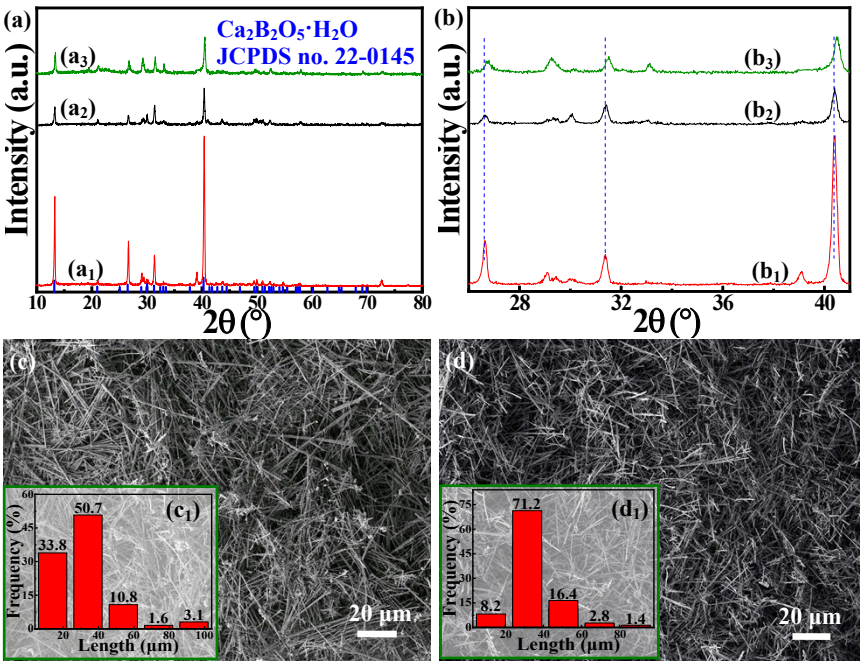


**Fig. S5**. XRD patterns (a, b) and SEM images (c, d) of the pristine $Ca_2B_2O_5{\cdot}H_2O$ nanowires ($a_1$, $b_1$), $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Eu^{3+}$ ($a_2$, $b_2$, c) and $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Tb^{3+}$ ($a_3$, $b_3$, d) nanophosphors. The insets ($c_1$) and ($d_1$) individually show the length distribution of the $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Eu^{3+}$ and $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Tb^{3+}$ nanophosphors. The blue vertical lines in (a) indicate the standard pattern of $Ca_2B_2O_5{\cdot}H_2O$ (JCPDS no. 22-0145).

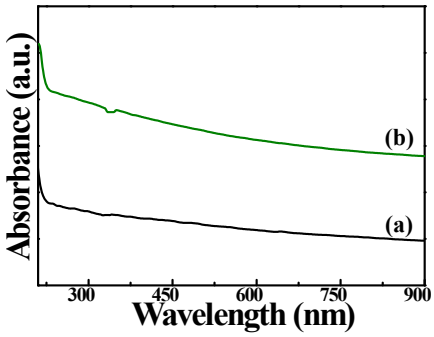


**Fig. S6**. UV-vis spectra of the $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Eu^{3+}$ (a) and $Ca_2B_2O_5{\cdot}H_2O$:5.0%$Tb^{3+}$ (b) nanophosphors.