Kaji eksperimental karakteristik sistem pembangkit termoelektrik pada panas buang dengan beda temperatur rendah = Experimental study of characteristics of generating system of thermoelectric on the waste heat with low temperature difference

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Abstrak

[ABSTRAK
Modul termoelektrik sebagai sebuah peralatan yang dapat mengubah energi listrik menjadi sebuah gradien temperatur atau sebaliknya dengan adanya gradien (perbedaan) temperatur, dapat mengubah energi panas (kalor) menjadi energi listrik. Sebagai sistem temoelektrik generator, elemen ini tidak berisik, perawatannya mudah, dimensi relatif kecil, ringan dan ramah terhadap lingkungan karena tidak menghasilkan polusi. Karena melimpahnya panas buangan dari pabrik, rumah tangga, perangkat elektronik dan iradiasi matahari yang ada, modul termoelektrik akan menjadi solusi teknologi alternatif yang murah dan ramah lingkungan bila digunakan sebagai sebuah generator (pembangkit daya) penghasil listrik dengan memanfaatkan panas buangan tersebut.
Penelitian ini dilakukan dengan metode eksperimen. Eksperimen yang telah dilakukan dengan menguji karakteristik modul termoelektrik pada 3 sumber kalor yang berbeda, yaitu: dengan menggunakan sumber kalor fluida (air) panas, sumber panas radiasi matahari dan sumber panas bohlam halogen.
Dari penelitian yang telah dilakukan diperoleh beberapa hasil antara lain; Karakterisasi modul TE pada sumber fluida panas menunjukkan bahwa dengan kenaikan temperatur fluida panas 5°C terjadi peningkatan beda tegangan berkisar sebesar 100 mV dan daya maksimum rata-rata dicapai sekitar 15 mW; dengan penggunaan heat pipe membangkitkan daya yang jauh lebih besar 4-5 kali pada modul TE tunggal (1.04 mW) dari modul TE tunggal tanpa heat pipe (0.15 mW), dan pada modul TE ganda yang menggunakan heat pipe menjadi 4 kali lebih besar (1.48mW) dari modul TE ganda yang tanpa heat pipe (0.37mW); diperoleh sebuah persamaan penentuan koefisien Seebeck untuk modul terkoneksi 􀗟􀯞= 􀮼􀰭 􀮼􀰮 􀀃 􀗟􀯧 dimana 􀗟􀯞 adalah koefisien Seebeck hasil koneksi, 􀗟􀯧 adalah koefisien Seebeck tunggal.
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ABSTRAK
Thermoelectric module as a device that can convert electrical energy into a

temperature gradient or vice versa with the gradient temperature, can change the heat energy into electricity. As a thermoelectric generator system, this element is not noisy, easy maintenance, relatively small dimensions, light weight and environmentally friendly because it does not produce pollution. Because of the abundance of waste heat from factories, household, electronic devices and existing solar irradiation, thermoelectric modules would be a cheap alternative technology solutions and environmentally friendly when used as a generator producing electricity by utilizing the waste heat .
This research was conducted with the experimental method. Experiments have been done by testing the characteristics of thermoelectric modules in 3 different heat sources, namely: using heat of hot water, heat of the solar radiation and heat of halogen bulb .
From the research that has been done shows some results, among others; Characterization of the TE module to the heat source fluid showed that different temperature of the hot fluid about 5°C will increase voltage range of 100 mV and a maximum average power is achieved of about 15 mW; by the use of heat pipe evokes a far greater power 4-5 times in a single TE module on (1.04 mW) than that a single TE module without heat pipes on (0.15 mW), and the double TE modules using heat pipes 4 times greater (1.48mW) of double TE modules without heat pipes (0.37mW); was obtained an equation for the Seebeck coefficient determination module connected 􀄮k = C1/C2 􀄮t where 􀄮k is the
Seebeck coefficient results of the connection, the Seebeck coefficient 􀄮t of single TE modules., Thermoelectric module as a device that can convert electrical energy into a temperature gradient or vice versa with the gradient temperature, can change the heat energy into electricity. As a thermoelectric generator system, this element is not noisy, easy maintenance, relatively small dimensions, light weight and environmentally friendly because it does not produce pollution. Because of the abundance of waste heat from factories, household, electronic devices and existing solar irradiation, thermoelectric modules would be a cheap alternative technology solutions and environmentally friendly when used as a generator producing electricity by utilizing the waste heat .
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