Bioenergy Recovery for TEP Device of Various Nanofluids

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Abstract (300 word limit)

A TEP (thermoelectric pipe) device was constructed graphite electrodes, Teflon material, and stainless steel tube involving nanofluids as electrolyte. Both of heat dissipation and power generation were carried out through the thermal-electrochemistry effect of nanofluids. Water based nanofluids inside the TEP device were employed for the intentions of cooling function and bioenergy recovery simultaneously. The results revealed that the titanium dioxide (TiO_2) water based nanofluid had the best thermoelectric performance and suspension stability properties among these water based nanofluids of TiO_2, aluminum oxide (Al_2O_3), and zinc oxide (ZnO). And the thermal conductivity and power density empirical formulas of the TEP device were derived through the intelligent dimensional analysis and evaluated at a temperature between 20 and 40 °C and 0.5 to 5 wt.%.

Image

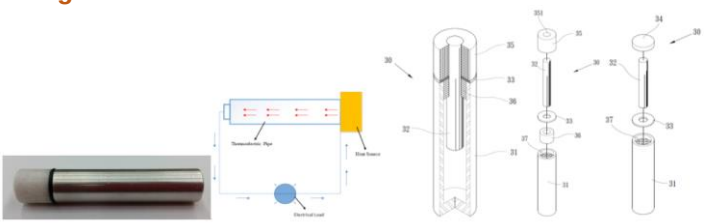


Fig.1 TEP device

Recent Publications (minimum 5)

1. P.-H. Yen and J.-C. Wang*, 2019, Power Generation and Electric Charge Density with Temperature Effect of Alumina Nanofluids using Dimensional Analysis, *Energy Conversion and Management,* Vol.186, April, pp.546-555. (SCI) (IF=6.377)
2. R.-T. Wang and J.-C. Wang*, 2017, Analysis of Thermal Conductivity in HI-LEDs Lighting Materials, Journal of Mechanical Science and Technology, 31(6), June pp.2911-2921. (SCI) (IF=1.128)
3. R.-T. Wang and J.-C. Wang*, 2017, Intelligent Dimensional and Thermal Performance Analysis of Al2O3 Nanofluid, Energy Conversion and Management, Vol.138, April, pp.686-697. (SCI) (IF=5.589)
4. R.-T. Wang and J.-C. Wang*, 2016, Analyzing the Structural Designs and Thermal Performance of Nonmetal LED Lighting Devices of LED bulbs, International Journal of Heat and Mass Transfer, Vol. 99, August, pp.750-761. (SCI) (IF=3.458)
5. R.-T. Wang and J.-C. Wang*, 2016, Alumina Nanofluids as Electrolytes Comparisons to Various Neutral Aqueous Solutions inside Battery, Journal of Mechanics, Vol. 32, No. 3, June, pp.369-379. (SCI) (IF=0.819)
6. R.-T. Wang and J.-C. Wang*, 2015, Optimization of Heat Flow Analysis for Exceeding Hundred Watts in HI-LEDs Projectors, International Communications in Heat and Mass Transfer, Vol. 67, October, pp.153-162. (SCI) (IF=3.718)
7. J.-C. Wang*, 2014, L- and U-shaped Heat Pipes Thermal Modules with Twin Fans for Cooling of Electronic System under Variable Heat Source Areas, Heat and Mass Transfer, Vol. 50, issue 11, pp.1487-1498. (SCI) (IF=1.233)
8. J.-C. Wang*, 2014, U- and L-shaped Heat Pipes Heat Sinks for Cooling Electronic Components Employed a Least Square Smoothing Method, Microelectronics Reliability, Vol. 54, Issues 6/7, June, pp.1344-1354. (SCI) (IF=1.371)
9. J.-C. Wang*, 2014, Thermal Module Design and Analysis of a 230 Watt LED Illumination Lamp under Three Incline Angles, Microelectronics Journal, Vol. 45, Issue 4, April, pp.416-423. (SCI) (IF=1.163)
10. J.-C. Wang*, 2013, Thermoelectric Transformation and Illuminative Performance Analysis of a Novel LED-MGVC Device, International Communications in Heat and Mass Transfer, Vol. 48, November, pp.80-85. (SCI) (IF=3.718)



Biography (150 word limit)

Jung-Chang Wang (J.-C. Wang) is a full Professor in the School of Marine Engineering (D.M.E.), National Taiwan Ocean University (NTOU), Keelung, Taiwan, and is also the Director of the Thermal-Fluid Illumination Laboratory. He received his Bachelor and Master degrees from National Cheng Kung University (NCKU) and Mechanical PhD from National Taiwan University (NTU) in Taiwan in 2007. He has been teaching and researching on electronic heat transfer and renewable energy for more than ten years. He has published more than 100 research papers in international journals, conferences and patents, and edited five book chapters. His main research interest includes applied and software engineering in thermal-fluid science.

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Notes/Comments: