The thermoelectric effect can be applied to direct conversion from heat (temperature difference) to electricity (voltage) or vice-versa. A thermoelectric device creates a certain voltage when a different temperature exists in a thermoelectric material. Thermoelectric materials are used to power generation or precise control of temperature. Thermoelectric power generation is expected to be applied to automotive industry and factories so that a large amount of waste heat from cars, trucks, buses, industrial furnaces, incinerators et al. can be recovered to electricity, resulting in energy-saving. We have developed state of the art technology of thermoelectric materials and modules. Currently we are making a prototype of device and advancing research activities towards the practical application of thermoelectric device.

1. Thermoelectric materials

We developed the Fe-Sb and Co-Sb filled skutterudite thermoelectric materials which can be used for power generation up to 600ºC and their dimensionless figure of merit ZT reached p-ZT=0.7 and n-ZT=1.0 as shown in Fig.1.

2. Thermoelectric modules

We established a thermoelectric module technology suitable for above skutterudite materials. The module has a thermoelectric conversion efficiency of 7% under the condition that the module’s hot/cold side temperatures are 600ºC/50ºC. An example of module’s power generation result is shown as follows

Module size:  50×50×7.6mm
Hot/cold side temperatures:  600ºC/50ºC
Power output:  30W
Thermoelectric conversion efficiency:  7%

3. Thermoelectric samples

We can offer samples of skutterudite elements and modules as shown in Fig. 2. If you are interested in these samples, please contact us.