

# Thermoelectric effect power generation system

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## ABSTRACT

The purpose of this research is to establish the experimental set up to study the effect of the temperature difference across the Thermoelectric(TE) chip to the electric power output. The efficiency of power to input heat flux can then be obtained. The heat flux is created by electromagnetic wave and goes through water, can cover and TE chip. The electric power is then created through chip, the rest heat flux goes through copper block and eventually removed by water cooling system. The power generated efficiency is then the ratio of output electric power to corresponding heat flux. LED is used as the electric load to this system. When the temperature difference difference is 68 °C the measured current is 0.2 Amp, while the average efficiency is 7.9%. The maximal temperature difference across the Bi<sub>2</sub>Te<sub>3</sub> chip is 29 °C in ANSYS simulation. The instant efficiency is therefore 6.1% and the average one is 6.0%. The model of electrical loading, heat dissipation and lighting of LED can be developed to predict the surface temperature, inner electrical resistance of LED. The comparison of theoretical and experimental resistances is well, and the error fall in 5%; The Seebeck coefficient of this tested thermoelectric chip is about 0.034V/°C, the Seebeck coefficient and inner resistance can successfully predict the output power. The efficiency is about 4%.

Keywords : thermoelectric chip (TE chip)、LED resistance、ANSYS thermal analysis、TE electric power generation.

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