PbCd$_2$B$_6$O$_{12}$ and EuZnB$_5$O$_{10}$: Syntheses, Crystal Structures and Characterizations of two New Mixed Metal Borates

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**Supporting Information**

Fig. S1. Simulated and experimental XRD powder patterns for the pure phases and calcinated samples of PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b); simulated and experimental XRD powder patterns for the pure phases of EuCdB$_3$O$_{10}$(c).

Fig. S2. The SEM images with EDX spectra of PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b).

Fig. S3. The asymmetric unit of the B$_6$O$_{16}$ group (a), the coordination environment the Pb atom (b) and view of the 2D [B$_6$O$_{16}$]$^{6-}$ anion along $b$ axis (c) in PbCd$_2$B$_6$O$_{12}$.

Fig. S4. TGA and DSC curves for PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b).

Fig. S5. Optical diffuse reflectance spectra for PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b).

Fig. S6. UV absorption spectra of PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b).

Fig. S7. IR spectra for PbCd$_2$B$_6$O$_{12}$ (a) and EuZnB$_5$O$_{10}$ (b).

Fig. S8. Solid state excitation spectrum under emission at 608 nm (a) and the emission spectrum under excitation at 395 nm (b) for EuCdB$_3$O$_{10}$.

Fig. S9. Photoluminescence decay curves of EuCdB$_3$O$_{10}$(a) and EuZnB$_5$O$_{10}$(b) at RT, with an exposure time of 1s. The red line represents the linear fit of data.
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