Supporting Information

Thermal cycling behavior of zinc antimonide thin films for high temperature thermoelectric power generation applications

Hyung Cheoul Shim, Chang-Su Woo, Seungwoo Han**

Department of Nano-Mechanics, Korea Institute of Machinery & Materials (KIMM), 305-343, 156, Gajeongbuk-Ro, Yuseong-Gu, Daejeon, Republic of Korea

E-mail: scafos@kimm.re.kr, swhan@kimm.re.kr

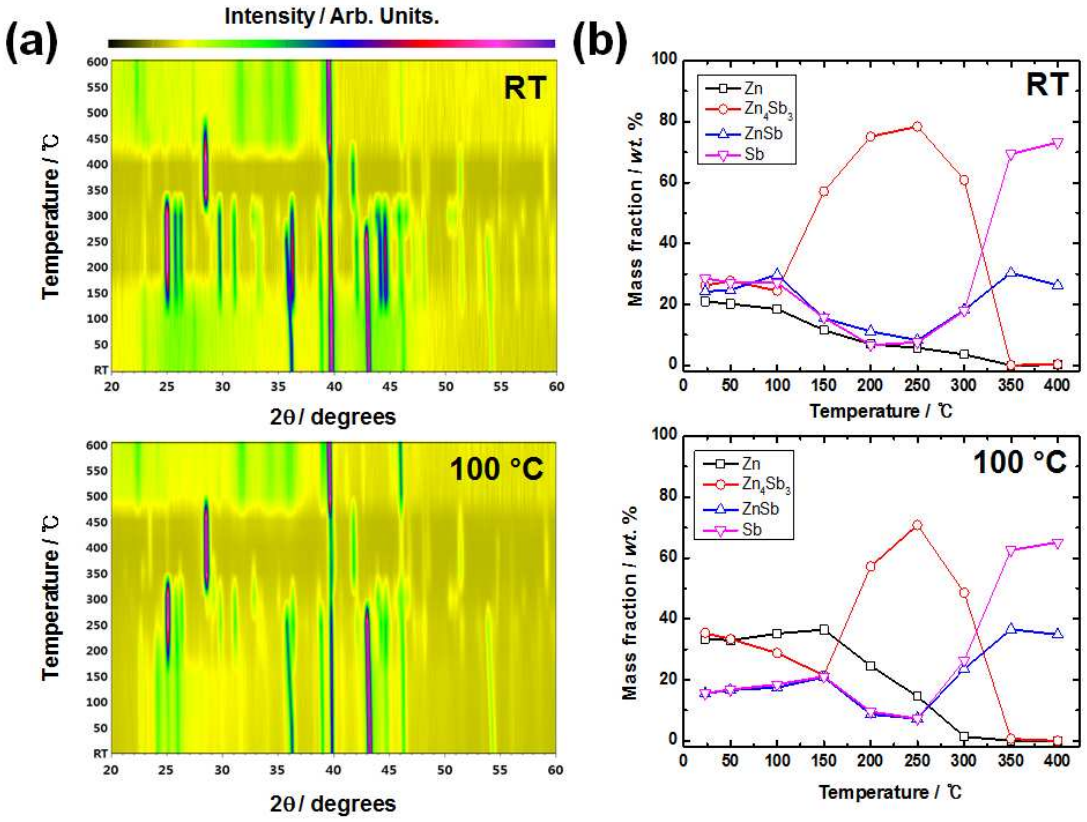

Figure S1. (a) *In-situ* high temperature XRD data after annealing of *type A* (RT) and *type B* (100 °C) samples. (b) Quantitative analysis from XRD data is shown in Figure S1a.

