Abstract

Recent research into thermoelectric alloy has shown that the most efficient convert heat into electricity for the near room temperature are based on bismuth (Bi), tellurium (Te) and antimony (Sb). Their ratio can be varied to obtain N-type or P-type semiconductor thermoelectric materials and to control their efficiency. For this reason thermoelectric materials base on Bi- Sb - Te were investigated for applications where waste heat from a variety of sources could be converted to electricity

Emphasis was placed on using local tools and inexpensive equipment that could lead to a production on a commercial scale. Preliminary studies found that the waste heat from many kinds of household electric appliances generate heat in the temperature ranges from 60-120 degrees Celsius. A simple low cost process for the synthesis of thermoelectric materials from Bi- Sb- Te was used involving of melting and cold pressing. It can be model in the production of thermoelectric modules in Thailand for applications near room temperature. The thermoelectric has a cylindrical shape with the length of 2 cm and diameter of 1.5 cm. Electrical resistivity and thermal conductivity are measured and used to evaluate their Figure of Merit.

A vacuum system for the evaporation and coating of substrates on support to applications in the form of synthesis thin film was designed and built. It consists of a vacuum chamber 70 cm high and with a diameter of 70 cm. In order to fully instrument the operating conditions and provide useful access doing the experiment there are 17 ports around vacuum chamber. The vacuum system has been tested by using diffusion pump and rotary pump to evaluate the air inside the chamber. A working pressure of 10-6 torr can be obtained with this set up.

The materials obtained by melting and cold processing were also used as targets for the production of thermoelectric thin films by laser ablation. A special technique was developed in order to achieve this.