## Remarkable Thermoelectric Efficiency of Cubic Antiperovskites Rb<sub>3</sub>X(Se & Te)I with Strong Anharmonicity

Shuming  $\operatorname{Zeng}^{,1,*}$  Qian Shen,<br/>^1 Lina Guo,^1 Yinchang

Zhao,<br/>2,† Hao Huang,<br/>3 Geng Li,<br/>4,5, $\ddagger$  and Yusong  $\mathrm{Tu}^{1,\, \S}$ 

<sup>1</sup>College of Physics Science and Technology, Yangzhou University, Jiangsu 225009, China <sup>2</sup>Department of Physics, Yantai University, Yantai 264005, People's Republic of China <sup>3</sup>Advanced Copper Industry College, Jiangxi University of Science and Technology, Yingtan 335000, China

<sup>4</sup>School of Materials Science and Engineering, National Institute for Advanced Materials, Nankai University,

Tongyan Road 38, Tianjin 300350, China.

<sup>5</sup>National Supercomputer Center in Tianjin, Tianjin 300457, China. (Dated: October 10, 2023)

 $<sup>^{\</sup>ast}$ zengsm@yzu.edu.cn

 $<sup>^\</sup>dagger$ y.zhao@ytu.edu.cn

<sup>&</sup>lt;sup>‡</sup> ligeng@nscc-tj.cn

<sup>\$</sup>ystu@yzu.edu.cn



FIG. S1. The calculated electron conductivities  $\sigma$ , electronic thermal conductivity  $\kappa_e$ , Seebeck coefficient S, and power factor (PF), for n-type and p-type doping levels ranging from  $1.0 \times 10^{18}$  to  $1.0 \times 10^{21}$  cm<sup>-3</sup>, at 300 K, 500 K and 800 K for Rb<sub>3</sub>SeI.



FIG. S2. The calculated electron conductivities  $\sigma$ , electronic thermal conductivity  $\kappa_e$ , Seebeck coefficient S, and power factor (PF), for n-type and p-type doping levels ranging from  $1.0 \times 10^{18}$  to  $1.0 \times 10^{21}$  cm<sup>-3</sup>, at 300 K, 500 K and 800 K for Rb<sub>3</sub>TeI.



FIG. S3. The DOS values for various doping concentrations at 300 K.