Decoupling Electrical Conductivity and Seebeck Coefficient via Isoelectronic Alloying in 9-4-9-type $Ca_{9-y}Eu_yZn_{4.7}Sb_9$ ($0 \leq y \leq 5.0$) Zintl Phase

Wenhua Xue,[a,b] Chen Chen,[c] Pengfei Nan,[d] Youwen Long,[a] Binghui Ge,[*d] Qian Zhang[*b] and Yumei Wang[*ae]

[a] Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China

[b] School of Materials Science and Engineering, Harbin Institute of Technology, Shenzhen 518055, China

[c] School of Physical Sciences, Great Bay University, Dongguan, 523000, China

[d] Institutes of Physical Science and Information Technology, Anhui University, Hefei 230601, China

[e] Beijing Branch of Songshan Lake Materials Laboratory, Beijing 100190, China

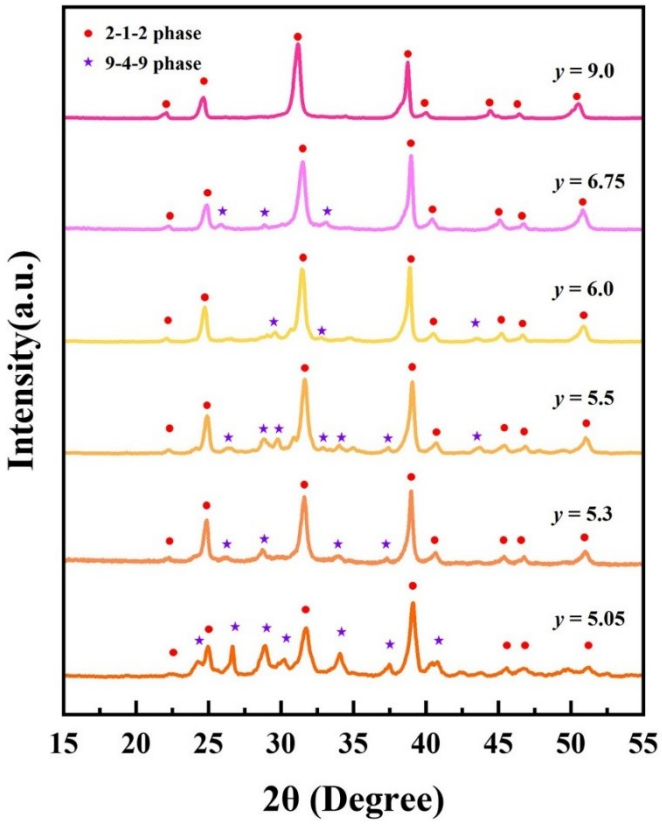

Fig. S1. The XRD patterns for the $Ca_{9-y}Eu_yZn_{4.7}Sb_9$ (y = 5.05, 5.3, 5.5, 6.0, 6.75) and $Ca_{9-y}Eu_yZn_{4.41}Sb_9$ (y = 9.0) samples.

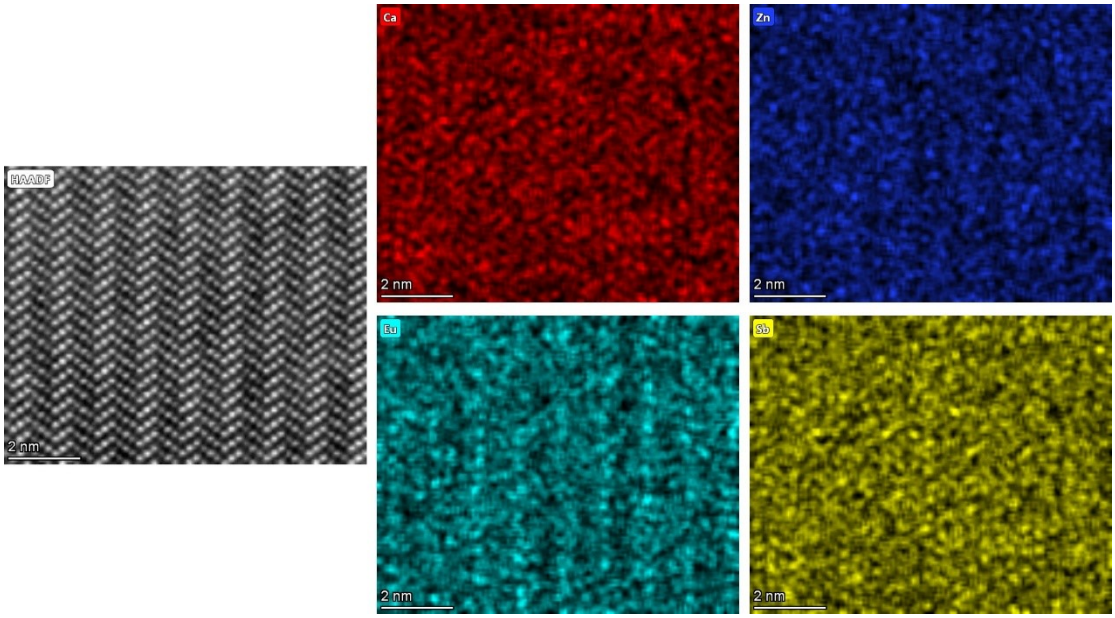

Fig. S2. The EDS mapping of the "intergrowth" structure in $Ca_{9-y}Eu_yZn_{4.7}Sb_9$ (y = 5.05).

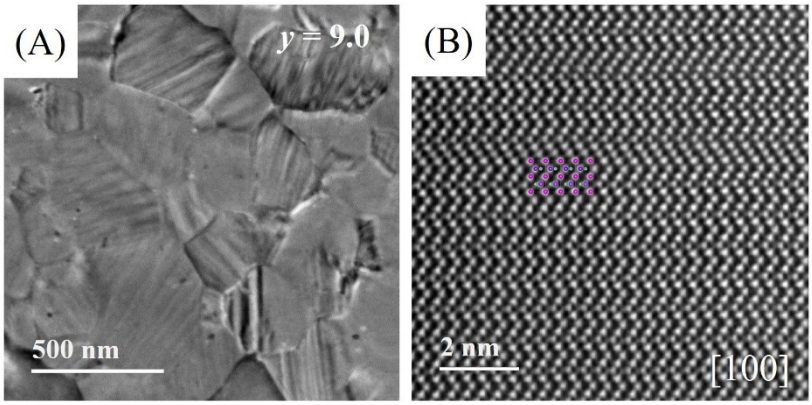

Fig. S3. (a) Low-magnification TEM image and (b) corresponding HAADF-STEM image for $Ca_{9-y}Eu_yZn_{4.41}Sb_9$ (y = 9.0).