

## Supporting Information

### Temperature Controlled Tunable Emission of Bi<sup>3+</sup>-doped Rb<sub>2</sub>SnCl<sub>6</sub> All- inorganic Vacancy Ordered Lead-free Perovskite for Advanced Anticounterfeiting

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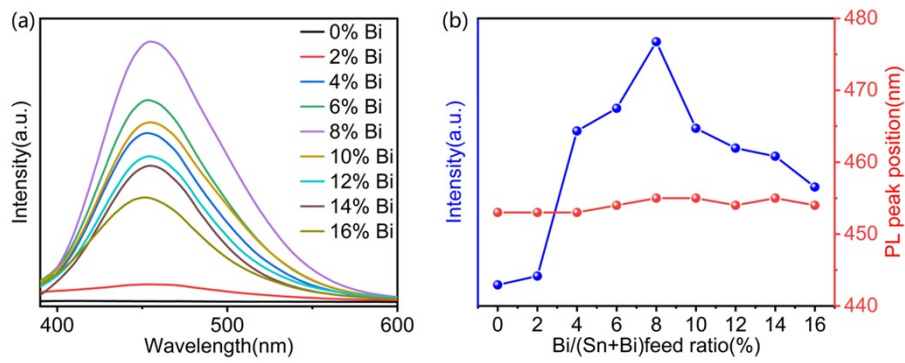
Tianjin, 300130, China.

<sup>1-4</sup> author order

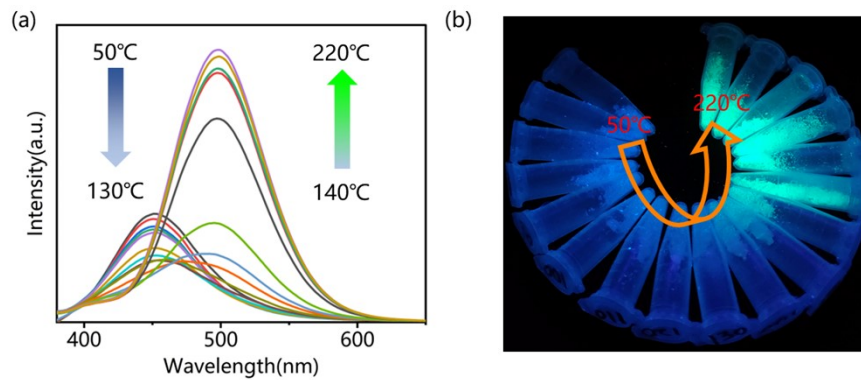
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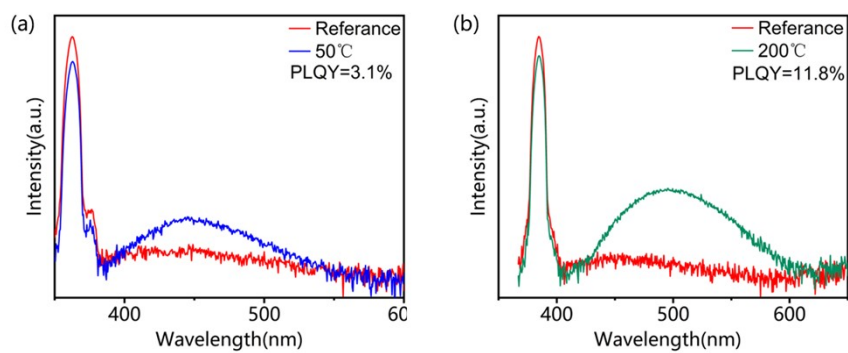
\* E-mail: [zyduan@hebut.edu.cn](mailto:zyduan@hebut.edu.cn)



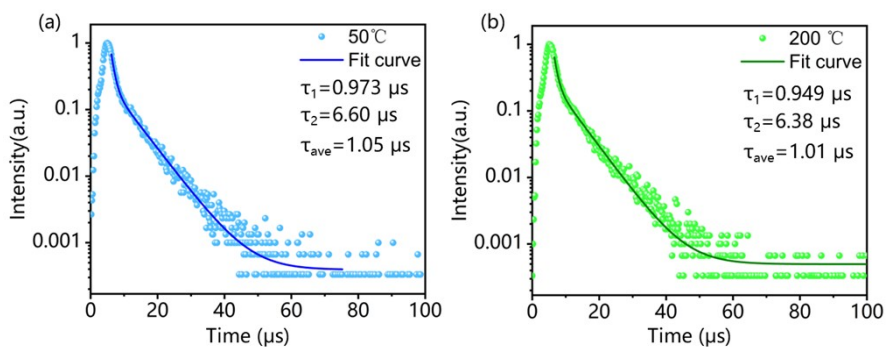
**Figure S1.** (a) PL spectra of  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$  with different  $\text{Bi}^{3+}$  feeding ratios, excitation by 365 nm. (b) Peak position and peak intensity for 450 nm with  $\text{Bi}^{3+}$  concentration.



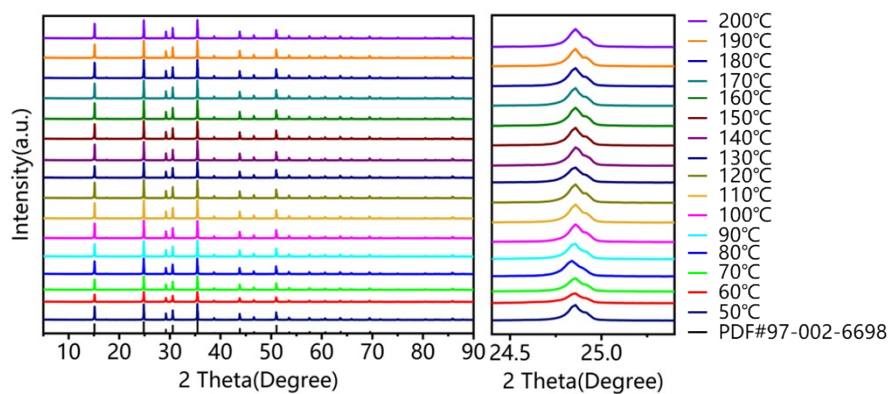
**Figure S2.** PL spectra image (a) and sample image under UV lamp (b) at various annealing temperatures from 50 to 220 °C, excitation by 365 nm.



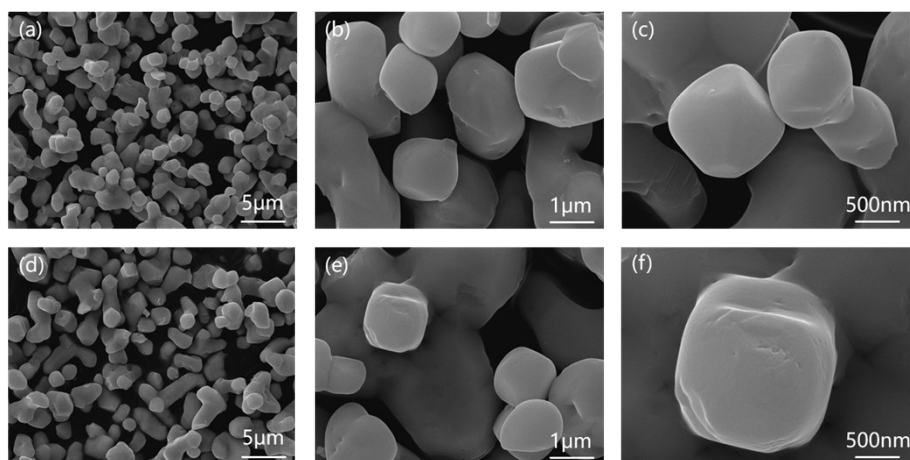
**Figure S3.** PL spectra for PLQY of 8%  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$ . (a) after 50 °C and (b) after 200 °C.