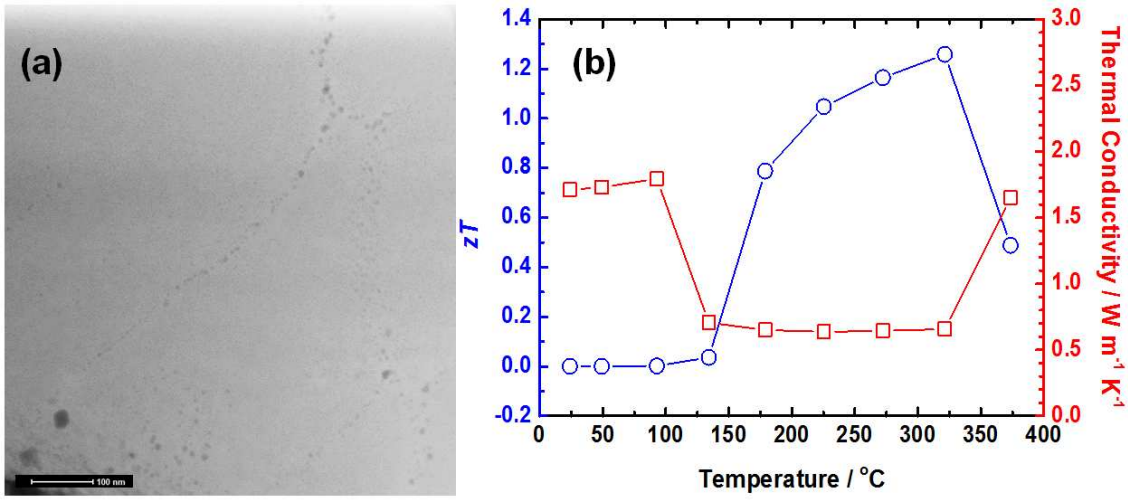

Figure S2. (a) STEM image of *type A* sample after 10 thermal cycles. The nano voids are generated along the grain boundaries. (b) Thermoelectric figure of merit, *zT* and thermal conductivity of *type A* sample as a function of temperature.

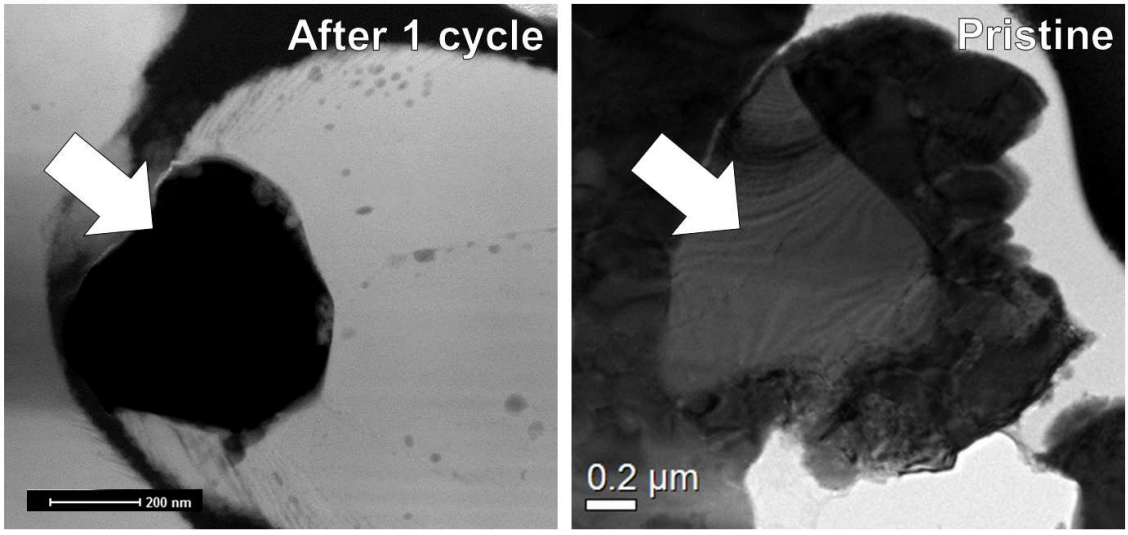

Figure S3. STEM and TEM images of a *type A* thin film after the first thermal cycle (left), and a pristine sample (right), respectively. The white arrow shows the position of Zn in a Zn-rich Zn_4Sb_3 particle.

