## LnBSb<sub>2</sub>O<sub>8</sub> (Ln = Sm, Eu, Gd, Tb): A Series of Lanthanide Boroantimonates with Unusual 3D Anionic Structures Dong Yan,<sup>*a,b*</sup> Fei-Fei Mao,<sup>*a,b*</sup> and Jiang-Gao Mao<sup>\*,*a*</sup>

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## **Supporting Information**

**Figure S1.** Experimental and simulated X-ray powder diffraction patterns for SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub> (b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).

Figure S2. UV-vis Optical diffuse spectra for SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub>

(b),  $GdSb_2BO_8(c)$ , and  $TbSb_2BO_8(d)$ .

Figure S3. UV-vis Optical absorption spectra for  $SmSb_2BO_8$  (a), EuSb<sub>2</sub>BO<sub>8</sub> (b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).

**Figure S4**. The IR spectra of SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub> (b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).

Figure S5. View of 3D anionic structure based on SbO<sub>6</sub> octahedra along a- (a) and b-axes (b).

**Figure S6.** Decay curves of the Sm ( ${}^{4}G_{5/2}$ ) state state for  $\lambda_{ex, em} = 397, 607$  nm (a) and the Eu ( ${}^{5}D_{0}$ ) state for  $\lambda_{ex, em} = 393, 621$  nm at room temperature (b) and 77 K (c).

**Figure S7.** Polyhedral diagram of the hexagonal tungsten oxide (HTO) topology for  $Rb_2(MoO_3)_3(SeO_3)$  in *ab*-plane.



Figure S1. Experimental and simulated X-ray powder diffraction patterns for SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub> (b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).



Figure S2. UV-vis Optical diffuse reflectance spectra for SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub>(b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).



**Figure S3.** UV-vis Optical absorption spectra for SmSb<sub>2</sub>BO<sub>8</sub> (a), EuSb<sub>2</sub>BO<sub>8</sub> (b), GdSb<sub>2</sub>BO<sub>8</sub> (c), and TbSb<sub>2</sub>BO<sub>8</sub> (d).



Figure S4. The IR spectra for  $SmSb_2BO_8$  (a),  $EuSb_2BO_8$  (b),  $GdSb_2BO_8$  (c), and  $TbSb_2BO_8$  (d).



**Figure S5.** View of 3D anionic structure composed of  $SbO_6$  octahedra along *a*-axis (a) and along *b*-axis (b).



**Figure S6.** Decay curves of the Sm ( ${}^{4}G_{5/2}$ ) state for  $\lambda_{ex, em} = 397$ , 607 nm (a) and the Eu ( ${}^{5}D_{0}$ ) state for  $\lambda_{ex, em} = 393$ , 621 nm at room temperature (b) and 77 K (c).



**Figure S7.** Polyhedral diagram of the hexagonal tungsten oxide (HTO) topology for  $Rb_2(MoO_3)_3(SeO_3)$  in *ab*-plane.