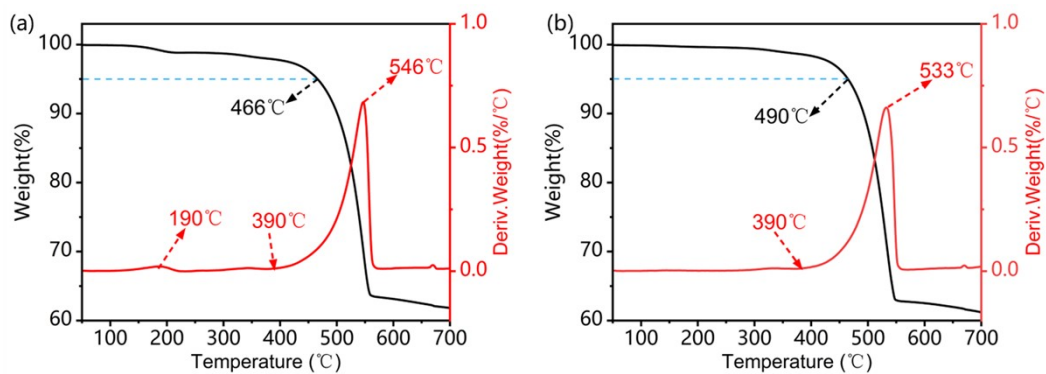
**Figure S4.** PL decay curves of  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$  at (a) after 50 °C,  $\lambda_{\text{ex}} = 365$  nm and  $\lambda_{\text{em}} = 453$  nm, and (b) after 200 °C,  $\lambda_{\text{ex}} = 387$  nm and  $\lambda_{\text{em}} = 500$  nm.



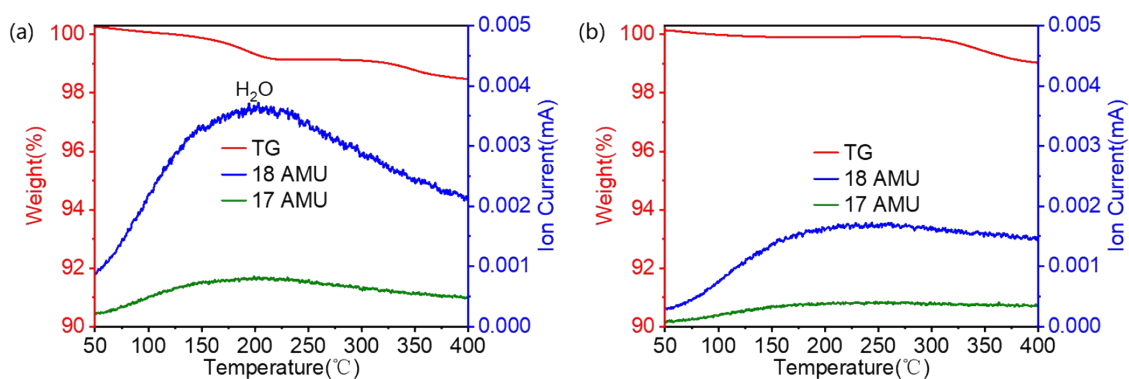
**Figure S5.** XRD patterns of 8%  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$  with different annealing temperatures.



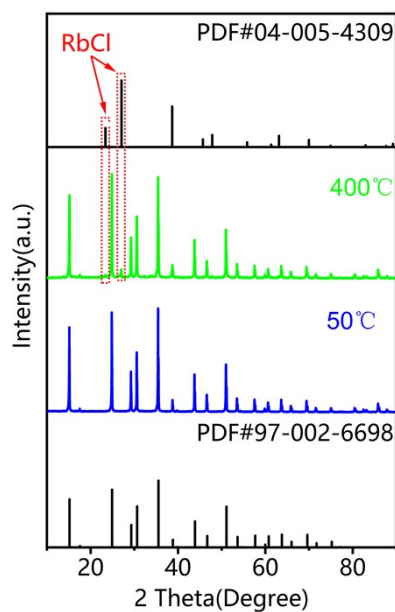
**Figure S6.** (a-c) SEM image of the sample before annealing. (d-f) SEM image of the sample after annealing at 200 °C.