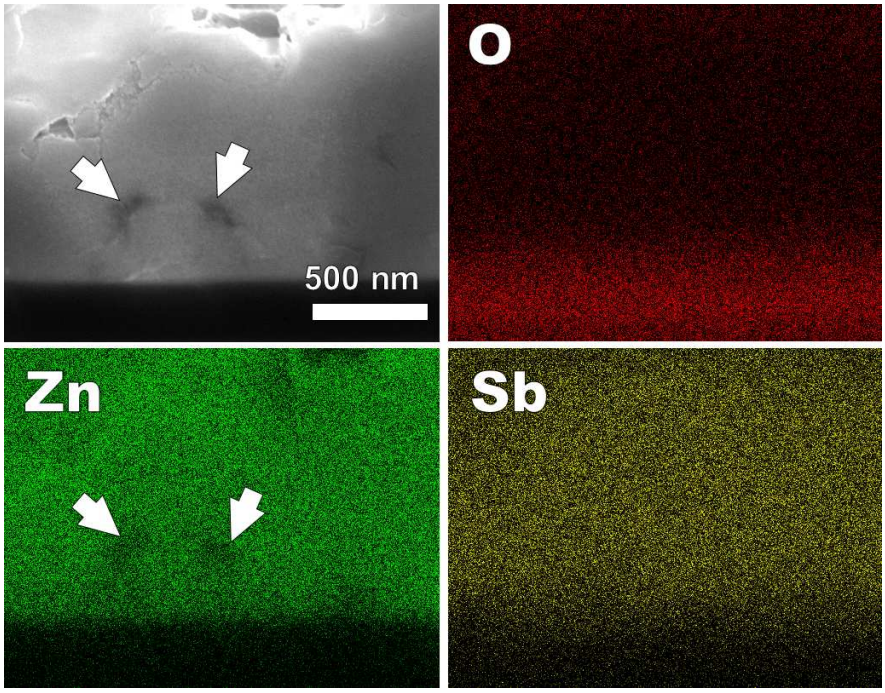

Figure S4. The SEM-EDS elemental mapping results of *type A* sample after 10 thermal cycles in N_2. The white arrow shows the identical position of dark marks between FESEM image and EDS mapping results of Zn.

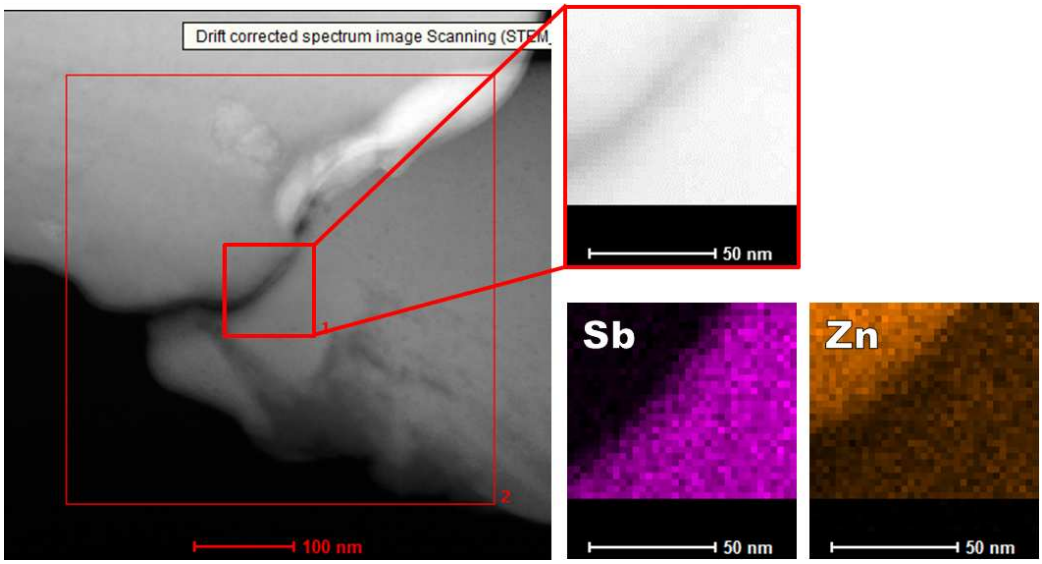

Figure S5. The STEM-EDS elemental mapping results of Zn_xSb_y thin film after 10 thermal cycles in air.

