



## Bioenergy Recovery for TEP Device of Various Nanofluids

**Jung-Chang Wang**

*Professor, Marine Engineering (DME), National Taiwan Ocean University (NTOU), Taiwan, ROC*

### Abstract:

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<sub>2</sub>) water based nanofluid had the best thermoelectric performance and suspension stability properties among these water based nanofluids of TiO<sub>2</sub>, aluminum oxide (Al<sub>2</sub>O<sub>3</sub>), 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. %

### Biography:

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 research interest includes applied and software engineering in thermal-fluid science. Email: jcwang@ntou.edu.tw



### Recent Publications:

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,
2. R.-T. Wang and J.-C. Wang\*, 2017, Analysis of Thermal Conductivity in HI-LEDs Lighting Materials, Journal of Mechanical
3. R.-T. Wang and J.-C. Wang\*, 2017, Intelligent Dimensional and Thermal Performance Analysis of Al<sub>2</sub>O<sub>3</sub> Nanofluid, Energy
4. R.-T. Wang and J.-C. Wang\*, 2016, Analyzing the Structural Designs and Thermal Performance of Non-metal LED Lighting
5. R.-T. Wang and J.-C. Wang\*, 2016, Alumina Nanofluids as Electrolytes Comparisons to Various Neutral Aqueous Solutions

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