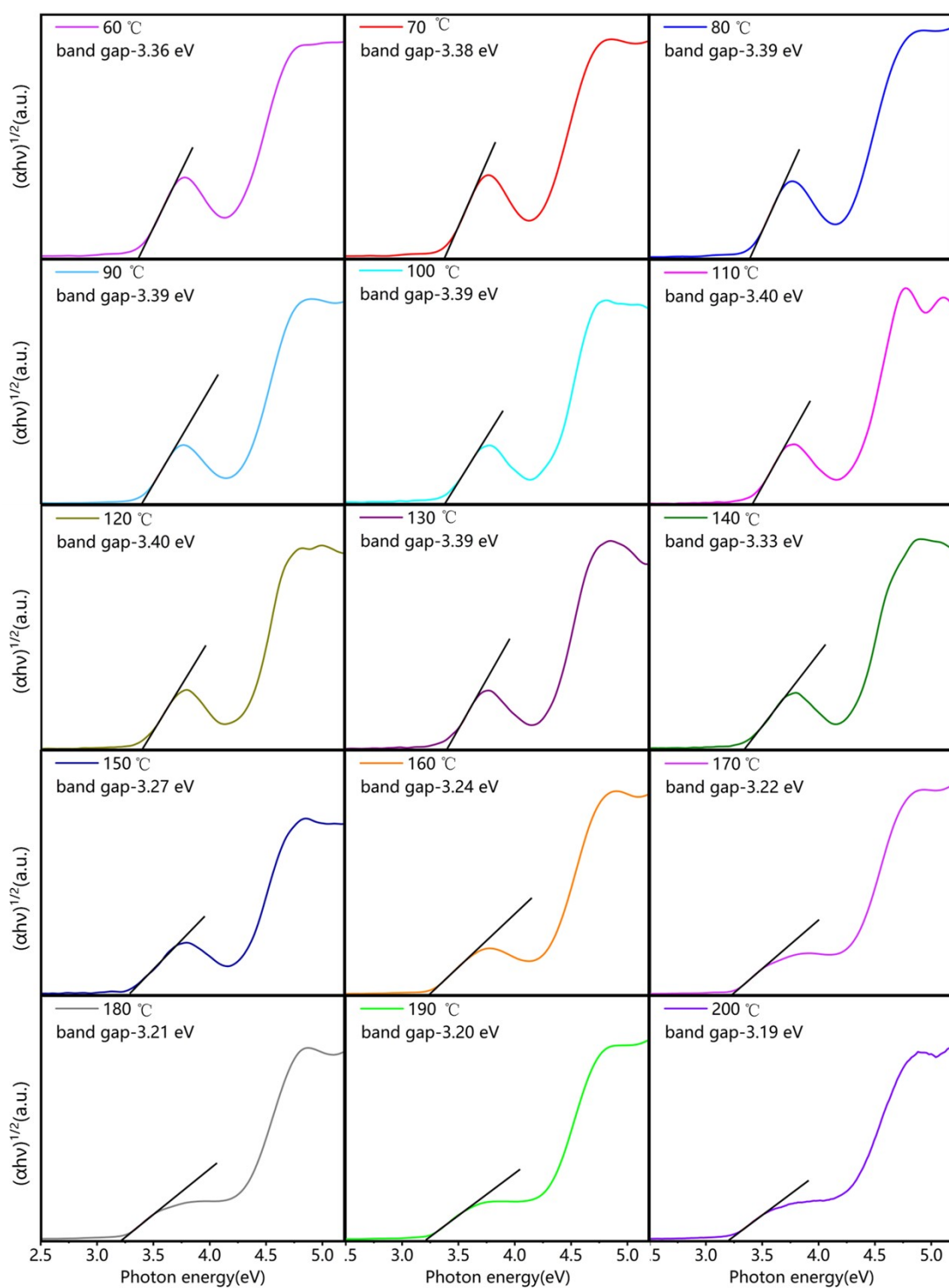
**Figure S7.** TGA and DSC spectra for  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$ . (a) after 50 °C and (b) after 200 °C.



**Figure S8.** TGA-MS spectra for  $\text{Bi}^{3+}$ -doped  $\text{Rb}_2\text{SnCl}_6$ . (a) after 50 °C and (b) after 200 °C.



**Figure S9.** XRD patterns after heat treatment at 400 °C.



**FigureS10.** Band gap patterns of 8% Bi<sup>3+</sup>-doped Rb<sub>2</sub>SnCl<sub>6</sub> with different annealing temperatures.