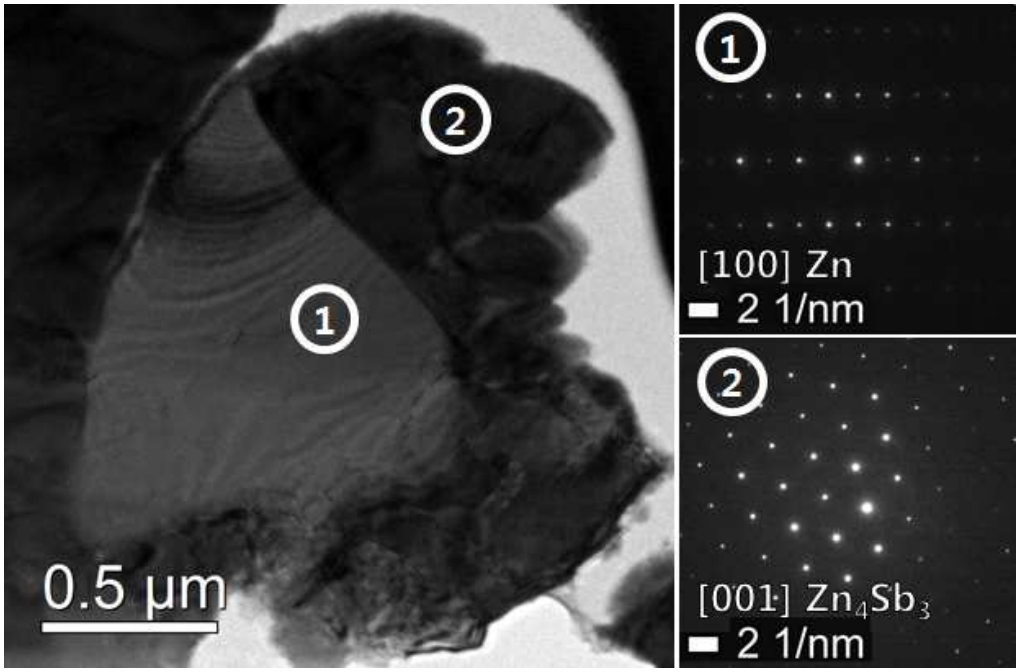

Figure S6. The SAD pattern results of Zn_xSb_y thin film after 10 thermal cycles in air.

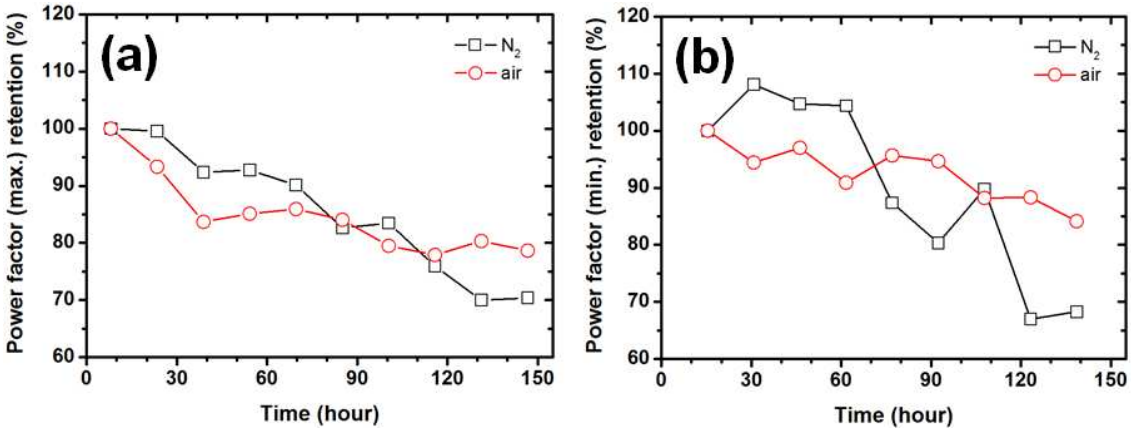

Figure S7. The maximum (a) and minimum (b) value of power factor retention during thermal cycling. The max. and min. value was extracted from the P.F. value as shown in Figure 3(c).